Deciding how to decide:

*The added value of using rational decision making methods within TomTom Mobility Solutions*
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1. Introduction to the research

1.1 TomTom

TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation

One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives

TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS' goals.

1.2.1 Rational decision making
Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective
The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions
The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?
2. What does the current decision making process and company culture of TomTom (MS) look like?
3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?
5. How did TomTom and its context change?
6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model

Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?
2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline

This paper exists of four parts. The interrelation between them is depicted in Figure 1.

- Research design and justification

This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.

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Figure 1 - report outline
2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

**Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?**

### 2.2.1 Demarcations

Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

### 2.2.2 Sub research questions

The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

**Opportunity identification**

1. **What are the products TomTom MS has to offer?**
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

Opportunity assessment (strategy)

3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of 'viable'. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

Recommendations on how to implement the selected opportunity (implementation measures)

6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

2.3 Characterization of issues within TomTom Mobility Solutions
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

### 2.3.1 Types of uncertainty and problems

According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems. Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
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<tr>
<td>Large</td>
<td>Technical problems</td>
</tr>
<tr>
<td>Large</td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td>Little</td>
<td>Political problems</td>
</tr>
<tr>
<td>Little</td>
<td>Wicked problems</td>
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</tbody>
</table>

### 2.3.2 Three categories of decisions

Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

### Table 2 - types of decisions

<table>
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<th></th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
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<tbody>
<tr>
<td><strong>Time range</strong></td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td><strong>Range of individuals or units</strong></td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td><strong>Means-end relationships</strong></td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td><strong>Type of uncertainty / how to solve</strong></td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
<tr>
<td><strong>Type of problems</strong></td>
<td>• Political problems • Wicked problems</td>
<td>• (Untamed) technical problems</td>
<td>• Technical problems</td>
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Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

### 2.3.3 Problem characterization

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to \textit{strategic} decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

\textbf{Policy decisions}

For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connekt (the Dutch ITS organization, where Lucien Groenhuizen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear \textit{what} should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more time is needed to provide some clarity on the issues. But it is also possible that the subject of research is very complex, which increases uncertainty. Last, but not least, it remains difficult to predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A great part of the policy decisions TomTom encounters are untamed technical problems.

Managerial decisions
Managerial decisions come down to one basic question: how should TomTom implement a certain strategy? This question is closely related to the company’s core business. For the majority of products, TomTom has to use sophisticated and innovative technology, which does not yet exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic. The idea of becoming a big player in the field of traffic information was no subject for discussion and existed for a long time. The complexity was in the technology to collect this traffic information. It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification already provided; most of its problems are untamed technical problems (highlighted in Table 1).

2.3.4 Characterization of the case
The case study as described in this chapter contains several elements, also present in the problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting to enter the business- and government market, but wanted more (factual) information on the subject to gain more certainty and to know how to enter the new field. This included creating a better picture of the type of services TomTom could develop and which business and government parties may be interesting. Second, it was also unclear whether these parties were interested in the information of TomTom. This (external) multi-actor aspect is interesting, since this will be even more important in the future. For this reason, TomTom considers the case study representative for the problems they are dealing with, now and in the future (Personal Communication, 2008f). However, an important difference must also be noted. Most problems TomTom deals with affect multiple departments and business units (the internal multi-actor context). The case study is demarcated in such a way that this problem only concerns TomTom Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attentions to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Figure 2 - research methods

Qualitative research

The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

3.1.1 Case study

This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

Reasons for choosing a case study

There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an instrument. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case” (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.
- There may also be an intrinsic interest in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom's business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

Data collection methods

Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant's perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS' decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

3.1.2 Desk research

In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. […] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as ‘rational decision making methods’.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process.
(see 4.3). Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)
This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty
Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty
In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

• Uncertainty as feelings
Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**
  Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**
  One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.
  
  These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “… risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts.” Risk and uncertainty add to the complexity of decision making.

Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or *decision support*, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term *decision making* covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

**Types of models**

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. *Descriptive* models can be used to assist description, explanation or help its users to understand complex issues. The *prescriptive*, or normative, type of models does not describe what is, but what ought to be. The last type of models, the *ideal type*, deal “*with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired*” (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“… most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

Pre-conditions

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.
- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

Criticism

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a *heuristic bias* (Bryant, 2007) or a *tunnelling of attention* (Pech and Cameron, 2006, p. 73).
- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called *bounded rationality* (Bryant, 2007, p. 735).
- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker’s behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

4.2.2 Political decision models

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; *organizational behaviour* and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The bureaucratic politics model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the garbage can model. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**

There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**

The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

**4.2.3 Routine**

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• **Equality of problems** – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

**Criticism**

• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.

• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: “When you have a hammer, everything looks like a nail” (Personal Communication, 2007a).

4.2.4 **Rational decision making – incrementalism**

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Golland Rasheed try to be more precise by defining rational decision making as *“a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making”* (Golland Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

Due to the number of actors involved and the complex nature of problems, Lindblom argues that decision makers stay close to alternatives they are familiar with. This means that decision making at best will result in a small improvement compared to the status quo.

**Pre-conditions**

• **Acceptable status quo** – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

**Criticism**

Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:

• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.

• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, ’t Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing

The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

**Pre-conditions**
- *Clear standards* - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- *Information available* - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

**Criticism**
- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning

The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

**Pre-conditions**
- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
Criticism

- The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

4.2.7 Rational decision making – synoptic model

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions

Simon’s model is based on two assumptions:

- Full information - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).
- Resources available - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).
- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.
- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable”. This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.
- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.
- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application
Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps
This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions
There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• *Synoptic model* – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria. By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:

- Adoption of the decision making results
- Value of the decision making results
- Duration of the decision making process (time)
- Costs of the decision making process
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process

Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex

Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”; after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: "Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work" (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: “The last issue I can recall was decided upon in three minutes.”
When asked who was involved in the decision making, the answer was simple: "The persons who were present at the office at that moment" (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team mangers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

**Whole company**
The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

To summarize, TomTom's decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

Results: TomTom’s experiences

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- Adoption / use – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- Value – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

Costs: TomTom’s experiences

- Duration of the process – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- Costs – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- **Satisfaction with involvement** – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- **Satisfaction with comprehensiveness** - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

### 5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

#### 5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom’s experiences

- **Adoption / use** – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- **Value** – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
Costs: TomTom’s experiences

- **Duration of the process** – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- **Costs** – Costs made included the salary of the author and the time and resources spent on supervision. The investment of €10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

Process: TomTom’s experiences

- **Satisfaction with involvement** – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- **Satisfaction with comprehensiveness** – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of “gut feeling” decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

Table 3 - decision making approaches compared

<table>
<thead>
<tr>
<th>Results: TomTom's experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>✓ Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs: TomTom's experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>✓ Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>✓ Higher than current</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process: TomTom's experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with involvement</td>
<td>✓ Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>
6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

• **Success and growth**

Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

• **Increasing external control**

Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

• **Complexity and growth of competition**

TomTom describes the market in which it operates as follows: *The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products* (TomTom, 2008c, p. 31).

Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

![Diagram of company configurations and transitions]

Figure 7 - influences on TomTom's company configuration

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

![Figure 8 - decision making requirements](image)

### 6.2.1 Involvement

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

6.2.2 Documentation
The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

6.2.3 Flexibility
The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

6.3 How to achieve them
The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.
- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.
- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions; results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or ‘deciding how to decide’. “Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)” (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner’s attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
7.2 The meta-decision making model

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

External factors

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

![Diagram](image)

**Figure 10 - meta-decision making model**

**Instruments**

The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

### 7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

![Flowchart Legend](image)

**Figure 11 - flowchart legend**

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

7.3.1 Entrepreneurial approach (1)

Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

![Figure 12 - flowchart entrepreneurial decision making](image)

7.3.2 Mixed scanning (2)

The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company’s objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

Figure 15 - flowchart rational decision making

7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes them selves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘-’ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

Figure 16 - causal analysis

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not have the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model

The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

![Figure 17 - meta-decision making model improved](image)

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

7.5 Practical use of the meta-decision making model

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

7.5.1 How to use the model?

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the "costs / comprehensiveness" curve together (Personal Communication, 2008g).

That's the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker's own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. Which theories on (rational) decision making are available within the scientific literature?

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

Eight decision making models

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making" (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• Synoptic model – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

Good decision making

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

**Results of decision making**
- Adoption of the decision making results
- Value of the decision making results

**Costs of decision making**
- Duration of the decision making process (time)
- Costs of the decision making process

**(Satisfaction with the) decision making process**
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. What does the current decision making process and company culture of TomTom (MS) look like?

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

- Success and growth – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- Increasing external control – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

### 6. What would good decision making look like for TomTom (MS)?

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

### 8.1.2 Main research question answer

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

| Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come? |

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

**Table 4 - decision making methods compared**

<table>
<thead>
<tr>
<th>Results: TomTom's experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>× Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
<tr>
<td>Costs: TomTom's experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>× Higher than current</td>
</tr>
<tr>
<td>Process: TomTom's experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td>× Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

**8.2 Conclusions meta-decision making model**

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model
For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model
In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making
When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections
Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods
The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer/researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation/interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

8.4.2 Case characteristics

It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
References


PERSONAL COMMUNICATION (2007b) Verbal conversation between George de Boer and author, December 5. Delft.

PERSONAL COMMUNICATION (2008a) Verbal conversation between Ben Rutten and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008d) Verbal conversation between George de Boer and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008g) Verbal conversation between George de Boer and author, May 19. Delft.

PERSONAL COMMUNICATION (2008h) Verbal conversation between George de Boer and author, May 27. Amsterdam.

PERSONAL COMMUNICATION (2008i) Verbal conversation between Ivar Zantinge and author, April 10. Amsterdam.


TOMTOM (2007b) TomTom Mobility Solutions Website.

TOMTOM (2008a) Investor Relations - Historic data.


Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

• George de Boer – manager Sales and Alliances
The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
3. Within TomTom, George is the single point of contact for the automotive business unit.
4. George is also responsible for the marketing and events within TomTom MS.
To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

• Lucien Groenhuijzen – Managing Director Mobility Solutions
Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

• Ben Rutten – Solution Manager
Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

• Bob Soeters – Software Developer
Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

• Jasper Verdooren – Solution Manager
Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

• Ivar Zantinge – Manager Sales
Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>200</td>
</tr>
<tr>
<td>2003</td>
<td>400</td>
</tr>
<tr>
<td>2004</td>
<td>600</td>
</tr>
<tr>
<td>2005</td>
<td>800</td>
</tr>
<tr>
<td>2006</td>
<td>1000</td>
</tr>
<tr>
<td>2007</td>
<td>1200</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
</tbody>
</table>
B.2 Competition

The PND-market is a very young market. TomTom’s most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

Table 7 - TomTom's share price

<table>
<thead>
<tr>
<th>Percentage Change</th>
<th>Absolute Share Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>2006</td>
</tr>
<tr>
<td>TomTom</td>
<td></td>
</tr>
<tr>
<td>Amsterdam</td>
<td></td>
</tr>
<tr>
<td>AEX</td>
<td></td>
</tr>
<tr>
<td>NavTeq</td>
<td></td>
</tr>
<tr>
<td>Tele Atlas</td>
<td></td>
</tr>
<tr>
<td>Trimble</td>
<td></td>
</tr>
<tr>
<td>SirF</td>
<td></td>
</tr>
<tr>
<td>Garmin</td>
<td></td>
</tr>
</tbody>
</table>

Volume (in 1000s)
Deciding how to decide:

The added value of using rational decision making methods

within TomTom Mobility Solutions

Master Thesis report
June 10, 2008

Name           Susan Lagerweij
E-mail         S.M.Lagerweij@student.tudelft.nl
Student number 1150243

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Graduation committee

Professor       Prof. Dr. Ir. W. Thissen
First supervisor Dr. Ir. A.R.C. de Haan
Second supervisor Dr. M.L.C. de Bruijne
External supervisor G. de Boer (TomTom)
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1. Introduction to the research

1.1 TomTom

TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation

One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives

TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS' goals.

1.2.1 Rational decision making
Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective
The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions
The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?

2. What does the current decision making process and company culture of TomTom (MS) look like?

3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

5. How did TomTom and its context change?

6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model

Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?

2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline

This paper exists of four parts. The interrelation between them is depicted in Figure 1.

- Research design and justification

This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.

**Figure 1 - report outline**
2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

**Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?**

### 2.2.1 Demarcations

Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

### 2.2.2 Sub research questions

The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

**Opportunity identification**

1. What are the products TomTom MS has to offer?
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

Opportunity assessment (strategy)
3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

Recommendations on how to implement the selected opportunity (implementation measures)
6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

2.3 Characterization of issues within TomTom Mobility Solutions
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

2.3.1 Types of uncertainty and problems

According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems. Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Technical problems</td>
</tr>
<tr>
<td>Little</td>
<td>Political problems</td>
</tr>
</tbody>
</table>

2.3.2 Three categories of decisions

Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

### Table 2 - types of decisions

<table>
<thead>
<tr>
<th></th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time range</strong></td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td><strong>Range of individuals or units</strong></td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td><strong>Means-end relationships</strong></td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td><strong>Type of uncertainty / how to solve</strong></td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
<tr>
<td><strong>Type of problems</strong></td>
<td>• Political problems • Wicked problems</td>
<td>• (Untamed) technical problems</td>
<td>• Technical problems</td>
</tr>
</tbody>
</table>

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

### 2.3.3 Problem characterization

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to strategic decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

**Policy decisions**

For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connect (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear what should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more time is needed to provide some clarity on the issues. But it is also possible that the subject of research is very complex, which increases uncertainty. Last, but not least, it remains difficult to predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A great part of the policy decisions TomTom encounters are untamed technical problems.

**Managerial decisions**

Managerial decisions come down to one basic question: how should TomTom implement a certain strategy? This question is closely related to the company’s core business. For the majority of products, TomTom has to use sophisticated and innovative technology, which does not yet exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic. The idea of becoming a big player in the field of traffic information was no subject for discussion and existed for a long time. The complexity was in the technology to collect this traffic information. It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification already provided; most of its problems are untamed technical problems (highlighted in Table 1).

**2.3.4 Characterization of the case**

The case study as described in this chapter contains several elements, also present in the problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting to enter the business- and government market, but wanted more (factual) information on the subject to gain more certainty and to know how to enter the new field. This included creating a better picture of the type of services TomTom could develop and which business and government parties may be interesting. Second, it was also unclear whether these parties were interested in the information of TomTom. This (external) multi-actor aspect is interesting, since this will be even more important in the future. For this reason, TomTom considers the case study representative for the problems they are dealing with, now and in the future (Personal Communication, 2008f). However, an important difference must also be noted. Most problems TomTom deals with affect multiple departments and business units (the internal multi-actor context). The case study is demarcated in such a way that this problem only concerns TomTom Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads to better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attention to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Figure 2 - research methods

Qualitative research
The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

3.1.1 Case study
This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

Reasons for choosing a case study
There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an instrument. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case” (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.
- There may also be an intrinsic interest in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom’s business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

Data collection methods
Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant’s perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS’ decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

3.1.2 Desk research
In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. [...] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as 'rational decision making methods'.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process...
(see 4.3). Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)

This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next section will provide the reader with an overview of the field of decision making models. Eight separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty

Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty

In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

- **Uncertainty as feelings**

Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**
  Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**
  One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

  These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “... risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts”. Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or *decision support*, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term *decision making* covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

#### Types of models

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. **Descriptive** models can be used to assist description, explanation or help its users to understand complex issues. The **prescriptive**, or normative, type of models does not describe what is, but what ought to be. The last type of models, the **ideal type**, deal “with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired” (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“… most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

**Pre-conditions**

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.
- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

**Criticism**

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a *heuristic bias* (Bryant, 2007) or a *tunnelling of attention* (Pech and Cameron, 2006, p. 73).
- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called *bounded rationality* (Bryant, 2007, p. 735).
- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker’s behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

**4.2.2 Political decision models**

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; *organizational behaviour* and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The **bureaucratic politics** model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the **garbage can model**. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**

There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**

The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

**4.2.3 Routine**

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• **Equality of problems** – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

**Criticism**

• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.

• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: "When you have a hammer, everything looks like a nail" (Personal Communication, 2007a).

### 4.2.4 Rational decision making – incrementalism

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making" (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

**Pre-conditions**

• **Acceptable status quo** – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

**Criticism**

Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:

• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.

• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, ’t Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing
The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

Pre-conditions
- **Clear standards** - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- **Information available** - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

Criticism
- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning
The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

Pre-conditions
- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
Criticism

- The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

4.2.7 Rational decision making – synoptic model

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions

Simon's model is based on two assumptions:

- **Full information** - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).

- **Resources available** - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).

- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.

- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general 'best' decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term 'good decision making' into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that "there may be many circumstances where 'agreement as the criterion of good policy' is acceptable". This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.
- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.
- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe 'good decision making' in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application
Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps
This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions
There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models (2)** – decisions are a result of compromise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• **Synoptic model** – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:

- Adoption of the decision making results
- Value of the decision making results
- Duration of the decision making process (time)
- Costs of the decision making process
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process

Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex

Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”; after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: *“Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work”* (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: *“The last issue I can recall was decided upon in three minutes”*. 
When asked who was involved in the decision making, the answer was simple: “The persons who were present at the office at that moment” (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

**Whole company**

The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
Cameron, 2006). However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

![Figure 5 - certainty curve for TomTom](image)

**Figure 5 - certainty curve for TomTom**

**TomTom's decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

**Results: TomTom’s experiences**

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- **Adoption / use** – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- **Value** – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

**Costs: TomTom’s experiences**

- **Duration of the process** – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- **Costs** – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

• Satisfaction with involvement – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

• Satisfaction with comprehensiveness - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom’s experiences

- **Adoption / use** – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- **Value** – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
**Costs: TomTom’s experiences**

- **Duration of the process** – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- **Costs** – Costs made included the salary of the author and the time and resources spent on supervision. The investment of € 10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

**Process: TomTom’s experiences**

- **Satisfaction with involvement** – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- **Satisfaction with comprehensiveness** – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of “gut feeling” decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods currently used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

**Table 3 - decision making approaches compared**

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible&lt;br&gt;× Quality risk: too fast</td>
<td>✓ Transparent&lt;br&gt;✓ Quality: involvement of all relevant people&lt;br&gt;✓ Robust</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs: TomTom’s experiences</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>× Higher than current</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process: TomTom’s experiences</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with involvement</td>
<td>× Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>
6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

• **Success and growth**

Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

• **Increasing external control**

Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

• **Complexity and growth of competition**

TomTom describes the market in which it operates as follows: *The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products* (TomTom, 2008c, p. 31).

Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

Figure 7 - influences on TomTom's company configuration

Figure 7 is derived from Mintzberg's pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by "cost engineering our products and seeking operational cost leverage from increasing sales volumes" (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by "hiring more experts and educated people" (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that "cannot tolerate an environment that is either dynamic or complex" (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

![Figure 8 - decision making requirements](image)

**6.2.1 Involvement**

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

6.2.2 Documentation

The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

6.2.3 Flexibility

The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

6.3 How to achieve them

The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

• Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.

• Develop a search engine that enables employees to find other employees through keywords or questions.

• Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

• His first task is to investigate what the qualities and fields of expertise are of the employees of his department.

• When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.
- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.
- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• Complexity and growth of competition – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative. Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions: results, costs and satisfaction with process.

• Involvement – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• Documentation – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• Flexibility – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or 'deciding how to decide'. "Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)" (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**

Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**

The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner's attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**

Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
Figure 9 - the system of decision making

7.2 The meta-decision making model

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

External factors

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

![Graph](https://example.com/graph.png)

**Figure 10 - meta-decision making model**

**Instruments**

The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making.
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

### 7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

![Figure 11 - flowchart legend](image)

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

7.3.1 Entrepreneurial approach (1)

Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

7.3.2 Mixed scanning (2)

The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company’s objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

![Flowchart](#)

**Figure 15 - flowchart rational decision making**

### 7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes themselves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘-‘ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

![Causal Diagram]

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not has the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model

The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

7.5 Practical use of the meta-decision making model

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

7.5.1 How to use the model?

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That’s the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

\textbf{Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?}

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. \textit{Which theories on (rational) decision making are available within the scientific literature?}

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on `better decision making’. Criteria were defined in order to measure the quality of decision making.

\textbf{Eight decision making models}

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- \textit{Entrepreneurialism} – decisions are made using intuition and ‘gut feeling’.
- \textit{Political decision making models} (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- \textit{Routine} – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as “\textit{a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making}” (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- \textit{Incrementalism} – decisions are made by altering the status quo with small steps.
- \textit{Satisficing} – a decision is based on the first alternative that is found that meets certain standards.
- \textit{Mixed scanning} – a solution is found by combining a broad scan with detailed analysis of the alternatives.
Synoptic model – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

Good decision making

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

Results of decision making
- Adoption of the decision making results
- Value of the decision making results

Costs of decision making
- Duration of the decision making process (time)
- Costs of the decision making process

(Satisfaction with the) decision making process
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. What does the current decision making process and company culture of TomTom (MS) look like?

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

- **Success and growth** – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

### 6. What would good decision making look like for TomTom (MS)?

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

### 8.1.2 Main research question answer

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

| Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come? |

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

**Table 4 - decision making methods compared**

<table>
<thead>
<tr>
<th>Results: TomTom's experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>✓ Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
<tr>
<td>Costs: TomTom's experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>× Higher than current</td>
</tr>
<tr>
<td>Process: TomTom's experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td>× Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

**8.2 Conclusions meta-decision making model**

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model
For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model
In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making
When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections
Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods
The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer/researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation/interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

8.4.2 Case characteristics

It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
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Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

- **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.
  To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

- **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

- **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

- **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

- **Jasper Verdoore – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

- **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>200</td>
</tr>
<tr>
<td>2003</td>
<td>400</td>
</tr>
<tr>
<td>2004</td>
<td>600</td>
</tr>
<tr>
<td>2005</td>
<td>800</td>
</tr>
<tr>
<td>2006</td>
<td>1000</td>
</tr>
<tr>
<td>2007</td>
<td>1200</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue € million</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
</tbody>
</table>
B.2 Competition

The PND-market is a very young market. TomTom’s most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

Table 7 - TomTom’s share price
Deciding how to decide:

*The added value of using rational decision making methods within TomTom Mobility Solutions*

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**Master Thesis report**
June 10, 2008

Name: Susan Lagerweij  
E-mail: S.M.Lagerweij@student.tudelft.nl  
Student number: 1150243

Program: Systems Engineering, Policy Analysis and Management  
Degree: Master of Science (Msc.)  
Faculty: Faculty of Technology, Policy and Management  
University: Delft University of Technology

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**Graduation committee**

Professor: Prof. Dr. Ir. W. Thissen  
First supervisor: Dr. Ir. A.R.C. de Haan  
Second supervisor: Dr. M.L.C. de Bruijne  
External supervisor: G. de Boer (TomTom)
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Appendix A – TomTom respondents

Appendix B – TomTom’s future trends

B.1 Growth

B.2 Competition
1. Introduction to the research

1.1 TomTom

TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation

One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives

TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS’ goals.

### 1.2.1 Rational decision making

Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of *phases*, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an *individual, central decision maker*, who makes his decisions on the basis of as much *information* as possible.
- The success of decision making is closely related to the achievement of clearly formulated *objectives*.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a *scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective*” (Koppenjan and Klijn, 2004, p. 46).

### 1.2.2 Research objective

The research objective is:

> To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

### 1.3 Research questions

The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

> Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?
2. What does the current decision making process and company culture of TomTom (MS) look like?
3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?
5. How did TomTom and its context change?
6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model

Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?
2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline

This paper exists of four parts. The interrelation between them is depicted in Figure 1.

- Research design and justification
  This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.

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**Figure 1 - report outline**

2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s...
profit and good reputation. The assignment can be summarized in the main research question for the case:

**Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?**

### 2.2.1 Demarcations

Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

### 2.2.2 Sub research questions

The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

**Opportunity identification**

1. *What are the products TomTom MS has to offer?*
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorm ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

Opportunity assessment (strategy)
3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

Recommendations on how to implement the selected opportunity (implementation measures)
6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

2.3 Characterization of issues within TomTom Mobility Solutions
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

2.3.1 Types of uncertainty and problems
According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems. Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Little</td>
</tr>
<tr>
<td>Technical problems</td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td>Little</td>
<td>Political problems</td>
</tr>
<tr>
<td>Wicked problems</td>
<td></td>
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</tbody>
</table>

2.3.2 Three categories of decisions
Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

Table 2 - types of decisions

<table>
<thead>
<tr>
<th></th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time range</strong></td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td><strong>Range of individuals</strong></td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td>or units</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td><strong>Means-end relationships</strong></td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td><strong>Type of uncertainty / how to solve</strong></td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
<tr>
<td><strong>Type of problems</strong></td>
<td>• Political problems</td>
<td>• (Untamed) technical problems</td>
<td>• Technical problems</td>
</tr>
<tr>
<td></td>
<td>• Wicked problems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

2.3.3 Problem characterization
For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to strategic decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

**Policy decisions**

For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connekt (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear what should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more time is needed to provide some clarity on the issues. But it is also possible that the subject of research is very complex, which increases uncertainty. Last, but not least, it remains difficult to predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A great part of the policy decisions TomTom encounters are untamed technical problems.

**Managerial decisions**

Managerial decisions come down to one basic question: *how* should TomTom implement a certain strategy? This question is closely related to the company’s core business. For the majority of products, TomTom has to use sophisticated and innovative technology, which does not yet exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic. The idea of becoming a big player in the field of traffic information was no subject for discussion and existed for a long time. The complexity was in the technology to collect this traffic information. It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification already provided; most of its problems are untamed technical problems (highlighted in Table 1).

**2.3.4 Characterization of the case**

The case study as described in this chapter contains several elements, also present in the problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting to enter the business- and government market, but wanted more (factual) information on the subject to gain more certainty and to know *how* to enter the new field. This included creating a better picture of the type of services TomTom could develop and which business and government parties may be interesting. Second, it was also unclear whether these parties were interested in the information of TomTom. This (external) multi-actor aspect is interesting, since this will be even more important in the future. For this reason, TomTom considers the case study representative for the problems they are dealing with, now and in the future (Personal Communication, 2008f). However, an important difference must also be noted. Most problems TomTom deals with affect multiple departments and business units (the internal multi-actor context). The case study is demarcated in such a way that this problem only concerns TomTom Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attentions to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Qualitative research

The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

3.1.1 Case study
This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

Reasons for choosing a case study
There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an instrument. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case” (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.
- There may also be an intrinsic interest in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom’s business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

Data collection methods
Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant's perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS’ decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

3.1.2 Desk research
In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. […] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as 'rational decision making methods'.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process.
(see 4.3). Section 3.1 explains that qualitative research is meant for research where
perceptions and experience are more important than hard facts. Therefore, qualitative
research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued
  that the case, subject of this research project, covers topics TomTom Mobility Solutions
typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a
conclusion it can be stated that the research question can be answered using these research
methods.
4. Decision making (theory)

This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next separate models, relevant for this study, were distinguished and described. Since there is no such thing as 'the best decision making model', section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty

Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty

In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

- **Uncertainty as feelings**

Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**

Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**

One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “… risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts”. Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or **decision support**, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term **decision making** covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

#### Types of models

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. **Descriptive** models can be used to assist description, explanation or help its users to understand complex issues. The **prescriptive**, or normative, type of models does not describe what is, but what ought to be. The last type of models, the **ideal type**, deal "with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired" (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“… most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

Pre-conditions

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.
- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

Criticism

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a *heuristic bias* (Bryant, 2007) or a *tunnelling of attention* (Pech and Cameron, 2006, p. 73).
- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called *bounded rationality* (Bryant, 2007, p. 735).
- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker’s behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

4.2.2 Political decision models

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; *organizational behaviour* and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The bureaucratic politics model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the garbage can model. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**
There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**
The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

### 4.2.3 Routine

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• **Equality of problems** – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

**Criticism**

• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.

• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: “When you have a hammer, everything looks like a nail” (Personal Communication, 2007a).

4.2.4 Rational decision making – incrementalism

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as “a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

Due to the number of actors involved and the complex nature of problems, Lindblom argues that decision makers stay close to alternatives they are familiar with. This means that decision making at best will result in a small improvement compared to the status quo.

**Pre-conditions**

• **Acceptable status quo** – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

**Criticism**

Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:

• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.

• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, 't Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing
The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

Pre-conditions
- **Clear standards** - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- **Information available** - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

Criticism
- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning
The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

Pre-conditions
- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
Criticism

- The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

4.2.7 Rational decision making – synoptic model

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions

Simon’s model is based on two assumptions:

- **Full information** - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).
- **Resources available** - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).
- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.
- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable.” This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.
- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.
- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application
Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps
This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions
There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• Synoptic model – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria. By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:
  • Adoption of the decision making results
  • Value of the decision making results
  • Duration of the decision making process (time)
  • Costs of the decision making process
  • Satisfaction with the involvement of people
  • Satisfaction with the comprehensiveness of the decision making process
Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex
Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”; after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: *Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work* (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: *“The last issue I can recall was decided upon in three minutes”.*
When asked who was involved in the decision making, the answer was simple: “The persons who were present at the office at that moment” (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

**Whole company**

The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
Cameron, 2006). However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

![Figure 5 - certainty curve for TomTom](image)

**Figure 5 - certainty curve for TomTom**

**TomTom’s decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

**Results: TomTom's experiences**

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- **Adoption / use** – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- **Value** – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

**Costs: TomTom's experiences**

- **Duration of the process** – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- **Costs** – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- **Satisfaction with involvement** – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- **Satisfaction with comprehensiveness** - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom’s experiences

- **Adoption / use** – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- **Value** – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
**Costs: TomTom’s experiences**

- **Duration of the process** – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- **Costs** – Costs made included the salary of the author and the time and resources spent on supervision. The investment of € 10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

**Process: TomTom’s experiences**

- **Satisfaction with involvement** – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- **Satisfaction with comprehensiveness** – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of "gut feeling" decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

**Table 3 - decision making approaches compared**

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
</tbody>
</table>
| Value                        | ✓ Flexible  
  × Quality risk: too fast   | ✓ Transparent  
  ✓ Quality: involvement of all relevant people  
  ✓ Robust                  |
| Costs: TomTom’s experiences  |         |          |
| Duration of the process      | ✓ Fast  | × Time consuming |
| Costs                        | ✓ Very low | × Higher than current |
| Process: TomTom’s experiences|         |          |
| Satisfaction with involvement| × Quality risk: involvement varies strongly | ✓ Easy sharing |
| Satisfaction with comprehensiveness | ✓ Sufficient | ✓ Very complete |
6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

- **Success and growth**
  
  Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

- **Increasing external control**
  
  Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

  Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

- **Complexity and growth of competition**
  
  TomTom describes the market in which it operates as follows: *The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products* (TomTom, 2008c, p. 31).

  Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

Figure 7 - influences on TomTom's company configuration

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

Figure 8 - decision making requirements

6.2.1 Involvement

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

### 6.2.2 Documentation

The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

### 6.2.3 Flexibility

The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

### 6.3 How to achieve them

The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.
- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.
- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions: results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or ‘deciding how to decide’. "Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)" (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner’s attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
**7.2 The meta-decision making model**

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

**External factors**

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

![Diagram of comprehensiveness and costs](image)

**Figure 10 - meta-decision making model**

**Instruments**

The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

![Flowchart Legend](image)

**Figure 11 - flowchart legend**

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

7.3.1 Entrepreneurial approach (1)
Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

![Flowchart Entrepreneurial Decision Making](image)

**Figure 12 - Flowchart entrepreneurial decision making**

7.3.2 Mixed scanning (2)
The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)
The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.

![Flowchart mixed scanning](image)
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company's objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes themselves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

### 7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

#### 7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘-’ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

![Causal diagram](image)

**Figure 16 - causal analysis**

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not have the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

### 7.4.2 New meta-decision making model

The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

![Diagram showing the new meta-decision making model improved](image)

**Figure 17 - meta-decision making model improved**

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

7.5 Practical use of the meta-decision making model

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

7.5.1 How to use the model?

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That’s the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker's own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. Which theories on (rational) decision making are available within the scientific literature?

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

Eight decision making models

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making" (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• *Synoptic model* – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

**Good decision making**

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

*Results of decision making*
- Adoption of the decision making results
- Value of the decision making results

*Costs of decision making*
- Duration of the decision making process (time)
- Costs of the decision making process

*(Satisfaction with the) decision making process*
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. *What does the current decision making process and company culture of TomTom (MS) look like?*

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. *Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?*
Concerning the issues TomTom (MS) faces there is no much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. **What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?**

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. **How did TomTom and its context change?**

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

- **Success and growth** – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

6. **What would good decision making look like for TomTom (MS)?**

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

8.1.2 **Main research question answer**

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

| Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come? |

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis.
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

### Table 4 - decision making methods compared

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>☑ Yes</td>
<td>☑ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>☑ Flexible</td>
<td>☑ Transparent</td>
</tr>
<tr>
<td></td>
<td>× Quality risk: too fast</td>
<td>☑ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☑ Robust</td>
</tr>
<tr>
<td>Costs: TomTom’s experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of the process</td>
<td>☑ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>☑ Very low</td>
<td>× Higher than current</td>
</tr>
<tr>
<td>Process: TomTom’s experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td>× Quality risk: involvement varies strongly</td>
<td>☑ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>☑ Sufficient</td>
<td>☑ Very complete</td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

### 8.2 Conclusions meta-decision making model

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

   The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

   One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

   First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model
For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model
In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making
When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections
Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods
The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer / researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation / interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

8.4.2 Case characteristics

It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
References


PERSONAL COMMUNICATION (2007b) Verbal conversation between George de Boer and author, December 5. Delft.

PERSONAL COMMUNICATION (2008a) Verbal conversation between Ben Rutten and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008d) Verbal conversation between George de Boer and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008g) Verbal conversation between George de Boer and author, May 19. Delft.

PERSONAL COMMUNICATION (2008h) Verbal conversation between George de Boer and author, May 27. Amsterdam.

PERSONAL COMMUNICATION (2008i) Verbal conversation between Ivar Zantinge and author, April 10. Amsterdam.


*Management Decision, 42, 243-258.*

TOMTOM (2007b) TomTom Mobility Solutions Website.
TOMTOM (2008a) Investor Relations - Historic data.


Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

- **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.
  To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

- **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

- **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

- **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

- **Jasper Verdooren – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

- **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>200</td>
</tr>
<tr>
<td>2003</td>
<td>400</td>
</tr>
<tr>
<td>2004</td>
<td>600</td>
</tr>
<tr>
<td>2005</td>
<td>800</td>
</tr>
<tr>
<td>2006</td>
<td>1000</td>
</tr>
<tr>
<td>2007</td>
<td>1200</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
</tbody>
</table>
B.2 Competition

The PND-market is a very young market. TomTom’s most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

Table 7 - TomTom’s share price

<table>
<thead>
<tr>
<th>Percentage Change</th>
<th>Absolute Share Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Graph showing share price trends for TomTom and competitors, with TomTom outperforming Garmin until mid 2006, after which Garmin takes over slightly.]
Deciding how to decide:

The added value of using rational decision making methods within TomTom Mobility Solutions

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Master Thesis report

June 10, 2008

Name  
Susan Lagerweij

E-mail  
S.M.Lagerweij@student.tudelft.nl

Student number  
1150243

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Systems Engineering, Policy Analysis and Management

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Professor  
Prof. Dr. Ir. W. Thissen

First supervisor  
Dr. Ir. A.R.C. de Haan

Second supervisor  
Dr. M.L.C. de Bruijne

External supervisor  
G. de Boer (TomTom)
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1. Introduction to the research

1.1 TomTom

TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation

One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives

TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS’ goals.

1.2.1 Rational decision making
Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective
The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions
The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?
2. What does the current decision making process and company culture of TomTom (MS) look like?
3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?
5. How did TomTom and its context change?
6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model
Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?
2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline
This paper exists of four parts. The interrelation between them is depicted in Figure 1.
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  
  This research report ends with conclusions and recommendations.
2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008]). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?

2.2.1 Demarcations
Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

2.2.2 Sub research questions
The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

Opportunity identification
1. What are the products TomTom MS has to offer?
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

Opportunity assessment (strategy)
3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

Recommendations on how to implement the selected opportunity (implementation measures)
6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

2.3 Characterization of issues within TomTom Mobility Solutions
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

### 2.3.1 Types of uncertainty and problems

According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems. Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

**Table 1 - types of problems**

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Large</td>
</tr>
<tr>
<td>Little</td>
<td>Technical problems</td>
</tr>
<tr>
<td></td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td></td>
<td>Political problems</td>
</tr>
<tr>
<td></td>
<td>Wicked problems</td>
</tr>
</tbody>
</table>

### 2.3.2 Three categories of decisions

Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon).

For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

**Table 2 - types of decisions**

<table>
<thead>
<tr>
<th></th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time range</strong></td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td><strong>Range of individuals or units</strong></td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td><strong>Means-end relationships</strong></td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td><strong>Type of uncertainty / how to solve</strong></td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
</tbody>
</table>

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

### 2.3.3 Problem characterization

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to *strategic* decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

**Policy decisions**

For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connekt (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear *what* should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more time is needed to provide some clarity on the issues. But it is also possible that the subject of research is very complex, which increases uncertainty. Last, but not least, it remains difficult to predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A great part of the policy decisions TomTom encounters are untamed technical problems.

**Managerial decisions**

Managerial decisions come down to one basic question: *how* should TomTom implement a certain strategy? This question is closely related to the company’s core business. For the majority of products, TomTom has to use sophisticated and innovative technology, which does not yet exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic. The idea of becoming a big player in the field of traffic information was no subject for discussion and existed for a long time. The complexity was in the technology to collect this traffic information. It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification already provided; most of its problems are untamed technical problems (highlighted in Table 1).

**2.3.4 Characterization of the case**

The case study as described in this chapter contains several elements, also present in the problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting to enter the business- and government market, but wanted more (factual) information on the subject to gain more certainty and to know *how* to enter the new field. This included creating a better picture of the type of services TomTom could develop and which business and government parties may be interesting. Second, it was also unclear whether these parties were interested in the information of TomTom. This (external) multi-actor aspect is interesting, since this will be even more important in the future. For this reason, TomTom considers the case study representative for the problems they are dealing with, now and in the future (Personal Communication, 2008f). However, an important difference must also be noted. Most problems TomTom deals with affect multiple departments and business units (the internal multi-actor context). The case study is demarcated in such a way that this problem only concerns TomTom Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attentions to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Figure 2 - research methods

Qualitative research

The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

3.1.1 Case study
This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

Reasons for choosing a case study
There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an instrument. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case” (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.
- There may also be an intrinsic interest in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom's business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

Data collection methods
Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant’s perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS’ decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

### 3.1.2 Desk research

In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. […] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as ‘rational decision making methods’.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process.
(see 4.3). Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)

This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next section will provide the reader with an overview of the field of decision making models. Eight separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty

Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty

In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

- **Uncertainty as feelings**

Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**

Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**

One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “... risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts”. Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or decision support, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term decision making covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

#### Types of models

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. **Descriptive** models can be used to assist description, explanation or help its users to understand complex issues. The **prescriptive**, or normative, type of models does not describe what is, but what ought to be. The last type of models, the **ideal type**, deals “with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired” (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“… most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

**Pre-conditions**

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.
- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

**Criticism**

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a *heuristic bias* (Bryant, 2007) or a *tunnelling of attention* (Pech and Cameron, 2006, p. 73).
- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called *bounded rationality* (Bryant, 2007, p. 735).
- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker's behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

### 4.2.2 Political decision models

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; *organizational behaviour* and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The bureaucratic politics model takes people's own interests as a starting-point. Individuals or departments within an organization have their own interests, which don't necessarily have to match with the whole organization's interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the garbage can model. The garbage can model (as formulated by Cohen, March and Olsen) identifies four 'streams' in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**

There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions ('where you stand depends on where you sit') or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**

The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

### 4.2.3 Routine

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• \textit{Equality of problems} – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

\textit{Criticism}

• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.

• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: \textit{“When you have a hammer, everything looks like a nail”} (Personal Communication, 2007a).

\subsection*{4.2.4 Rational decision making – incrementalism}

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as \textit{“a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making”} (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

Due to the number of actors involved and the complex nature of problems, Lindblom argues that decision makers stay close to alternatives they are familiar with. This means that decision making at best will result in a small improvement compared to the status quo.

\textit{Pre-conditions}

• \textit{Acceptable status quo} – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

\textit{Criticism}

Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:

• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.

• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, 't Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing

The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

Pre-conditions
- **Clear standards** - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- **Information available** - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

Criticism
- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning

The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

Pre-conditions
- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
4.2.7 Rational decision making – synoptic model

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions

Simon’s model is based on two assumptions:

- **Full information** - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).

- **Resources available** - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).

- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.

- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable”. This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.

- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.

- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application

Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps

This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• *Synoptic model* – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria. By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:

- Adoption of the decision making results
- Value of the decision making results
- Duration of the decision making process (time)
- Costs of the decision making process
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process

Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex

Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”; after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: *“Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work”* (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:
- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: *“The last issue I can recall was decided upon in three minutes”*. 
When asked who was involved in the decision making, the answer was simple: "The persons who were present at the office at that moment" (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: "Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams" (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

**Whole company**

The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
Cameron, 2006). However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

![Figure 5 - certainty curve for TomTom](image)

**TomTom's decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

**Results: TomTom’s experiences**

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- **Adoption / use** – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- **Value** – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

**Costs: TomTom’s experiences**

- **Duration of the process** – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- **Costs** – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- **Satisfaction with involvement** – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- **Satisfaction with comprehensiveness** - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

### 5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

#### 5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom’s experiences

- Adoption / use – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- Value – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
Costs: TomTom’s experiences

- Duration of the process – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- Costs – Costs made included the salary of the author and the time and resources spent on supervision. The investment of € 10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

Process: TomTom’s experiences

- Satisfaction with involvement – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- Satisfaction with comprehensiveness – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of "gut feeling" decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

Table 3 - decision making approaches compared

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible&lt;br&gt;× Quality risk: too fast</td>
<td>✓ Transparent&lt;br&gt;✓ Quality: involvement of all relevant people&lt;br&gt;✓ Robust</td>
</tr>
</tbody>
</table>

| Costs: TomTom’s experiences | | |
|-----------------------------| | |
| Duration of the process     | ✓ Fast | × Time consuming |
| Costs                       | ✓ Very low | × Higher than current |

| Process: TomTom’s experiences | | |
|-------------------------------| | |
| Satisfaction with involvement| × Quality risk: involvement varies strongly | ✓ Easy sharing |
| Satisfaction with comprehensiveness | ✓ Sufficient | ✓ Very complete |
6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom's structure and hence, decision making processes.

- **Success and growth**
  
  Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

- **Increasing external control**
  
  Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

  Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

- **Complexity and growth of competition**
  
  TomTom describes the market in which it operates as follows: *The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products*" (TomTom, 2008c, p. 31).

  Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

![Diagram](image.png)

**Figure 8 - decision making requirements**

### 6.2.1 Involvement

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

6.2.2 Documentation
The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

6.2.3 Flexibility
The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

6.3 How to achieve them
The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.

- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.

- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions; results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or 'deciding how to decide'. "Dror emphasizes the costliness of analysis in his 'economically rational model' which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy's quality)" (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner’s attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
Figure 9 - the system of decision making

7.2 The meta-decision making model

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

External factors

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

![Figure 10 - meta-decision making model](image)

**Instruments**

The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

### 7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

![Flowchart Legend](image)

**Figure 11 - flowchart legend**

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

7.3.1 Entrepreneurial approach (1)
Since entrepreneurial decision making is closely related to gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

![Entrepreneurial Decision Making Flowchart](image)

**Figure 12 - flowchart entrepreneurial decision making**

7.3.2 Mixed scanning (2)
The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.

Figure 13 - flowchart mixed scanning
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company's objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

Figure 15 - flowchart rational decision making

7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes them selves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a '+' means that when factor A increases, factor B increases as well. The reversed symbol '-' indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not has the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model

The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

![Diagram of the new meta-decision making model improved](https://example.com/figure17.png)

**Figure 17 - meta-decision making model improved**

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

### 7.5 Practical use of the meta-decision making model

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

#### 7.5.1 How to use the model?

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That's the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

**Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?**

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. **Which theories on (rational) decision making are available within the scientific literature?**

   The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

   **Eight decision making models**

   There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

   - **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
   - **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
   - **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

   Rational decision making is briefly described as “a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

   - **Incrementalism** – decisions are made by altering the status quo with small steps.
   - **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
   - **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• **Synoptic model** – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

**Good decision making**

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

*Results of decision making*
- Adoption of the decision making results
- Value of the decision making results

*Costs of decision making*
- Duration of the decision making process (time)
- Costs of the decision making process

*(Satisfaction with the) decision making process*
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. **What does the current decision making process and company culture of TomTom (MS) look like?**

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. **Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?**
Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

- **Success and growth** – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal...
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

6. **What would good decision making look like for TomTom (MS)?**

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

8.1.2 **Main research question answer**

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

| Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come? |

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

Table 4 - decision making methods compared

<table>
<thead>
<tr>
<th>Results: TomTom's experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>✓ Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td>✓ Robust</td>
<td>✓ Robust</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs: TomTom's experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>✓ Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>✓ Higher than current</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process: TomTom's experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with involvement</td>
<td>✓ Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

8.2 Conclusions meta-decision making model

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model

For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model

In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making

When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections

Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods

The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer / researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation / interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

8.4.2 Case characteristics

It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
References


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PERSONAL COMMUNICATION (2008a) Verbal conversation between Ben Rutten and author, April 10. Amsterdam.
PERSONAL COMMUNICATION (2008d) Verbal conversation between George de Boer and author, April 10. Amsterdam.
PERSONAL COMMUNICATION (2008g) Verbal conversation between George de Boer and author, May 19. Delft.
PERSONAL COMMUNICATION (2008h) Verbal conversation between George de Boer and author, May 27. Amsterdam.
PERSONAL COMMUNICATION (2008i) Verbal conversation between Ivar Zantinge and author, April 10. Amsterdam.
*Management Decision, 42,* 243-258.
TOMTOM (2007b) TomTom Mobility Solutions Website.
TOMTOM (2008a) Investor Relations - Historic data.
Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

- **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.
  To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

- **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

- **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

- **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

- **Jasper Verdoore – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

- **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
<tr>
<td>2008</td>
<td>1200</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
<tr>
<td>2008</td>
<td>1200</td>
</tr>
<tr>
<td>2009</td>
<td>1400</td>
</tr>
<tr>
<td>2010</td>
<td>1600</td>
</tr>
<tr>
<td>2011</td>
<td>1800</td>
</tr>
<tr>
<td>2012</td>
<td>2000</td>
</tr>
</tbody>
</table>


**B.2 Competition**

The PND-market is a very young market. TomTom’s most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

**Table 7 - TomTom’s share price**
Deciding how to decide:

*The added value of using rational decision making methods within TomTom Mobility Solutions*

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**Master Thesis report**

June 10, 2008

Name: Susan Lagerweij  
E-mail: S.M.Lagerweij@student.tudelft.nl  
Student number: 1150243

Program: Systems Engineering, Policy Analysis and Management  
Degree: Master of Science (Msc.)  
Faculty: Faculty of Technology, Policy and Management  
University: Delft University of Technology

Keywords: Decision making, rationality, entrepreneurialism, systems analysis  
Words main text: 29,942

**Graduation committee**

Professor: Prof. Dr. Ir. W. Thissen  
First supervisor: Dr. Ir. A.R.C. de Haan  
Second supervisor: Dr. M.L.C. de Bruijne  
External supervisor: G. de Boer (TomTom)
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1.2.2 Research objective

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Appendix A – TomTom respondents

Appendix B – TomTom’s future trends

B.1 Growth

B.2 Competition
1. Introduction to the research

1.1 TomTom

TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company's shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation

One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives

TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
1.2.1 Rational decision making
Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective
The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions
The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?
2. What does the current decision making process and company culture of TomTom (MS) look like?
3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?
5. How did TomTom and its context change?
6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model
Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?
2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline
This paper exists of four parts. The interrelation between them is depicted in Figure 1.

- Research design and justification
This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.
2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008j). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

**Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?**

### 2.2.1 Demarcations

Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

### 2.2.2 Sub research questions

The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

**Opportunity identification**

1. *What are the products TomTom MS has to offer?*
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

2.3 Characterization of issues within TomTom Mobility Solutions
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

2.3.1 Types of uncertainty and problems

According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems. Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Technical problems</td>
</tr>
<tr>
<td>Small</td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td>Small</td>
<td>Political problems</td>
</tr>
<tr>
<td>Small</td>
<td>Wicked problems</td>
</tr>
</tbody>
</table>

2.3.2 Three categories of decisions

Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

Table 2 - types of decisions

<table>
<thead>
<tr>
<th></th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time range</td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td>Range of individuals or units</td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td>Content</td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td>Means-end relationships</td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td>Type of uncertainty / how to solve</td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
</tbody>
</table>

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

2.3.3 Problem characterization

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to strategic decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

**Policy decisions**

For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connekt (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear what should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more
time is needed to provide some clarity on the issues. But it is also possible that the subject of
research is very complex, which increases uncertainty. Last, but not least, it remains difficult to
predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for
TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem
formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A
great part of the policy decisions TomTom encounters are untamed technical problems.

**Managerial decisions**
Managerial decisions come down to one basic question: *how* should TomTom implement a
certain strategy? This question is closely related to the company’s core business. For the majority
of products, TomTom has to use sophisticated and innovative technology, which does not yet
exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic.
The idea of becoming a big player in the field of traffic information was no subject for discussion
and existed for a long time. The complexity was in the technology to collect this traffic information.
It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification
already provided; most of its problems are untamed technical problems (highlighted in Table 1).

**2.3.4 Characterization of the case**
The case study as described in this chapter contains several elements, also present in the
problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting
to enter the business- and government market, but wanted more (factual) information on the
subject to gain more certainty and to know *how* to enter the new field. This included creating a
better picture of the type of services TomTom could develop and which business and government
parties may be interesting. Second, it was also unclear whether these parties were interested in
the information of TomTom. This (external) multi-actor aspect is interesting, since this will be
even more important in the future. For this reason, TomTom considers the case study
representative for the problems they are dealing with, now and in the future (Personal
Communication, 2008f). However, an important difference must also be noted. Most problems
TomTom deals with affect multiple departments and business units (the internal multi-actor
context). The case study is demarcated in such a way that this problem only concerns TomTom
Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken
into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attentions to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Figure 2 - research methods

Qualitative research

The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. "Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

### 3.1.1 Case study

This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

**Reasons for choosing a case study**

There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an *instrument*. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case” (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.
- There may also be an *intrinsic interest* in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom's business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

**Data collection methods**

Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant's perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS’ decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

3.1.2 Desk research
In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. [...] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as 'rational decision making methods'.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process
Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)

This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next section will provide the reader with an overview of the field of decision making models. Eight separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty

Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty

In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

- **Uncertainty as feelings**

Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**

Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**

One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “... risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts”. Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or decision support, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term decision making covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

#### Types of models

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. **Descriptive** models can be used to assist description, explanation or help its users to understand complex issues. The **prescriptive**, or normative, type of models does not describe what is, but what ought to be. The last type of models, the **ideal type**, deal “with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired” (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of 'uncertainty as feelings' can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the 'uncertainty as politics' point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“... most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

**Pre-conditions**

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.

- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

**Criticism**

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a *heuristic bias* (Bryant, 2007) or a *tunnelling of attention* (Pech and Cameron, 2006, p. 73).

- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called *bounded rationality* (Bryant, 2007, p. 735).

- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker’s behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

**4.2.2 Political decision models**

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; *organizational behaviour* and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The **bureaucratic politics** model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the **garbage can model**. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**

There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**

The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

### 4.2.3 Routine

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
Equality of problems – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

Criticism
- It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.
- It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: “When you have a hammer, everything looks like a nail” (Personal Communication, 2007a).

4.2.4 Rational decision making – incrementalism
Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as “a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

Pre-conditions
- Acceptable status quo – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

Criticism
Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:
- The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.
- Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, ’t Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing

The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

Pre-conditions

- **Clear standards** - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- **Information available** - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

Criticism

- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning

The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

Pre-conditions

- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
**Criticism**

- The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

**4.2.7 Rational decision making – synoptic model**

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. **Intelligence gathering** – the collection of information, focused towards the defined problem or opportunity.
2. **Identifying all options** – the identification and analysis of possible solutions or alternatives.
3. **Assessing consequences of options** – the identification of all costs and benefits of the policy options available.
4. **Relating consequences to values** – the consequences of all options are evaluated using a set of criteria.
5. **Choosing preferred option** – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

**Pre-conditions**

Simon’s model is based on two assumptions:

- **Full information** - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).
- **Resources available** - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

**Criticism**

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).
- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.
- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable”. This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.
- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.
- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
**4.4 Gaps in the theory**

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic *can* be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) *should* be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

**4.4.1 Comparing decision making approaches**

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two...
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application
Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000).

This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps
This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable.

Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions
There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
Synoptic model – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria. By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:

- Adoption of the decision making results
- Value of the decision making results
- Duration of the decision making process (time)
- Costs of the decision making process
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process

Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex

Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”, after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: “Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work” (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: “The last issue I can recall was decided upon in three minutes”.

When asked who was involved in the decision making, the answer was simple: “The persons who were present at the office at that moment” (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

**Whole company**

The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

![Figure 5 - certainty curve for TomTom](image)

**TomTom's decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

Results: TomTom’s experiences

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- Adoption / use – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- Value – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

Costs: TomTom’s experiences

- Duration of the process – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- Costs – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- **Satisfaction with involvement** – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- **Satisfaction with comprehensiveness** - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

### 5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

#### 5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom’s experiences

- **Adoption / use** – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- **Value** – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
Costs: TomTom’s experiences

- **Duration of the process** – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “*Nine women are not able to give birth to a child in one month*” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “*Much too long*” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- **Costs** – Costs made included the salary of the author and the time and resources spent on supervision. The investment of € 10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

Process: TomTom’s experiences

- **Satisfaction with involvement** – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- **Satisfaction with comprehensiveness** – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of "gut feeling" decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

Table 3 - decision making approaches compared

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Rational</th>
</tr>
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<tbody>
<tr>
<td><strong>Results: TomTom’s experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>✗ Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
<tr>
<td><strong>Costs: TomTom’s experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>✗ Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>✗ Higher than current</td>
</tr>
<tr>
<td><strong>Process: TomTom’s experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td>✗ Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>
6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

- **Success and growth**

  Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

- **Increasing external control**

  Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

  Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

- **Complexity and growth of competition**

  TomTom describes the market in which it operates as follows: The market for satellite navigation products in each of the geographic markets in which we operate is **highly dynamic and competitive**. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products” (TomTom, 2008c, p. 31).

  Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

![Diagram of company configurations](image)

**Figure 7 - influences on TomTom's company configuration**

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7...
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements
The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

![Figure 8 - decision making requirements](image)

### 6.2.1 Involvement

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

6.2.2 Documentation

The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

6.2.3 Flexibility

The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

6.3 How to achieve them

The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.

- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.

- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions; results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or ‘deciding how to decide’. “Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)” (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner’s attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
7.2 The meta-decision making model

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

**External factors**

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on 'gut feeling'. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making

Figure 10 - meta-decision making model

Instruments
The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

### 7.3.1 Entrepreneurial approach (1)

Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

![Flowchart entrepreneurial decision making](image)

#### Figure 12 - flowchart entrepreneurial decision making

### 7.3.2 Mixed scanning (2)

The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.

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7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company’s objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

![Flowchart](image)

**Figure 15 - flowchart rational decision making**

### 7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes themselves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘-’ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of

parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not have the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model
The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

7.5 Practical use of the meta-decision making model

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

7.5.1 How to use the model?

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That's the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. Which theories on (rational) decision making are available within the scientific literature?

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

Eight decision making models

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making" (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• **Synoptic model** – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

**Good decision making**

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

*Results of decision making*
- Adoption of the decision making results
- Value of the decision making results

*Costs of decision making*
- Duration of the decision making process (time)
- Costs of the decision making process

*(Satisfaction with the) decision making process*
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

**2. What does the current decision making process and company culture of TomTom (MS) look like?**

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

**3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?**
Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

- **Success and growth** – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

6. **What would good decision making look like for TomTom (MS)?**

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

8.1.2 **Main research question answer**

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

**Table 4 - decision making methods compared**

<table>
<thead>
<tr>
<th>Results: TomTom's experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adoption / use</strong></td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>× Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
<tr>
<td><strong>Costs: TomTom's experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Duration of the process</strong></td>
<td>✓ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td>✓ Very low</td>
<td>× Higher than current</td>
</tr>
<tr>
<td><strong>Process: TomTom's experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction with involvement</strong></td>
<td>× Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td><strong>Satisfaction with comprehensiveness</strong></td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

**8.2 Conclusions meta-decision making model**

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

   The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

   One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

   First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

### 8.3 Recommendations

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model
For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model
In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making
When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections
Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods
The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer / researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation / interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

### 8.4.2 Case characteristics

It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
References


PERSONAL COMMUNICATION (2007b) Verbal conversation between George de Boer and author, December 5. Delft.

PERSONAL COMMUNICATION (2008a) Verbal conversation between Ben Rutten and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008d) Verbal conversation between George de Boer and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008g) Verbal conversation between George de Boer and author, May 19. Delft.

PERSONAL COMMUNICATION (2008h) Verbal conversation between George de Boer and author, May 27. Amsterdam.

PERSONAL COMMUNICATION (2008i) Verbal conversation between Ivar Zantinge and author, April 10. Amsterdam.


TOMTOM (2007b) TomTom Mobility Solutions Website.

TOMTOM (2008a) Investor Relations - Historic data.


Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

• **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.
  To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

• **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

• **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

• **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

• **Jasper Verdoore – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

• **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year (n)</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year (n)</th>
<th>Revenue (£ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
</tbody>
</table>
B.2 Competition

The PND-market is a very young market. TomTom's most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

Table 7 - TomTom’s share price

![Graph showing share price comparison between TomTom and Garmin, along with other share comparators such as Amsterdam, AEX, NavTeq, Tele Atlas, Trimble, SirF, and Garmin. The graph illustrates the percentage change and absolute share price over the years 2005 to 2007.]
Deciding how to decide:
*The added value of using rational decision making methods within TomTom Mobility Solutions*

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**Master Thesis report**
June 10, 2008

Name: Susan Lagerweij  
E-mail: S.M.Lagerweij@student.tudelft.nl  
Student number: 1150243

Program: Systems Engineering, Policy Analysis and Management  
Degree: Master of Science (Msc.)  
Faculty: Faculty of Technology, Policy and Management  
University: Delft University of Technology

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**Graduation committee**

Professor: Prof. Dr. Ir. W. Thissen  
First supervisor: Dr. Ir. A.R.C. de Haan  
Second supervisor: Dr. M.L.C. de Bruijne  
External supervisor: G. de Boer (TomTom)
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1.1 TomTom
TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation
One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives
TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS’ goals.

1.2.1 Rational decision making
Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective
The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions
The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?
2. What does the current decision making process and company culture of TomTom (MS) look like?
3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?
5. How did TomTom and its context change?
6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model

Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?
2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline

This paper exists of four parts. The interrelation between them is depicted in Figure 1.

- Research design and justification
This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.
2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008]). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

**Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?**

### 2.2.1 Demarcations

Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfill these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

### 2.2.2 Sub research questions

The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

**Opportunity identification**

1. What are the products TomTom MS has to offer?
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

Opportunity assessment (strategy)
3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

Recommendations on how to implement the selected opportunity (implementation measures)
6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

2.3 Characterization of issues within TomTom Mobility Solutions
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom's issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

2.3.1 Types of uncertainty and problems
According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems.

Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Large</td>
</tr>
<tr>
<td>Little</td>
<td>Little</td>
</tr>
<tr>
<td>Technical problems</td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td>Political problems</td>
<td>Wicked problems</td>
</tr>
</tbody>
</table>

2.3.2 Three categories of decisions
Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

**Table 2 - types of decisions**

<table>
<thead>
<tr>
<th>Time range</th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of individuals or units</td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td>Content</td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td>Means-end relationships</td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td>Type of uncertainty / how to solve</td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
</tbody>
</table>

| Type of problems | • Political problems | • (Untamed) technical problems | • Technical problems |

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

**2.3.3 Problem characterization**

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to strategic decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

**Policy decisions**

For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connekt (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear what should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more time is needed to provide some clarity on the issues. But it is also possible that the subject of research is very complex, which increases uncertainty. Last, but not least, it remains difficult to predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A great part of the policy decisions TomTom encounters are untamed technical problems.

**Managerial decisions**

Managerial decisions come down to one basic question: *how* should TomTom implement a certain strategy? This question is closely related to the company’s core business. For the majority of products, TomTom has to use sophisticated and innovative technology, which does not yet exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic. The idea of becoming a big player in the field of traffic information was no subject for discussion and existed for a long time. The complexity was in the technology to collect this traffic information. It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification already provided; most of its problems are untamed technical problems (highlighted in Table 1).

**2.3.4 Characterization of the case**

The case study as described in this chapter contains several elements, also present in the problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting to enter the business- and government market, but wanted more (factual) information on the subject to gain more certainty and to know *how* to enter the new field. This included creating a better picture of the type of services TomTom could develop and which business and government parties may be interesting. Second, it was also unclear whether these parties were interested in the information of TomTom. This (external) multi-actor aspect is interesting, since this will be even more important in the future. For this reason, TomTom considers the case study representative for the problems they are dealing with, now and in the future (Personal Communication, 2008f). However, an important difference must also be noted. Most problems TomTom deals with affect multiple departments and business units (the internal multi-actor context). The case study is demarcated in such a way that this problem only concerns TomTom Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attentions to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Figure 2 - research methods

Qualitative research

The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

3.1.1 Case study
This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

Reasons for choosing a case study
There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an instrument. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case” (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.

- There may also be an intrinsic interest in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom’s business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

Data collection methods
Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant's perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS' decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

3.1.2 Desk research
In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However, the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: "Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. [...] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to "what if" analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision" (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of 'a variety of tools'. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as 'rational decision making methods'.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process
(see 4.3). Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)

This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next section will provide the reader with an overview of the field of decision making models. Eight separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty

Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty

In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

- **Uncertainty as feelings**

Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**

Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**

One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “… risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts”. Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or *decision support*, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term *decision making* covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

**Types of models**

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. *Descriptive* models can be used to assist description, explanation or help its users to understand complex issues. The *prescriptive*, or normative, type of models does not describe what is, but what ought to be. The last type of models, the *ideal type*, deal "with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired" (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“… most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

Pre-conditions

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.
- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

Criticism

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a *heuristic bias* (Bryant, 2007) or a *tunnelling of attention* (Pech and Cameron, 2006, p. 73).
- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called *bounded rationality* (Bryant, 2007, p. 735).
- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker’s behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

4.2.2 Political decision models

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; *organizational behaviour* and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The **bureaucratic politics** model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the **garbage can model**. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**

There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**

The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

### 4.2.3 Routine

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• **Equality of problems** – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

**Criticism**

• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.

• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: “When you have a hammer, everything looks like a nail” (Personal Communication, 2007a).

### 4.2.4 Rational decision making – incrementalism

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as “a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

**Pre-conditions**

• **Acceptable status quo** – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

**Criticism**

Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:

• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.

• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, 't Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing

The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

**Pre-conditions**

- *Clear standards* - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- *Information available* - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

**Criticism**

- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning

The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

**Pre-conditions**

- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
Criticism

- The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

4.2.7 Rational decision making – synoptic model

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions

Simon’s model is based on two assumptions:

- **Full information** - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).

- **Resources available** - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).

- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.

- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable”. This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.

- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.

- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application
Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps
This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions
There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• Synoptic model – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria. By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:

• Adoption of the decision making results
• Value of the decision making results
• Duration of the decision making process (time)
• Costs of the decision making process
• Satisfaction with the involvement of people
• Satisfaction with the comprehensiveness of the decision making process

Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex

Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”, after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: "Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work" (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: "The last issue I can recall was decided upon in three minutes".
When asked who was involved in the decision making, the answer was simple: “The persons who were present at the office at that moment” (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

**Whole company**
The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

![Figure 5 - certainty curve for TomTom](image)

**TomTom's decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

Results: TomTom’s experiences

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- Adoption / use – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- Value – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

Costs: TomTom’s experiences

- Duration of the process – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- Costs – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- **Satisfaction with involvement** – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- **Satisfaction with comprehensiveness** - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type...
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom's experiences

- Adoption / use – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- Value – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
**Costs: TomTom’s experiences**

- **Duration of the process** – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- **Costs** – Costs made included the salary of the author and the time and resources spent on supervision. The investment of € 10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

**Process: TomTom’s experiences**

- **Satisfaction with involvement** – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- **Satisfaction with comprehensiveness** – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of "gut feeling" decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods currently used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

**Table 3 - decision making approaches compared**

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>✗ Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs: TomTom’s experiences</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>✗ Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>✗ Higher than current</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process: TomTom’s experiences</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with involvement</td>
<td>✗ Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>
6. Improving TomTom’s decision making
This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future
TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past
When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

- **Success and growth**

  Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

- **Increasing external control**

  Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

  Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

- **Complexity and growth of competition**

  TomTom describes the market in which it operates as follows: *The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products* (TomTom, 2008c, p. 31).

  Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

Figure 8 - decision making requirements

6.2.1 Involvement

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

### 6.2.2 Documentation

The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

### 6.2.3 Flexibility

The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

### 6.3 How to achieve them

The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.

- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.

- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions: results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or ‘deciding how to decide’. “Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)” (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner’s attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
7.2 The meta-decision making model

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

**External factors**

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

Figure 10 - meta-decision making model

Instruments
The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

### 7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

![Figure 11 - flowchart legend](image)

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a "start" and "end" sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

7.3.1 Entrepreneurial approach (1)
Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

7.3.2 Mixed scanning (2)
The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company’s objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

![Flowchart of rational decision making](image)

**Figure 15 - flowchart rational decision making**

### 7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes themselves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘−’ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

![Causal Diagram](image)

**Figure 16 - causal analysis**

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of...
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not have the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model
The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

![Figure 17 - meta-decision making model improved](image)

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

7.5 Practical use of the meta-decision making model

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

7.5.1 How to use the model?

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That's the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. Which theories on (rational) decision making are available within the scientific literature?

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

Eight decision making models

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- Entrepreneurialism – decisions are made using intuition and ‘gut feeling’.
- Political decision making models (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- Routine – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as “a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- Incrementalism – decisions are made by altering the status quo with small steps.
- Satisficing – a decision is based on the first alternative that is found that meets certain standards.
- Mixed scanning – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• **Synoptic model** – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

**Good decision making**

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

*Results of decision making*
- Adoption of the decision making results
- Value of the decision making results

*Costs of decision making*
- Duration of the decision making process (time)
- Costs of the decision making process

*(Satisfaction with the) decision making process*
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. **What does the current decision making process and company culture of TomTom (MS) look like?**

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. **Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?**
Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

- **Success and growth** – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

• *Complexity and growth of competition* – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

### 6. What would good decision making look like for TomTom (MS)?

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

• *Involvement* – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• *Documentation* – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

• *Flexibility* – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

### 8.1.2 Main research question answer

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

• While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

Table 4 - decision making methods compared

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>× Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
</tbody>
</table>

| Costs: TomTom’s experiences   |  ✓ Fast                                   | × Time consuming          |
| Duration of the process       |  ✓ Very low                               | × Higher than current     |

| Process: TomTom’s experiences | × Quality risk: involvement varies strongly |  ✓ Easy sharing           |
| Satisfaction with involvement |                                          |                          |
| Satisfaction with comprehensiveness | × Sufficient                              | ✓ Very complete          |

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

8.2 Conclusions meta-decision making model

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

   The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

   One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

   First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model

For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model

In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making

When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections

Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods

The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer / researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation / interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

8.4.2 Case characteristics
It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
References


PERSONAL COMMUNICATION (2007b) Verbal conversation between George de Boer and author, December 5. Delft.

PERSONAL COMMUNICATION (2008a) Verbal conversation between Ben Rutten and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008d) Verbal conversation between George de Boer and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008g) Verbal conversation between George de Boer and author, May 19. Delft.

PERSONAL COMMUNICATION (2008h) Verbal conversation between George de Boer and author, May 27. Amsterdam.

PERSONAL COMMUNICATION (2008i) Verbal conversation between Ivar Zantinge and author, April 10. Amsterdam.


TOMTOM (2007b) TomTom Mobility Solutions Website.

TOMTOM (2008a) Investor Relations - Historic data.


Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

- **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.
  To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

- **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

- **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

- **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

- **Jasper Verdooren – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

- **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Number of TomTom employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>employees</td>
</tr>
<tr>
<td>year</td>
</tr>
<tr>
<td>2002</td>
</tr>
<tr>
<td>2003</td>
</tr>
<tr>
<td>2004</td>
</tr>
<tr>
<td>2005</td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2007</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Revenue TomTom</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ million</td>
</tr>
<tr>
<td>year</td>
</tr>
<tr>
<td>2003</td>
</tr>
<tr>
<td>2004</td>
</tr>
<tr>
<td>2005</td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2007</td>
</tr>
</tbody>
</table>
B.2 Competition

The PND-market is a very young market. TomTom’s most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

Table 7 - TomTom’s share price

<table>
<thead>
<tr>
<th>Percentage Change</th>
<th>Absolute Share Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0%</td>
</tr>
<tr>
<td>2006</td>
<td>0%</td>
</tr>
<tr>
<td>2007</td>
<td>0%</td>
</tr>
</tbody>
</table>

Share Comparators:
- TomTom
- Amsterdam
- AEX
- NavTeq
- Tele Atlas
- Trimble
- SirF
- Garmin

Volume (in 1000s)

<table>
<thead>
<tr>
<th>0</th>
<th>7,116</th>
</tr>
</thead>
<tbody>
<tr>
<td>14,232</td>
<td>3.5</td>
</tr>
<tr>
<td>18.4</td>
<td>33.3</td>
</tr>
<tr>
<td>48.2</td>
<td>63.0</td>
</tr>
<tr>
<td>77.9</td>
<td>124.0</td>
</tr>
<tr>
<td>243.0</td>
<td>324.0</td>
</tr>
</tbody>
</table>

01 04 07 10 01 04 07 10 01 07 10 01
Deciding how to decide:

*The added value of using rational decision making methods within TomTom Mobility Solutions*

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Master Thesis report
June 10, 2008

Name: Susan Lagerweij  
E-mail: S.M.Lagerweij@student.tudelft.nl  
Student number: 1150243

Program: Systems Engineering, Policy Analysis and Management  
Degree: Master of Science (Msc.)  
Faculty: Faculty of Technology, Policy and Management  
University: Delft University of Technology

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Graduation committee

Professor: Prof. Dr. Ir. W. Thissen  
First supervisor: Dr. Ir. A.R.C. de Haan  
Second supervisor: Dr. M.L.C. de Bruijne  
External supervisor: G. de Boer (TomTom)
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1. Introduction to the research

1.1 TomTom

TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation

One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives

TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS' goals.

1.2.1 Rational decision making
Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective
The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions
The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?

2. What does the current decision making process and company culture of TomTom (MS) look like?

3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

5. How did TomTom and its context change?

6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model

Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?

2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline

This paper exists of four parts. The interrelation between them is depicted in Figure 1.

- Research design and justification
  This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.

---

**Figure 1 - report outline**
2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?

2.2.1 Demarcations
Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

2.2.2 Sub research questions
The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

Opportunity identification
1. What are the products TomTom MS has to offer?
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

Opportunity assessment (strategy)

3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

Recommendations on how to implement the selected opportunity (implementation measures)

6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

2.3 Characterization of issues within TomTom Mobility Solutions
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

### 2.3.1 Types of uncertainty and problems

According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems. Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
</tr>
<tr>
<td>Technical problems</td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td>Untamed technical problems</td>
<td></td>
</tr>
<tr>
<td>Political problems</td>
<td>Wicked problems</td>
</tr>
<tr>
<td>Little</td>
<td></td>
</tr>
</tbody>
</table>

### 2.3.2 Three categories of decisions

Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

Table 2 - types of decisions

<table>
<thead>
<tr>
<th>Time range</th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
<td></td>
</tr>
<tr>
<td>Range of individuals or units</td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td>Content</td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td>Means-end relationships</td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td>Type of uncertainty / how to solve</td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
</tbody>
</table>

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

2.3.3 Problem characterization

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to strategic decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

Policy decisions
For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connekt (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear what should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more time is needed to provide some clarity on the issues. But it is also possible that the subject of research is very complex, which increases uncertainty. Last, but not least, it remains difficult to predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A great part of the policy decisions TomTom encounters are untamed technical problems.

Managerial decisions
Managerial decisions come down to one basic question: how should TomTom implement a certain strategy? This question is closely related to the company’s core business. For the majority of products, TomTom has to use sophisticated and innovative technology, which does not yet exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic. The idea of becoming a big player in the field of traffic information was no subject for discussion and existed for a long time. The complexity was in the technology to collect this traffic information. It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification already provided; most of its problems are untamed technical problems (highlighted in Table 1).

2.3.4 Characterization of the case
The case study as described in this chapter contains several elements, also present in the problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting to enter the business- and government market, but wanted more (factual) information on the subject to gain more certainty and to know how to enter the new field. This included creating a better picture of the type of services TomTom could develop and which business and government parties may be interesting. Second, it was also unclear whether these parties were interested in the information of TomTom. This (external) multi-actor aspect is interesting, since this will be even more important in the future. For this reason, TomTom considers the case study representative for the problems they are dealing with, now and in the future (Personal Communication, 2008f). However, an important difference must also be noted. Most problems TomTom deals with affect multiple departments and business units (the internal multi-actor context). The case study is demarcated in such a way that this problem only concerns TomTom Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attentions to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Figure 2 - research methods

Qualitative research

The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

### 3.1.1 Case study

This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

**Reasons for choosing a case study**

There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an *instrument*. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case” (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.

- There may also be an *intrinsic interest* in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom’s business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

**Data collection methods**

Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe...
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant's perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS' decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

3.1.2 Desk research

In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

• Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.

• Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. [...] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as ‘rational decision making methods’.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process.
(see 4.3). Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)

This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next section will provide the reader with an overview of the field of decision making models. Eight separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty

Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty

In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

• **Uncertainty as feelings**

Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in *affect*, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, *affect* functions as a mental shortcut and is therefore also related to *heuristics*. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the *heuristic procedure of availability*, people rely on remembering previous occurrences of the event and their related experiences with that particular event.
- **Uncertainty as analysis**

  Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

- **Uncertainty as politics**

  One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

  These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “… risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts”. Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or **decision support**, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term **decision making** covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

#### Types of models

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. **Descriptive** models can be used to assist description, explanation or help its users to understand complex issues. The **prescriptive**, or normative, type of models does not describe what is, but what ought to be. The last type of models, the **ideal type**, deal “with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired” (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“… most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

Pre-conditions
- Availability of (personal) experience - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.
- Entrepreneurs involved - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

Criticism
Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.
- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a heuristic bias (Bryant, 2007) or a tunnelling of attention (Pech and Cameron, 2006, p. 73).
- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called bounded rationality (Bryant, 2007, p. 735).
- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker’s behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

4.2.2 Political decision models
Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; organizational behaviour and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The **bureaucratic politics** model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the **garbage can model**. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**
There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**
The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

**4.2.3 Routine**
According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• Equality of problems – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

Criticism
• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.
• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: “When you have a hammer, everything looks like a nail” (Personal Communication, 2007a).

4.2.4 Rational decision making – incrementalism

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as “a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

Due to the number of actors involved and the complex nature of problems, Lindblom argues that decision makers stay close to alternatives they are familiar with. This means that decision making at best will result in a small improvement compared to the status quo.

Pre-conditions
• Acceptable status quo – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

Criticism
Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:
• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.
• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, ’t Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing

The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

Pre-conditions
- **Clear standards** - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- **Information available** - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

Criticism
- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning

The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

Pre-conditions
- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
Criticism

- The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

4.2.7 Rational decision making – synoptic model

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions

Simon’s model is based on two assumptions:

- **Full information** - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).

- **Resources available** - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).

- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.

- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable”. This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.
- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.
- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application

Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps

This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- Entrepreneurialism – decisions are made using intuition and ‘gut feeling’.
- Political decision making models (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- Routine – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- Incrementalism – decisions are made by altering the status quo with small steps.
- Satisficing – a decision is based on the first alternative that is found that meets certain standards.
- Mixed scanning – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• *Synoptic model* – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria. By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:
  • Adoption of the decision making results
  • Value of the decision making results
  • Duration of the decision making process (time)
  • Costs of the decision making process
  • Satisfaction with the involvement of people
  • Satisfaction with the comprehensiveness of the decision making process
Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex

Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”, after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: *“Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work”* (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: *“The last issue I can recall was decided upon in three minutes”*. 
When asked who was involved in the decision making, the answer was simple: “The persons who were present at the office at that moment” (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

Whole company

The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
Cameron, 2006). However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proved that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008).

![Figure 5 - certainty curve for TomTom](image)

**Figure 5 - certainty curve for TomTom**

**TomTom's decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

### 5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

**Results: TomTom’s experiences**

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- **Adoption / use** – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- **Value** – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

**Costs: TomTom’s experiences**

- **Duration of the process** – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- **Costs** – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom's experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- **Satisfaction with involvement** – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- **Satisfaction with comprehensiveness** - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

### 5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

#### 5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

**Results: TomTom’s experiences**

- **Adoption / use** – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- **Value** – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
**Costs: TomTom's experiences**

- **Duration of the process** – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- **Costs** – Costs made included the salary of the author and the time and resources spent on supervision. The investment of €10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

**Process: TomTom's experiences**

- **Satisfaction with involvement** – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- **Satisfaction with comprehensiveness** – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of "gut feeling" decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
Figure 6 - costs and uncertainty curve

5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

Table 3 - decision making approaches compared

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Results: TomTom's experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>× Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
<tr>
<td><strong>Costs: TomTom's experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>× Higher than current</td>
</tr>
<tr>
<td><strong>Process: TomTom's experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td>× Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>
6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

• Success and growth

Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

• Increasing external control

Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

• Complexity and growth of competition

TomTom describes the market in which it operates as follows: The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products” (TomTom, 2008c, p. 31).

Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.
  
  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

**Figure 8 - decision making requirements**

### 6.2.1 Involvement

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally...
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

6.2.2 Documentation

The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

6.2.3 Flexibility

The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

6.3 How to achieve them

The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.

- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.

- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions; results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or ‘deciding how to decide’. “Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)” (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner's attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
7.2 The meta-decision making model

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

External factors

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

![Diagram of decision making model](image)

**Figure 10 - meta-decision making model**

**Instruments**

The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

### 7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

![Figure 11 - flowchart legend]

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

### 7.3.1 Entrepreneurial approach (1)

Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

#### Figure 12 - Flowchart entrepreneurial decision making

![Flowchart entrepreneurial decision making](image)

#### 7.3.2 Mixed scanning (2)

The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company’s objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes themselves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

### 7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

#### 7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘-‘ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

**Figure 16 - causal analysis**

The most important finding of this quick causal analysis (Figure 16) is the division between the *desired* level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is *possible* with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not have the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model
The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

![Figure 17 - meta-decision making model improved](image)

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

7.5 Practical use of the meta-decision making model
The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

7.5.1 How to use the model?
The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That's the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. Which theories on (rational) decision making are available within the scientific literature?

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

Eight decision making models

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• **Synoptic model** – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

**Good decision making**

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

*Results of decision making*
- Adoption of the decision making results
- Value of the decision making results

*Costs of decision making*
- Duration of the decision making process (time)
- Costs of the decision making process

*(Satisfaction with the) decision making process*
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. **What does the current decision making process and company culture of TomTom (MS) look like?**

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. **Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?**
Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

• **Success and growth** – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

• **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

6. **What would good decision making look like for TomTom (MS)?**

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

8.1.2 **Main research question answer**

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

> Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

### Table 4 - decision making methods compared

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td><img src="#" alt="✓ Yes" /></td>
<td><img src="#" alt="✓ Yes" /></td>
</tr>
<tr>
<td>Value</td>
<td><img src="#" alt="✓ Flexible" /></td>
<td><img src="#" alt="✓ Transparent" /></td>
</tr>
<tr>
<td></td>
<td><img src="#" alt="✗ Quality risk: too fast" /></td>
<td><img src="#" alt="✓ Quality: involvement of all relevant people" /></td>
</tr>
<tr>
<td></td>
<td><img src="#" alt="✓ Robust" /></td>
<td></td>
</tr>
<tr>
<td>Costs: TomTom’s experiences</td>
<td><img src="#" alt="✗ Time consuming" /></td>
<td><img src="#" alt="✗ Higher than current" /></td>
</tr>
<tr>
<td>Duration of the process</td>
<td><img src="#" alt="✓ Fast" /></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td><img src="#" alt="✓ Very low" /></td>
<td><img src="#" alt="✗ Higher than current" /></td>
</tr>
<tr>
<td>Process: TomTom’s experiences</td>
<td><img src="#" alt="✗ Quality risk: involvement varies strongly" /></td>
<td><img src="#" alt="✓ Easy sharing" /></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td><img src="#" alt="✗ Quality risk: involvement varies strongly" /></td>
<td><img src="#" alt="✓ Easy sharing" /></td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td><img src="#" alt="✓ Sufficient" /></td>
<td><img src="#" alt="✓ Very complete" /></td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

**8.2 Conclusions meta-decision making model**

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

   The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

   One of the most important lessons learned from this research is that there is no 'best' decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

   First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker's own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model

For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model

In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making

When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections

Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods

The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input...
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer/researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation/interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

### 8.4.2 Case characteristics

It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
References


PERSONAL COMMUNICATION (2007b) Verbal conversation between George de Boer and author, December 5. Delft.

PERSONAL COMMUNICATION (2008a) Verbal conversation between Ben Rutten and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008d) Verbal conversation between George de Boer and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008g) Verbal conversation between George de Boer and author, May 19. Delft.

PERSONAL COMMUNICATION (2008h) Verbal conversation between George de Boer and author, May 27. Amsterdam.

PERSONAL COMMUNICATION (2008i) Verbal conversation between Ivar Zantinge and author, April 10. Amsterdam.


_Management Decision, 42_, 243-258.


TOMTOM (2007b) TomTom Mobility Solutions Website.

TOMTOM (2008a) Investor Relations - Historic data.


Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

- **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.

To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

- **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

- **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

- **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

- **Jasper Verdooren – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

- **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
<tr>
<td>2008</td>
<td>1200</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
<tr>
<td>2008</td>
<td>1200</td>
</tr>
</tbody>
</table>
**B.2 Competition**

The PND-market is a very young market. TomTom’s most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

**Table 7 - TomTom’s share price**

<table>
<thead>
<tr>
<th>Percentage Change</th>
<th>Absolute Share Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
</tr>
<tr>
<td></td>
<td>2006</td>
</tr>
<tr>
<td></td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td>3.5</td>
</tr>
<tr>
<td>81.0%</td>
<td>7,116</td>
</tr>
<tr>
<td>162.0%</td>
<td>14,232</td>
</tr>
<tr>
<td>243.0%</td>
<td>18.4</td>
</tr>
<tr>
<td>224.0%</td>
<td>33.3</td>
</tr>
<tr>
<td>181.0%</td>
<td>48.2</td>
</tr>
<tr>
<td>162.0%</td>
<td>63.0</td>
</tr>
<tr>
<td>143.0%</td>
<td>77.9</td>
</tr>
<tr>
<td>124.0%</td>
<td></td>
</tr>
</tbody>
</table>

Share Comparators
- TomTom
- Amsterdam
- AEX
- NavTeq
- Tele Atlas
- Trimble
- SirF
- Garmin
Deciding how to decide:

*The added value of using rational decision making methods within TomTom Mobility Solutions*

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**Master Thesis report**

June 10, 2008

Name: Susan Lagerweij  
E-mail: S.M.Lagerweij@student.tudelft.nl  
Student number: 1150243

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University: Delft University of Technology

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**Graduation committee**

Professor: Prof. Dr. Ir. W. Thissen  
First supervisor: Dr. Ir. A.R.C. de Haan  
Second supervisor: Dr. M.L.C. de Bruijne  
External supervisor: G. de Boer (TomTom)
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1. Introduction to the research

1.1 TomTom

TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation

One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives

TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS’ goals.

1.2.1 Rational decision making
Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective
The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions
The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?
2. What does the current decision making process and company culture of TomTom (MS) look like?
3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?
5. How did TomTom and its context change?
6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model

Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?
2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline

This paper exists of four parts. The interrelation between them is depicted in Figure 1.

- Research design and justification

This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.

**Figure 1 - report outline**
2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008j). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

**Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?**

### 2.2.1 Demarcations

Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

### 2.2.2 Sub research questions

The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

**Opportunity identification**

1. What are the products TomTom MS has to offer?
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. Which interesting parties or segments could be distinguished within the B2B and B2G field?
In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

**Opportunity assessment (strategy)**

3. What are the criteria for a business opportunity to be viable?
The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. Which are the most promising opportunities?
The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. What is the impact of each opportunity on the criteria?
Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

**Recommendations on how to implement the selected opportunity (implementation measures)**

6. What are the business related decisions to make before a new product can be launched?
The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

**2.3 Characterization of issues within TomTom Mobility Solutions**
This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

2.3.1 Types of uncertainty and problems

According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems.

Both knowledge and agreement on the problem are lacking. This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Technical problems</td>
</tr>
<tr>
<td>Little</td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td>Large</td>
<td>Political problems</td>
</tr>
<tr>
<td>Little</td>
<td>Wicked problems</td>
</tr>
</tbody>
</table>

2.3.2 Three categories of decisions

Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

Table 2 - types of decisions

<table>
<thead>
<tr>
<th></th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time range</td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td>Range of individuals or units</td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td>Content</td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td>Means-end relationships</td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td>Type of uncertainty / how to solve</td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
</tbody>
</table>

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

2.3.3 Problem characterization

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to strategic decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

Policy decisions
For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connekt (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear what should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more time is needed to provide some clarity on the issues. But it is also possible that the subject of research is very complex, which increases uncertainty. Last, but not least, it remains difficult to predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A great part of the policy decisions TomTom encounters are untamed technical problems.

**Managerial decisions**

Managerial decisions come down to one basic question: *how* should TomTom implement a certain strategy? This question is closely related to the company’s core business. For the majority of products, TomTom has to use sophisticated and innovative technology, which does not yet exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic. The idea of becoming a big player in the field of traffic information was no subject for discussion and existed for a long time. The complexity was in the technology to collect this traffic information. It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification already provided; most of its problems are untamed technical problems (highlighted in Table 1).

### 2.3.4 Characterization of the case

The case study as described in this chapter contains several elements, also present in the problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting to enter the business- and government market, but wanted more (factual) information on the subject to gain more certainty and to know *how* to enter the new field. This included creating a better picture of the type of services TomTom could develop and which business and government parties may be interesting. Second, it was also unclear whether these parties were interested in the information of TomTom. This (external) multi-actor aspect is interesting, since this will be even more important in the future. For this reason, TomTom considers the case study representative for the problems they are dealing with, now and in the future (Personal Communication, 2008f). However, an important difference must also be noted. Most problems TomTom deals with affect multiple departments and business units (the internal multi-actor context). The case study is demarcated in such a way that this problem only concerns TomTom Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken into account when interpreting the research results (see 8.3).
3. Research methods

This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attention to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project

The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Qualitative research

The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of

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people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

3.1.1 Case study
This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

Reasons for choosing a case study
There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an instrument. Stake describes this as a situation where there is "a need for general understanding, and feel that we may get insight into the question by studying a particular case" (Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.
- There may also be an intrinsic interest in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom's business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

Data collection methods
Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant's perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS’ decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

### 3.1.2 Desk research

In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. [...] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as ‘rational decision making methods’.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process.
Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)
This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next section will provide the reader with an overview of the field of decision making models. Eight separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty
Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty
In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

- **Uncertainty as feelings**
Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**

Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**

One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “… *risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts*”. Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or *decision support*, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term *decision making* covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

**Types of models**

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. *Descriptive* models can be used to assist description, explanation or help its users to understand complex issues. The *prescriptive*, or normative, type of models does not describe what is, but what ought to be. The last type of models, the *ideal type*, deal “*with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired*” (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“… most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

**Pre-conditions**

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.

- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

**Criticism**

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a *heuristic bias* (Bryant, 2007) or a *tunnelling of attention* (Pech and Cameron, 2006, p. 73).

- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called *bounded rationality* (Bryant, 2007, p. 735).

- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker’s behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

**4.2.2 Political decision models**

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; *organizational behaviour* and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The **bureaucratic politics** model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the **garbage can model**. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**

There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**

The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

### 4.2.3 Routine

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• **Equality of problems** – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

**Criticism**

• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.

• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: “When you have a hammer, everything looks like a nail” (Personal Communication, 2007a).

4.2.4 Rational decision making – incrementalism

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as “a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making” (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

Due to the number of actors involved and the complex nature of problems, Lindblom argues that decision makers stay close to alternatives they are familiar with. This means that decision making at best will result in a small improvement compared to the status quo.

**Pre-conditions**

• **Acceptable status quo** – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

**Criticism**

Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:

• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.

• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, 't Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing

The concept of satisficing was derived from the concept of ‘bounded rationality’; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

**Pre-conditions**

- **Clear standards** - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- **Information available** - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

**Criticism**

- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning

The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

**Pre-conditions**

- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
Criticism
• The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

4.2.7 Rational decision making – synoptic model
A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions
Simon’s model is based on two assumptions:
• Full information - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).
• Resources available - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism
As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.
• The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).
• Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.
• Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable”. This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.
- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.
- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
Figure 4 - decision making criteria

4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

### 4.4.2 Practical application

Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

### 4.4.3 Filling in the gaps

This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

### 4.5 Conclusions

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of compromise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• *Synoptic model* – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:

• Adoption of the decision making results
• Value of the decision making results
• Duration of the decision making process (time)
• Costs of the decision making process
• Satisfaction with the involvement of people
• Satisfaction with the comprehensiveness of the decision making process

Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom
Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions
In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature
In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex
Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”, after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: "Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work" (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: "The last issue I can recall was decided upon in three minutes".
When asked who was involved in the decision making, the answer was simple: “The persons who were present at the office at that moment” (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a [...] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

**Whole company**
The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

![Figure 5 - certainty curve for TomTom](image)

**TomTom's decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

**Results: TomTom’s experiences**

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “*Just take a look at our annual figures*” (Personal Communication, 2008d).

- **Adoption / use** – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- **Value** – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

  It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

**Costs: TomTom’s experiences**

- **Duration of the process** – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- **Costs** – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- Satisfaction with involvement – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- Satisfaction with comprehensiveness - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom’s experiences

- Adoption / use – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- Value – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
Costs: TomTom’s experiences

- **Duration of the process** – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

  TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- **Costs** – Costs made included the salary of the author and the time and resources spent on supervision. The investment of € 10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

Process: TomTom’s experiences

- **Satisfaction with involvement** – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- **Satisfaction with comprehensiveness** – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of "gut feeling" decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success.

This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

**Table 3 - decision making approaches compared**

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible&lt;br&gt;✗ Quality risk: too fast</td>
<td>✓ Transparent&lt;br&gt;✓ Quality: involvement of all relevant people&lt;br&gt;✓ Robust</td>
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<tr>
<th>Costs: TomTom’s experiences</th>
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<tbody>
<tr>
<td>Duration of the process</td>
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<td>Costs</td>
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<th>Process: TomTom’s experiences</th>
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<tr>
<td>Satisfaction with involvement</td>
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<td>Satisfaction with comprehensiveness</td>
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6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate its administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

- **Success and growth**

  Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

- **Increasing external control**

  Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

  Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

- **Complexity and growth of competition**

  TomTom describes the market in which it operates as follows: The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products” (TomTom, 2008c, p. 31).

  Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

Figure 7 - influences on TomTom's company configuration

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**

  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**

  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**

  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

![Figure 8 - decision making requirements](image)

**6.2.1 Involvement**

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

6.2.2 Documentation

The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

6.2.3 Flexibility

The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

6.3 How to achieve them

The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.
- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.
- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions; results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or ‘deciding how to decide’. “Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)” (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner's attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).
Figure 9 - the system of decision making

7.2 The meta-decision making model

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axle, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

External factors

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

Figure 10 - meta-decision making model

Instruments
The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

### 7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

![Figure 11 - flowchart legend](image)

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

7.3.1 Entrepreneurial approach (1)

Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

![Flowchart Entrepreneurial Decision Making](image)

**Figure 12 - flowchart entrepreneurial decision making**

7.3.2 Mixed scanning (2)

The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.

Figure 13 - flowchart mixed scanning
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company’s objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

![Flowchart](image)

**Figure 15 - flowchart rational decision making**

### 7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes themselves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘-’ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not has the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model

The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

**7.5 Practical use of the meta-decision making model**

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

**7.5.1 How to use the model?**

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That’s the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker's own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

| Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come? |

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. Which theories on (rational) decision making are available within the scientific literature?

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

Eight decision making models

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making" (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• *Synoptic model* – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

**Good decision making**

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

*Results of decision making*
- Adoption of the decision making results
- Value of the decision making results

*Costs of decision making*
- Duration of the decision making process (time)
- Costs of the decision making process

*(Satisfaction with the) decision making process*
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. **What does the current decision making process and company culture of TomTom (MS) look like?**

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. **Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?**
Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

• Success and growth – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

• Increasing external control – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

6. **What would good decision making look like for TomTom (MS)?**

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.

- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

8.1.2 **Main research question answer**

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

> Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis...
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

Table 4 - decision making methods compared

<table>
<thead>
<tr>
<th>Results: TomTom's experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>× Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
<tr>
<td>Costs: TomTom's experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>× Higher than current</td>
</tr>
<tr>
<td>Process: TomTom’s experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td>× Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

8.2 Conclusions meta-decision making model

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

   The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

   One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

   First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.
8.3.1 Evaluation of meta-decision making model

For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model

In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making

When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections

Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods

The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer / researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation / interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

8.4.2 Case characteristics
It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
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Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

• **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.
  To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

• **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

• **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

• **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

• **Jasper Verdooren – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

• **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends
This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth
TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of TomTom employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>200</td>
</tr>
<tr>
<td>2004</td>
<td>400</td>
</tr>
<tr>
<td>2005</td>
<td>600</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>1000</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue TomTom (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>0</td>
</tr>
<tr>
<td>2004</td>
<td>200</td>
</tr>
<tr>
<td>2005</td>
<td>400</td>
</tr>
<tr>
<td>2006</td>
<td>600</td>
</tr>
<tr>
<td>2007</td>
<td>800</td>
</tr>
</tbody>
</table>
### B.2 Competition

The PND-market is a very young market. TomTom's most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

#### Table 7 - TomTom's share price

<table>
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<tr>
<th>Percentage Change</th>
<th>Absolute Share Price</th>
<th>Share Comparators</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>77.9</td>
<td>TomTom</td>
</tr>
<tr>
<td>2006</td>
<td>63.0</td>
<td>Amsterdam</td>
</tr>
<tr>
<td>2007</td>
<td>48.2</td>
<td>AEX</td>
</tr>
<tr>
<td></td>
<td>33.3</td>
<td>NavTeq</td>
</tr>
<tr>
<td></td>
<td>18.4</td>
<td>Tele Atlas</td>
</tr>
<tr>
<td></td>
<td>3.5</td>
<td>Trimble</td>
</tr>
<tr>
<td></td>
<td>14,232</td>
<td>SirF</td>
</tr>
<tr>
<td></td>
<td>7,116</td>
<td>Garmin</td>
</tr>
</tbody>
</table>

Volume (In 1000s)
Deciding how to decide:

*The added value of using rational decision making methods within TomTom Mobility Solutions*

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**Master Thesis report**

June 10, 2008

Name: Susan Lagerweij  
E-mail: S.M.Lagerweij@student.tudelft.nl  
Student number: 1150243

Program: Systems Engineering, Policy Analysis and Management  
Degree: Master of Science (Msc.)  
Faculty: Faculty of Technology, Policy and Management  
University: Delft University of Technology

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**Graduation committee**

Professor: Prof. Dr. Ir. W. Thissen  
First supervisor: Dr. Ir. A.R.C. de Haan  
Second supervisor: Dr. M.L.C. de Bruijine  
External supervisor: G. de Boer (TomTom)
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1. Introduction to the research

1.1 TomTom
TomTom is the European market leader for personal navigation products and services. Since its foundation in 1991, TomTom’s growth and innovation created one of the most successful stories within the consumer electronics field. Annual growth rates of more than 100 percent in revenue and number of people hired are not unfamiliar for a company like TomTom (TomTom, 2007a, p. 25). As a result of its success, the company’s shares were listed on the Amsterdam Stock Exchange in 2005.

Growth of such an order has its effect on the organization. There is an urgent need for qualified people, but considering the current economic situation, it is a hard task to hire enough well-educated people. Consequently, TomTom has a serious lack of human resources and needs to make well-balanced decisions on where to spend those resources on.

1.1.1 TomTom’s challenge: resource allocation
One of TomTom’s most important strengths is the way new ideas are generated within the company. Many good and innovative ideas are available. However, having good ideas is not enough in order to launch innovative products and services. Resources are needed to develop, implement and operate these products and services. As mentioned earlier, the lack of qualified human resources is a major problem for TomTom. This implies that not all generated ideas can be implemented. When hiring new employees is very difficult, effective allocation of people is the only way to make sure there are resources available to develop the best ideas. TomTom needs to make well-balanced decisions on which ideas to develop further and where to assign people to.

1.2 Problem statement and research objectives
TomTom is changing rapidly. Its success, growth and the fact that there are shareholders involved influences the number and impact of decisions that need to be taken. One may ask whether the currently used decision making processes still stroke with the changing environment and company, and lead to the most effective way of achieving TomTom’s goals. This doubt is supported by the literature: according to Mintzberg (1983), a changing company asks for a different way of decision making. Furthermore, this question is also raised by employees from TomTom Mobility Solutions (hereafter: TomTom MS); they have a feeling that their decision making is somewhat chaotic and should become more rationalized (Personal Communication, 2007b). This preference towards rational decision making is very recognizable: there is a large group of people that favor the rational approach over feelings and emotions when it comes to (strategic) decision making and consequently, rationality was placed on a pedestal (Slovic et al., 2004, p. 313).

In order to find out whether TomTom MS needs more rationality in its decision making processes, rational methods will be applied to a case. This case concerns decision making for TomTom MS, on a strategic level. By evaluating the methods used with the people from
TomTom, conclusions will be drawn on which decision making approach contributes most to achieving TomTom MS’ goals.

1.2.1 Rational decision making

Rational decision making is a term that is widely applied. Therefore, it is necessary to be precise in what is meant with rational decision making in this report. Koppenjan and Klijn (2004) distinguish four approaches to decision making, of which the rational approach is one. A couple of features, characteristic for this approach, are mentioned:

- The problem solving process is split up in a number of phases, including problem formulation, the identification of solutions and the evaluation of these solutions.
- The rational decision making approach knows an individual, central decision maker, who makes his decisions on the basis of as much information as possible.
- The success of decision making is closely related to the achievement of clearly formulated objectives.

Four specific decision making models are mentioned in relation to the rational decision making approach: the rational synoptic model, incrementalism, satisficing and mixed scanning. These four models will be elaborated upon in Chapter 4. All models lead towards a rational decision: “a scientifically grounded answer to a well defined problem, in which appropriate means are sought on the basis of a given objective” (Koppenjan and Klijn, 2004, p. 46).

1.2.2 Research objective

The research objective is:

To investigate and evaluate the value of rational decision-making methods and the relationship between decision-making methods and company characteristics. This will be done using a case-study and theories available.

1.3 Research questions

The topic described under the research objective will be investigated by evaluating the use of rational decision making methods within one company: TomTom. The application of these methods to the TomTom MS case will be evaluated through the following research question:

Does the use of rational decision models lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?

In order to answer this research question a comparison needs to be made between the current decision-making processes and the more rational oriented processes applied to the case. These results will be compared to the arguments that can be found within the literature. This is captured by six sub research questions:
1. Which theories on (rational) decision making methods are available within the scientific literature?
2. What does the current decision making process and company culture of TomTom (MS) look like?
3. Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?
4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?
5. How did TomTom and its context change?
6. What would good decision making look like for TomTom (MS)?

The first research question will also cover the literature on what ‘good’ or ‘better’ decision making exactly means. This definition will be used to answer sub-question 3 and the main research question.

1.3.1 Additional research question – decision making model
Using the results from the literature research, a model will be developed that all private organizations (including TomTom MS) can use for choosing the appropriate decision making method when facing issues covering other topics and contexts.

How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

Experiences with the methods used for the case will be used in order to decide which elements should be captured by the model and which not. These considerations are structured with the following two sub-questions:

1. What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?
2. How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?

The experiences of TomTom will be used; however, the model should also be useful for other private organizations as well. Special attention will be paid to user friendliness of the model and the practical application of it. These are important aspects for them to use the model in the future.

1.4 Report outline
This paper exists of four parts. The interrelation between them is depicted in Figure 1.
• Research design and justification
This part covers this introduction, Chapter 2 and Chapter 3. Chapter 2 contains a detailed description of TomTom MS and the case that is solved for TomTom MS. Chapter 3 explains
which research methods are used for which reason and whether it is possible to answer the research questions with these methods.

- **Theoretical background**
  Chapter 4 provides the theoretical background, covering topics like uncertainty and decision making. This theoretical background will be used in comparison with the research results.

- **Research results**
  Chapter 5 contains most of the answers of the sub-questions. By combining the theoretical findings of Chapter 4 and the experiences of the people of TomTom MS, more insight is created in the current decision making methods TomTom (MS) uses and what would be the best decision making approach for them. Chapter 6 contains the evaluation of the rational decision making methods applied to the case, from a TomTom MS and researcher point of view. At last, Chapter 7 describes the general decision making model that was developed using the research results and theoretical findings.

- **Conclusions**
  This research report ends with conclusions and recommendations.

---

**Figure 1 - report outline**

2. Context of the research: TomTom Mobility Solutions and case description

This Master Thesis research is focused towards decision making processes within TomTom MS. The first part of this chapter contains a more detailed description of TomTom MS. The second part elaborates on the case needed to conduct this research; an issue where rational decision making methods could be applied to. The second section will show that the reason for initiating the decision making process which is the subject of this research are opportunities perceived by TomTom MS.

2.1 TomTom Mobility Solutions

TomTom develops products with an emphasis on innovation, ease of use and quality, in order to attract more customers and to make a profit. An important contribution to offering high-quality navigation services is made by integrating dynamic content with navigation. An example of this content is information such as traffic conditions, weather forecasts and the latest speeding camera positions.

The main objective of the business unit TomTom MS is acquiring this high-quality dynamic content (Personal Communication, 2008j). Right now, the focus has been mainly on the development, implementation and operation of innovative traffic information services. One of the most promising traffic information services is High Definition Traffic (HD Traffic), launched in November 2007 in the Netherlands. An HD Traffic navigation device makes sure that people have the latest and most accurate traffic information available. This enables people to make better decisions on time of departure and route, in order to avoid delays as much as possible.

In order to deliver this accurate traffic information, the core activity of TomTom MS is the collection of traffic information. This is achieved by combining as much information sources as possible (like information retrieved from the Vodafone network and 3rd party information) and translating this data into real traffic information. This advanced technology makes sure that TomTom has the most accurate traffic information available in the Netherlands, covering the largest road network (TomTom, 2007b). Roll-out of the same technology in other countries is scheduled and of high priority.

2.2 Case: exploring B2B and B2G opportunities

Right now, this traffic information is mainly used for HD Traffic, a consumer product. Nevertheless, there is reason to believe that this information could be used for other purposes and services as well. In this regard, TomTom MS is especially interested in the ways the same traffic information can be used to serve businesses and governments (besides consumers). Exploring the Business-to-Business (B2B) and Business-to-Government (B2G) opportunities may not be directly useful for achieving TomTom MS’ own specific goals (the collection of high-quality dynamic content), but are nevertheless very valuable for achieving TomTom’s higher level goals. One can easily imagine that exploiting B2B and B2G opportunities could contribute to TomTom’s
profit and good reputation. The assignment can be summarized in the main research question for the case:

Which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach?

**2.2.1 Demarcations**

Considering the fact that this research will be conducted for TomTom MS and taking the scope of the master thesis project into account, two important demarcations concerning these B2B and B2G opportunities are made:

- The opportunities should be chosen in such a way that only traffic information already available within TomTom MS will be used and transformed into other end-products.
- TomTom MS should be able to develop, implement and operate the identified opportunities by themselves, without the need to cooperate intensively with other business units or third parties. This enables TomTom MS to launch new products in a relatively short time-span, which makes sure they will be the first to launch such a product. Being independent from other business units or third parties also gives TomTom MS more control and flexibility concerning the quality of the products and services delivered. This vision is in line with the general TomTom vision on keeping core activities in-house (TomTom, 2008c, p. 11).

The opportunities that do not fulfil these requirements may be very interesting, but are also more complex and more time is needed to develop and launch them. For this research they will be left out of consideration.

The two demarcations are a barrier for applying fully rational methods (since that implies that all possibilities should be taken into account). However, the demarcations could not be ignored since they were of high priority for TomTom MS, one of the most important stakeholders of this research. Therefore, a quick assessment was made of to what extent these demarcations would influence the research. The first demarcation will primarily influence the number of opportunities that will be identified and selected for further assessment (sub-question 1). The second demarcation covers operational aspects (sub-question 6). The demarcations concern only two sub-questions, which do not touch the most important part of the case (the assessment of opportunities using rational methods and making the decision). For this reason, the author believed that the case study could still be used to test rational decision making methods. The influence of the demarcations on the research results is considered acceptable.

**2.2.2 Sub research questions**

The exploration of B2B and B2G opportunities covers three basic steps: opportunity identification; opportunity assessment and recommendations on how to implement chosen opportunities. Each step consists of one or more sub research questions.

**Opportunity identification**

1. What are the products TomTom MS has to offer?
New products and services needed to be formulated. As mentioned under section 2.2.1, existing information had to be used as a basis for these products. An overview of the available (traffic) information was made, and starting-points for new products or services were identified. Other sources of information were brainstorms and ideas already defined by TomTom MS. This sub-question resulted in short descriptions of each type of product.

2. **Which interesting parties or segments could be distinguished within the B2B and B2G field?**

In the B2B and B2G area, interesting parties or segments were defined. A number of ideas on this topic were already available within TomTom MS. New parties or segments were found by doing desktop research. The answer to this sub-question is a list of interesting parties and segments, and a short, structured argumentation what makes them interesting potential customers.

**Opportunity assessment (strategy)**

3. **What are the criteria for a business opportunity to be viable?**

The first sub-question provides more clarity on the exact meaning of ‘viable’. Objectives and criteria are bound to a specific actor. The specific criteria for TomTom MS are formulated by interviewing people from TomTom MS. In order to answer this research question with a structured list of criteria, the results of these interviews were structured in objectives and causal analyses.

4. **Which are the most promising opportunities?**

The products, segments and parties from the second and third sub-question together will form opportunities. That’s why an opportunity is formulated as a combination between a product and segment. At the same time, profiles of parties with the same needs could be distinguished, which resulted in grouping these parties together in so-called clusters of opportunities.

5. **What is the impact of each opportunity on the criteria?**

Rational methods were used in order to provide more clarity on the interrelations between opportunities (sub-question 4) and the criteria (sub-question 1). Examples of methods used are Multi-Criteria Decision Analysis (MCDA) methods such as SMART and scorecards, and causal analysis. Applying these methods resulted in a clear advice to TomTom Mobility Solutions on which opportunities to develop further and which not, based on the information available. A selection of 5 clusters of opportunities was made together with the people from TomTom Mobility Solutions.

**Recommendations on how to implement the selected opportunity (implementation measures)**

6. **What are the business related decisions to make before a new product can be launched?**

The business related decisions refer to the choices that need to be made before a product can be developed and implemented. Examples of these decisions concern pricing mechanisms (the possibility to offer services for free), the set-up of pilot projects and target countries.

**2.3 Characterization of issues within TomTom Mobility Solutions**

This section characterizes issues within TomTom (MS) in terms of uncertainty and type of problems. The first two parts provide a classification scheme derived from the relevant literature.
The schemes are used to classify the majority of issues relevant for TomTom (MS). Second, the subject of the case study is analysed as well. Characterizing TomTom’s issues is important when to decide upon which decision making method fits TomTom (MS), but it can also be used in order to clarify whether the case is representative for most of the issues TomTom has to deal with and to reflect later on the case used for this research.

2.3.1 Types of uncertainty and problems

According to Koppenjan and Klijn (2004), there are two sources of substantive uncertainty: a lack of certainty on scientific knowledge and a lack of consensus on what (the nature of) the problem is. Combining these two sources results in four types of problems:

- **Technical problems** – This type of problems is the least complex type, and can simply be solved by conducting some research.
- **Untamed technical problems** – This type of problems includes those problems where there is agreement about the problem and the fact that it must be solved. However, there is uncertainty about how to solve the problem.
- **Political problems** – Sometimes, (technical) solutions are available, but people cannot come to an agreement whether it is appropriate to use these solutions for a specific problem. Controversial technologies are often associated with these types of problems.
- **Wicked problems** – This type of problems represents the most complex type of problems. Both knowledge and agreement on the problem are lacking.

This classification of four types of problems is summarized in Table 1 (derived from Koppenjan and Klijn, 2004, p. 29).

<table>
<thead>
<tr>
<th>(Societal) agreement on problem formulation</th>
<th>Certainty on (scientific) knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
</tr>
<tr>
<td>Large</td>
<td>Technical problems</td>
</tr>
<tr>
<td>Little</td>
<td>Untamed technical problems</td>
</tr>
<tr>
<td>Little</td>
<td>Political problems</td>
</tr>
<tr>
<td></td>
<td>Wicked problems</td>
</tr>
</tbody>
</table>

2.3.2 Three categories of decisions

Peterson (1972) provides a very useful framework for classifying decisions. He distinguishes three levels of decisions: policy decisions; managerial decisions and operating decisions. He distinguishes them by using four dimensions: time range, individuals or organizational units affected; content and means-end relationships. He goes beyond classification of decisions; he also gives starting-points on the most appropriate structure for solving them, making a distinction in where the disagreement can be found. He therefore makes the same distinction in uncertainty as Koppenjan and Klijn, although given another name (derived from the work of Herbert Simon). For each decision, he identifies a “value” component, which captures arguments on the
imperative quality and ethical issues. The other component concerns facts and figures (knowledge). The three types of decisions are summarized in Table 2.

Table 2 - types of decisions

<table>
<thead>
<tr>
<th></th>
<th>Policy decisions</th>
<th>Managerial decisions</th>
<th>Operating decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time range</strong></td>
<td>Long term</td>
<td>Mid range</td>
<td>Short term</td>
</tr>
<tr>
<td><strong>Range of individuals or units</strong></td>
<td>All affected</td>
<td>Fewer than policy</td>
<td>Small range</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Strategies, goals, priorities.</td>
<td>Resource allocation, coordination of efforts, conflict mediation.</td>
<td>How to carry out programmes. Schedules, fund allocation.</td>
</tr>
<tr>
<td><strong>Means-end relationships</strong></td>
<td>Obtaining agreement on desired ends for the institution (goals).</td>
<td>Agreement on ends, disagreement on means.</td>
<td>Agreement on ends and means, discussion on implementation and details.</td>
</tr>
<tr>
<td><strong>Type of uncertainty / how to solve</strong></td>
<td>Value aspect very high, factual aspect low. Emphasis on compromise and agreement on value.</td>
<td>Value aspect decreased, factual aspect increased. Greater analytical effort required.</td>
<td>Low value content, high factual content. Routine administrative procedure.</td>
</tr>
<tr>
<td><strong>Type of problems</strong></td>
<td>• Political problems</td>
<td>• (Untamed) technical problems</td>
<td>• Technical problems</td>
</tr>
</tbody>
</table>

Table 2 goes beyond the work of Peterson. Taking the type of uncertainty into account, a translation is made into the type of problems that is most likely to be encountered in a particular decision making category (using the classification of Koppenjan and Klijn). This means that it is very likely that decisions on a policy level concern political or wicked problems. Decisions on management level can often be classified as (untamed) technical problems, whereas operating decisions are likely to be problems of a technical nature. The next part of this section will examine whether this also holds for TomTom MS.

2.3.3 Problem characterization

For each level of decisions (policy, managerial and operating) two factors will be examined: the agreement on problem formulation (or value component) and the certainty on scientific
knowledge (the factual component). This will lead to a classification which type of problems TomTom faces most concerning that category of decisions. The operating decisions are left out of consideration. The problem statement (described in 1.2) narrowed the research topic to strategic decision making. It is assumed that strategic decision making takes place on policy level, and also to some extent at managerial level. However, it is very unlikely that strategic decisions are made on the operating level, which is therefore not included in this section.

**Policy decisions**

For the agreement on problem formulation on the highest decision level, it is interesting to take the environment of TomTom into account. TomTom operates in a multi-actor environment; which can be illustrated by the fact that TomTom cooperates with several organizations like Vodafone, ANWB, the Red Cross, Connect (the Dutch ITS organization, where Lucien Groenhuijzen from TomTom Mobility Solutions is a board member), DHV, the Ministry of Transport and Rabobank (Personal Communication, 2008f). This multi-actor environment will become even more important in the future, due to a number of trends. First, TomTom’s position in society is becoming more visible. A clear example is the involvement of TomTom in the Dutch traffic congestion debate. But it extends itself to other societal issues, for instance parking in large cities. A recent example of this was given by a Dutch Assistant Secretary who wanted to know why TomTom does not provide parking information and argued why TomTom should do that (Wierenga, 2008). Second, TomTom is expanding its business to a large number of new countries. Obviously, this leads to the involvement of new parties (for example mobile operators and governments). The multi-actor environment is becoming more and more important for TomTom, but does not immediately lead towards little (societal) agreement on problems. There are two reasons for this. First, TomTom is a private actor (as opposed to a public organisation). This means that TomTom has a couple of strong objectives to pursue, and will do everything in its scope in order not to stay involved in projects that do not contribute to, or even go against, these objectives. This can be illustrated by the example of the decision that TomTom needed to make concerning participation in the National Data Warehouse, set up by the Dutch government. There were some preconditions for participation that would go against important values of TomTom. Hereupon, TomTom decided not to get involved in the NDW at all; and consequently, to avoid issues around reaching agreement with the NDW (NM Magazine editorial, 2007). Second, in contrast with other private parties operating in the traffic information market, TomTom owns a great part of the whole chain of information collection, processing and distribution. This results in a position where TomTom is independent from suppliers to a large extent.

Most of the time, there is agreement on objectives on the long term. However, it is not always clear what should be done in order to reach those goals, so a large share of the discussions on policy level concerns strategy formulation. TomTom tries to solve this in a rational way, instead of letting emotional (or political) arguments getting the overhand (Personal Communication, 2008h). It cannot be denied that TomTom faces political games to some extent (internal, but also with third parties), but the majority of complexity of issues TomTom (MS) has to deal with is caused by a lack of certainty on (scientific) knowledge. There are several factors that could cause a lack of
(scientific) knowledge. It could be the result of the fact that research is in its early phase and more
time is needed to provide some clarity on the issues. But it is also possible that the subject of
research is very complex, which increases uncertainty. Last, but not least, it remains difficult to
predict the future (Koppenjan and Klijn, 2004). This last reason may be the most relevant for
TomTom, taking its highly dynamic and unpredictable environment into account.

Considering these arguments, it can be concluded that there is large agreement on problem
formulation and goals, whereas scientific knowledge on how to achieve those goals is lacking. A
great part of the policy decisions TomTom encounters are untamed technical problems.

**Managerial decisions**

Managerial decisions come down to one basic question: *how* should TomTom implement a
certain strategy? This question is closely related to the company’s core business. For the majority
of products, TomTom has to use sophisticated and innovative technology, which does not yet
exist at the moment the problem arises. This can be illustrated by the recent launch of HD Traffic.
The idea of becoming a big player in the field of traffic information was no subject for discussion
and existed for a long time. The complexity was in the technology to collect this traffic information.
It took years to develop it up to a level of good quality.

For decisions on a management level, it can be stated that TomTom follows the classification
already provided; most of its problems are untamed technical problems (highlighted in Table 1).

**2.3.4 Characterization of the case**

The case study as described in this chapter contains several elements, also present in the
problems TomTom has to deal with (in the future). First, TomTom MS knew that it was interesting
to enter the business- and government market, but wanted more (factual) information on the
subject to gain more certainty and to know *how* to enter the new field. This included creating a
better picture of the type of services TomTom could develop and which business and government
parties may be interesting. Second, it was also unclear whether these parties were interested in
the information of TomTom. This (external) multi-actor aspect is interesting, since this will be
even more important in the future. For this reason, TomTom considers the case study
representative for the problems they are dealing with, now and in the future (Personal
Communication, 2008f). However, an important difference must also be noted. Most problems
TomTom deals with affect multiple departments and business units (the internal multi-actor
context). The case study is demarcated in such a way that this problem only concerns TomTom
Mobility Solutions and thus avoids the internal multi-actor complexity. This aspect will be taken
into account when interpreting the research results (see 8.3).
3. Research methods
This chapter answers the question whether the research methods used are appropriate for answering the research question. The research question contains different topics, which should all be properly addressed by using the chosen research methods. The purpose of this research, as formulated in the research question, is to find out whether the use of rational decision making methods (1) leads towards better decision making (2) within TomTom, keeping the historical context (3) and situations to come in mind.

The first section explains and justifies the choice for a case study as the central research method, and will relate to the second and third part of the research question (number 2 and 3). The second section pays attentions to the methods used to solve the case; it will be clarified whether these methods can be classified as rational decision making methods (which relate to the first part of the research question). The third section will summarize the main findings of this chapter.

3.1 Research methods used for Master Thesis project
The choice for a particular research method requires some deliberation. There are three aspects that should be taken into account by such a decision (Creswell, 2003): the research problem, personal experiences of the researcher and the audience the report will be written for. These three aspects will be referred to in next sections.

Figure 2 presents the choices that had to be made in order to arrive at a sound research strategy. The classification is derived from the work of Creswell (2003). This section describes the reasons for selecting a qualitative research approach, and the choices for accompanying research- and data collection methods. The position of literature research, as an indispensable part of a master thesis research, is also clarified.

Figure 2 - research methods

Qualitative research
The central research method for this master thesis project is a case study (as described under Chapter 2). A case study belongs to the group of qualitative research. “Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach is new, the topic has never been addressed with certain sample or group of
people, or existing theories do not apply with the particular sample or group under study” (Creswell, 2003, p. 22). In this case, the topic of decision making is never addressed within TomTom MS to this extent, which was one of the reasons for seeking a proper research method among the qualitative research methods. There are a number of characteristics of qualitative research, which are very relevant for this study (adapted from Creswell, 2003).

- Qualitative research is conducted where the events of interests occur. For this master thesis study, the author was located at the TomTom office in Amsterdam for 7 months.
- To a large extent, the data is collected through the researcher. In collecting this data for this case, the author was especially interested in understanding how decision making occurred.
- The data collected is descriptive, rather than quantitative. This is closely related to the focus on perceptions and experiences of the participants.

3.1.1 Case study

This section describes the reasons for choosing a case study and which specific data collection methods were used in order to carry out the case study.

Reasons for choosing a case study

There are two ways to use a case study for research, and they were both applicable to this master thesis project.

- A case study can be used as an instrument. Stake describes this as a situation where there is “a need for general understanding, and feel that we may get insight into the question by studying a particular case”(Stake, 1995, p. 3). The problem statement in Chapter 1 describes the uncertainty about which decision making method is best for TomTom MS. A case study, where specific decision making methods are used on a demarcated subject, provides more insight whether these decision making methods are useful for TomTom MS. Conclusions drawn from the case study can even be used to find new scientific insights on decision making in general.
- There may also be an intrinsic interest in a particular case, which is a reason to investigate it. TomTom MS has a special interest in the case results, since they can be used to improve TomTom’s business. TomTom MS is part of the audience the research is conducted for, which provided the second reason to investigate the research question by using a case study.

Data collection methods

Performing a case study is characterized by qualitative data and research methods. The use of these methods enabled the author to get a deep understanding of the subject. Qualitative research methods do not only provide data, but also enable the researcher to discover the reason behind certain events or decisions. For this case study, the data collection methods used comprises interviews and the author’s observations.

The observations are made while the participants from TomTom knew the role of the researcher. Being on the site for a longer period had the advantage that the author could observe
decision making within TomTom MS directly while it actually took place. The interviews (mainly one-on-one interviews) with participants complemented the observations by providing historical information and the participant's perception on decision making. Appendix A contains a list of the respondents, their background and the reason they were selected.

The observations, made by both the author and respondents, concerned a larger group of people: all employees who work for TomTom MS. The interviews and observations made sure that first-hand information on decision making within TomTom MS was available, which is the primary focus of this research (see Chapter 1). However, for a complete analysis of TomTom MS' decision making and its broader context, it was also necessary to draw conclusions on decision making within the whole company of TomTom (see Chapter 5). Unfortunately, it was not possible to attend board-meetings; therefore, the experiences of the employees of TomTom MS were used for data collection on this point. The lack of first-hand information is, taken the small contribution of this particular analysis to the research into account, not seen as insurmountable.

The major drawback of using these qualitative methods is the questionable reliability, due to the interpretive and subjective character of qualitative research. For example, the observer could influence the findings by his own personal view and beliefs. In interviews, the respondent may filter his answers through his own view (Creswell, 2003, de Neufville, 1998).

Nutt (2001) encountered the same problem in his evaluation of decision making. He describes that studying decision making often relies on subjective measures by a lack of objective indicators. For this research, it was concluded that there was no other option than to use qualitative and subjective data collection methods and consequently, to deal with the drawbacks and to keep them in mind by formulating the conclusions of this research (see also Chapter 8).

### 3.1.2 Desk research

In addition to the qualitative approach selected and clarified in the previous section, an additional literature review is essential for various reasons. This section lists the reasons mentioned by Creswell (2003) and applicable to this research.

First of all, knowledge of the existing literature was of good use in the preparatory stage of the research. Good literature research helped in determining the scope and importance of the proposed research. Secondly, the literature review fulfils a crucial role within the research report. This function is twofold:

- Literature is used to ‘frame’ the problem. A literature review provides the reader with more insight in the research field related to the master thesis’ topic. It relates one single study to a broader field and hence, its importance can be conveyed.
- Literature research foresees in material the case study results can be compared and contrasted with.

The literature can be found in the introduction of this report (primarily to frame the problem), in a separate section (summarizing broad themes) and at the end of this report (to compare the case study results with).
3.2 Research methods used within the case study

The central question of the case study is which viable B2B and B2G opportunities for TomTom MS can be identified and assessed using the (classical) rational decision making approach. However the subject and means to solve the case study are already defined, it still left plenty of methods to choose from. The methods used for the case study are mentioned in this section.

3.2.1 Rational decision making methods

When selecting the specific methods for conducting the case research in a rational way, insights from the field of policy analysis were used. The field of (public) policy analysis covers a large number of topics, varying in overlap with the topics encountered in private organizations. For example, there is great difference in multi-actor issues in the public or private field. On the other side, similarities can be found with respect to the application of rational decision making methods in both public and private decision making. This can be illustrated by comparing the definition of (public) policy analysis with the goals TomTom wants to achieve with the case study.

In his paper, Walker (2000) gives a brief examination of the policy analysis field, applied to the public sector. Walker gives the following review: “Policy analysis is a rational, systematic approach to making policy choices in the public sector. It supports policymakers in identifying policies that are cost-effective and that would help them to achieve their policy goals and objectives. [...] The traditional policy analysis process generates information on the consequences that would follow the adoption of various policies. (This is sometimes referred to “what if” analysis.) It uses a variety of tools to develop this information and to present it to the parties involved in the policymaking process in a manner that helps them come to a decision” (Walker, 2000, p. 3). Policy analysis shows great similarity with the goals of the TomTom MS case study. It contains the same elements of opportunity (or policy) identification, based on criteria (objectives) and the calculation of the consequences of these opportunities. Therefore, the author believed it justified to use insights from the (public) policy analysis field for the selection of methods for the TomTom case.

Concerning the selection of methods, Walker speaks of ‘a variety of tools’. To be more precise about which tools are meant, the policy analysis methods described by Bots (2002) were used. The following methods were selected: for the opportunity identification, objectives analysis and causal analysis were used. For the opportunity assessment, score cards and the SMART-method were used. Data collection methods were desktop research and interviews with people from TomTom.

3.3 Conclusions

By introducing this chapter, three parts of the research question were highlighted, which should be addressed by the research methods selected.

- The first part concerned rational decision making methods. Section 3.2.1 showed that the methods used to solve the case can be classified as 'rational decision making methods'.
- The second part spoke of evaluating decision making. Evaluating decision making is closely related to the participants’ perceptions about costs, results and the decision making process
(see 4.3). Section 3.1 explains that qualitative research is meant for research where perceptions and experience are more important than hard facts. Therefore, qualitative research can be seen as an appropriate method to evaluate decision making.

- The last part referred to the context TomTom operates in (now and in the future). It is argued that the case, subject of this research project, covers topics TomTom Mobility Solutions typically deals with, in the past and in the future (3.1.1).

All three parts of the research question are dealt with by using these research methods. As a conclusion it can be stated that the research question can be answered using these research methods.
4. Decision making (theory)

This chapter will provide the theoretical background, necessary for relating the research subject to a broader context. Theoretical models discussed in this chapter will also be used to compare the research results with.

The first section will elaborate on the concept of uncertainty, and ways to deal with it. The next section will provide the reader with an overview of the field of decision making models. Eight separate models, relevant for this study, were distinguished and described. Since there is no such thing as ‘the best decision making model’, section 3 explains how to define good decision making. During the research, some gaps in the literature were identified and summarized in the third section. The fifth section describes what gap there exists in the theory, and in what way this research could make a contribution. This chapter ends with a short description of the main conclusions.

4.1 Uncertainty

Uncertainty is a very broad concept and it is beyond the scope of this research to get into the details of it. Although they are closely related, it is useful to make a first distinction between uncertainty and risk. “Distinctions are often made between risk and uncertainty: risk is typically viewed as something that can be described in statistical terms, and uncertainty characterizes situations in which potential outcomes are not fully understood” (Miller and Lessard, 2000, p. 76).

4.1.1 How to deal with uncertainty

In order to describe how to deal with uncertainty, the work of Slovic et al. (2004) was used. They describe ways of dealing with risk. They use the term ‘risk’ for the same situations that are defined as ‘uncertain’ by Miller and Lessard (situations in which potential outcomes are not fully understood). Therefore, the author believes that in this case the work of Slovic et al. can be used to describe ways of dealing with uncertainty.

There are two fundamental ways uncertainty is confronted and dealt with: one can regard uncertainty as feelings, or as analysis. Sometimes, a third way is added to that list: uncertainty as politics.

- **Uncertainty as feelings**

Dealing with uncertainty according to the “experiential system” is “intuitive, fast, mostly automatic, and not very accessible to conscious awareness” (Slovic et al., 2004, p. 311). Intuition, instinct and gut feeling are captured in affect, a response that tells rapidly whether something feels ‘good’ or ‘bad’. In this sense, affect functions as a mental shortcut and is therefore also related to heuristics. This is underlined by Morgan and Henrion (1990) who argue that people making judgements under uncertain circumstances use heuristics. One of these heuristics, derived from earlier work of Kahneman, Slovic and Tversky, is called the heuristic procedure of availability; people rely on remembering previous occurrences of the event and their related experiences with that particular event.
• **Uncertainty as analysis**

Another way to deal with uncertainty is using the “analytic system”. This includes using algorithms, probability calculations, formal logic and risk assessment. Dealing with uncertainty in such a way implies that immediate action is excluded, since performing the required calculations and assessments takes time.

• **Uncertainty as politics**

One can speak of uncertainty as a political process when instincts clash with scientific analyses. In that case, uncertainty is dealt with by negotiating about facts and feelings.

These ways of dealing with uncertainty can be transferred to a larger context: human decision making. This will be clarified in the next sections.

### 4.2 Models of decision making

Uncertainty is closely related to decision making. Miller and Lessard (2000, p. 76) formulate this relationship as follows: “... risks and uncertainty combine with indeterminacy to create ambiguous decision-making contexts.” Risk and uncertainty add to the complexity of decision making. Decision making models aim to decrease this complexity or show how to deal with it.

Van Zanten (1996) emphasizes that decision making exists of two parts: the preparation of decision making and taking the actual decision. The preparation, or decision support, comprises the collection of knowledge and information, in order to perform certain analyses which could create more clarity on what is best to do (and decrease uncertainty). The process of preparation is followed by the process of taking the actual decision, using the information retrieved from decision support. For this research, the term decision making covers both decision support and the decision making itself.

There are different ways of collecting and using information and consequently, taking decisions. This chapter describes eight models of decision making.

**Types of models**

A model is a simplified representation of reality, made with a specific purpose in mind. With respect to decision making, three types of models can be distinguished: descriptive, prescriptive and ideal types. Descriptive models can be used to assist description, explanation or help its users to understand complex issues. The prescriptive, or normative, type of models does not describe what is, but what ought to be. The last type of models, the ideal type, deal “with entities that nowhere exist in real life but which can help us to understand and explain real phenomena and to formulate or refine statements of what is desired” (Hogwood and Gunn, 1994, p. 43).

The models described in this chapter are used and should be seen as ideal types. They are described in order to explain and classify TomTom’s current decision making methods and most of all; to point towards desired decision making methods for TomTom (see Chapter 5). In Chapter 7, four models will be presented as a prescriptive type.
The field of decision making

The eight models of decision making, considered relevant for this master thesis research, are depicted in Figure 3. Two scales are used to position the methods in the field of decision making. First, the ways of dealing with uncertainty (as described under 4.1.1) are reflected at the horizontal axis. On the left side methods using the approach of ‘uncertainty as feelings’ can be found, whilst at the right side the more analytical approaches are located. Another distinction is made between a single or multi-actor environment. Positioning decision making methods on this axis clarifies whether a decision making method is able to cope with different parties and interests. This approaches the ‘uncertainty as politics’ point of view.

Figure 3 - decision making approaches

The theories of decision making methods are far more complex than suspected by just looking at Figure 3. Therefore, one should use this figure for getting a first understanding of these methods and to make a quick comparison. Some decision making models were developed as a normative model, it presented the creator’s thoughts on how decisions were or should be made. In many cases, these models were criticised, which led to the development of new models. The next sections will describe each method in more detail, paying special attention to the origin of each model, the assumptions and criticism.

4.2.1 Entrepreneurialism

“... most of the important decisions are made on a basis of observation, intuition and experience” (Scherpereel, 2006, p. 1258). The idea of entrepreneurialism elaborates on that statement and is therefore classified as a normative model. It relies heavily on the concept of ‘the entrepreneur’, which can be defined as “a person who habitually creates and innovates to build something of recognized value around perceived opportunities” (Thompson, 2004, p. 244). It is also possible to distinguish the entrepreneur by a number of characteristics. Pech and Cameron (2006) argue that entrepreneurs are better able to recognize and exploit opportunities and show strong problem solving skills. For this reason, entrepreneurs are not just people starting and having their own
businesses. On the contrary, people having the entrepreneurial characteristics can be found as employees within large organizations as well, regardless whether the organization belongs to the profit, non-profit or government sector (Pech and Cameron, 2006, Thompson, 2004, Bryant, 2007).

An entrepreneurial spirit in a company influences decision-making to a large extent. Decision-making is based on certain beliefs, attitudes, values and heuristics (Pech and Cameron, 2006). These heuristics are usually based on earlier experience and knowledge. This way of decision-making is often mentioned as very effective and fast under circumstances of stress, uncertainty, dynamics and little information available (Bryant, 2007, p. 745). Another important advantage is the creativity and activity in opportunity seeking and exploitation that is associated with entrepreneurialism and intuition (Pech and Cameron, 2006, p. 73).

**Pre-conditions**

- **Availability of (personal) experience** - As mentioned, heuristics are often based on earlier experiences. In this regard, personal experience to rely on should be available.
- **Entrepreneurs involved** - Entrepreneurial intuition is a personal matter. In order to make decisions using the entrepreneurial approach, people having the right entrepreneurial characteristics should be present (or employed) and involved.

**Criticism**

Besides the advantages, there is also criticism on this form of decision making. The fact that entrepreneurialism or heuristic based decision-making is often described as error-prone is basically due to two human aspects.

- First, entrepreneurs filter the information they receive and tend to interpret information in favour of their plans. Something that is also called a **heuristic bias** (Bryant, 2007) or a **tunnelling of attention** (Pech and Cameron, 2006, p. 73).
- Second, not all relevant information can be captured by people in order to make a well-balanced decision, also called **bounded rationality** (Bryant, 2007, p. 735).
- The fact that our feelings or affective reactions are not always trustworthy is not automatically a matter of our own limits. There are external parties seeking for ways to control the decision maker's behaviour. Think of the way advertising or marketing manipulates our affective reactions (Slovic et al., 2004, p. 319).

**4.2.2 Political decision models**

Allison (1999) starts by stating that governments or organizations are not one single actor. They exist of many different departments and officials, each having their own ideas and goals. Although this is also a form of criticism on single-actor models, it is not just a model based on criticism. The political models that are developed are also based on the original idea that decisions are the result of influencing each other, conflict and compromise. Allison distinguishes between two separate political models; **organizational behaviour** and bureaucratic politics. The first model emphasizes the fact that different positions cause different views on the situation (and also conflicts). People act according to their position and therefore decision making can partially be explained by the organizational structure and procedures.
The bureaucratic politics model takes people’s own interests as a starting-point. Individuals or departments within an organization have their own interests, which don’t necessarily have to match with the whole organization’s interests. In that regard, decision making can be seen as an arena where all participants meet (Allison and Zelikow, 1999, Van Zanten, 1996).

Another interesting political model to mention is the garbage can model. The garbage can model (as formulated by Cohen, March and Olsen) identifies four ‘streams’ in decision making: problems, solutions, participants and choice opportunities. Choice opportunities can be seen as garbage cans, where participants independently from each other put in their problems and solutions. Decision making comes down to whether the content of these garbage cans match and will lead to a decision (Van Zanten, 1996).

**Pre-conditions**

There are two basic assumptions to note with regard to the political decision models.

- **Multiple actors involved** - A number of actors are involved in the decision making process. These can also be different actors working for the same organisation or government. Each actor has a different view on the situation, due to different positions (‘where you stand depends on where you sit’) or different interests.

- **No dominant player** – None of the actors involved has the power to make the decision by himself. The actors need each other in order to reach an agreement (Van Zanten, 1996).

**Criticism**

The main criticism concerning political decision models exists of people who refuse to believe that decision making is all about coincidence or just a matter of tug of war.

**4.2.3 Routine**

According to Simon (Hogwood and Gunn, 1994), a distinction can be made between programmed and non-programmed decisions. He characterizes non-programmed decisions as new, complex and unstructured, which implies that this type of problems needs tailored treatment; an approach also recommended by other scientists (Duck, 2008, p. 10). The programmed type of problems are repetitive and should therefore be treated on a routine basis: procedures for handling them are available (Hogwood and Gunn, 1994). This makes this model part of the group of normative models. Besides the use of certain rules and procedures, Muller (1990) states that habits, experiences and heuristics are also part of routine decision making. One of the major advantages of using routine decision making methods is the fact that they are less expensive than tailor-made methods. Muller adds to that the argument that formal rules and procedures (in some cases) afterwards may serve as legitimization for decisions already taken.

**Pre-conditions**

- **Problems are structured** – The nature of the problem should be structured, which makes it possible to apply certain procedures to the issue. Unstructured or complex problems require more tailored approaches and are not fit for the routine approach.

- **Repetitive problems** – Decision makers will only develop a certain routine in making decisions when they encounter certain problems many times. It is of no use to develop procedures for issues that occur only once in a while.
• **Equality of problems** – The routine approach of decision making will only be suitable for multiple decisions that should be taken on the same conditions. This does not mean that their exact content should be the same.

**Criticism**

• It is very likely that the attention of decision makers applying the same procedures many times will get weaker over time. The strictness of applying the procedures could decrease, but decision makers could also pay less attention to the details of the problem, which could lead to misjudgements on the nature of the problem and the way it should be dealt with.

• It is very tempting to classify a problem as the type of problems where one has already experience with and hence, to deal with it in the same way. This chance might be even bigger when there are standard procedures available, which are cheaper to use than a tailored approach. Misjudgement of problems might lead towards solving a problem using the wrong methods and consequently, bad solutions. This point of criticism can be summarized by a quote often used by W.E. Walker: "When you have a hammer, everything looks like a nail" (Personal Communication, 2007a).

### 4.2.4 Rational decision making – incrementalism

Of all decision making methods, rational decision making is the most systematic and structurally coordinated (Pech and Cameron, 2006, p. 63). Goll and Rasheed try to be more precise by defining rational decision making as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making" (Goll and Rasheed, 2005, p. 1005). Within the field of rational decision making, different models and approaches can be distinguished. The next sections describe four of them, to start with incrementalism.

**Pre-conditions**

• **Acceptable status quo** – The status quo is a situation one can live with. The current situation does not require rigorous changes. This means for example that incrementalism cannot be applied to situations of crisis.

**Criticism**

Lindblom believes that his model describes the best type of decision making, especially because he criticizes the rational synoptic model as being unrealistic (which is also the origin of the development of Lindblom’s model). However, there are also some critical arguments concerning incrementalism:

• The small steps Lindblom describes evoke the expectation that a particular decision can be made undone. That is not always the case. Small steps can be just as irreversible as large ones. Incrementalism is not as flexible as it seems to be.

• Lindblom applies his theory to complex problems. It is not unlikely that complex problems ask for drastic changes. Even when the means and chances are available that provide for new
innovative solutions, it is very likely that they will be neglected by incrementalists, having a very narrow view on the possible solutions. In this regard, the incremental approach is not very ambitious or innovative (section based on Muller, 1990, 't Hart, 1988, Hogwood and Gunn, 1994).

4.2.5 Rational decision making – satisficing

The concept of satisficing was derived from the concept of 'bounded rationality'; the assumption that people and organizations are only capable of processing a limited amount of information. This is one of the points of criticism on the rational synoptic model, which classifies this model a response to another model. The satisficing process starts with a decision maker who considers a number of alternatives, and defines a set of standards. Finally, he chooses the alternative that meets the standards. He tries to find a satisfying solution, instead of aiming for the optimal solution. This approach has two advantages: there is no need to collect and process a large amount of information. Besides that, striving for an acceptable solution creates room for negotiations and compromises, which are necessary in situation involving multiple actors (Muller, 1990).

Pre-conditions
- **Clear standards** - It is very important to have a full understanding of the standards, in order to determine the level where one is satisfied with a solution.
- **Information available** - Information is also needed on the problems, opportunities and consequences (Hogwood and Gunn, 1994, p. 46). Although satisficing requires less information compared to the rational-synoptic model, it remains important to have sufficient information to determine which solutions meet the standards.

Criticism
- Satisficing may be considered more realistic than the synoptic approach, but this advantage is closely related to a decrease in quality of decision making. Good solutions may be neglected or sacrificed in the process of negotiating (Muller, 1990).

4.2.6 Rational decision making – mixed scanning

The synoptic approach stems from two points of criticism: the fact that the synoptic model is too time-consuming and the thought that incrementalism is not capable for making drastic and innovative decisions. Mixed scanning tries to avoid these drawbacks by combining the strengths of the two decision making methods. First, all possible alternatives are identified. From this set of alternatives, a first selection of useful alternatives is made (the screening of alternatives). A detailed analysis of the consequences is conducted for the remaining alternatives, leading to a final decision. The mixed-scanning approach is a combination between detailed analysis and broad scanning, depending on what the circumstances require (Hogwood and Gunn, 1994).

Pre-conditions
- It should be possible to conduct detailed analyses on the alternatives. This means that the pre-conditions stated under the rational-synoptic model (4.2.7) are also valid for this type of decision making.
Criticism

- The chance that good solutions are filtered out in the first scanning phase of the decision making process is still there.

4.2.7 Rational decision making – synoptic model

A great contribution to the field is made by Herbert Simon by formulating his normative rational-synoptic model. He argued that rational decision making comprises five steps:

1. Intelligence gathering – the collection of information, focused towards the defined problem or opportunity.
2. Identifying all options – the identification and analysis of possible solutions or alternatives.
3. Assessing consequences of options – the identification of all costs and benefits of the policy options available.
4. Relating consequences to values – the consequences of all options are evaluated using a set of criteria.
5. Choosing preferred option – the selection of the option with the most favourable consequences (Hogwood and Gunn, 1994).

Pre-conditions

Simon’s model is based on two assumptions:

- Full information - A full understanding of problems, opportunities, consequences and criteria is needed in order to assess all policy options available in a fully rational way (Hogwood and Gunn, 1994, p. 46). This information should be available, or the organization should be willing to collect this information (Van Zanten, 1996, p. 50).

- Resources available - Decision-making according to the rational-synoptic model is a very time-consuming process which implies that resources like time, money and people should be available to carry out the process in a proper way (Goll and Rasheed, 2005, 1006).

Criticism

As one of the first explicit theories on decision making, the rational-synoptic model is heavily criticized throughout the years.

- The most obvious point of criticism is that models of rational policy-making are unrealistic and impracticable. Full rationality is bound by limitations, finding their origin in multiple aspects of the decision making processes: psychological limitations (bounded rationality), limitations arising from multiple values (multi-actor context), organizational limitations, cost limitations and situational limitations (Hogwood and Gunn, 1994, p. 51).

- Even when there is perfect knowledge of the present situation, there are questions whether this also holds for a future situation. This makes the rational-synoptic model relatively rigid.

- Criteria are closely linked to values. The importance of values in the rational-synoptic model causes some problems. Values are not purely rational, they are related to personal and subjective feelings (Hogwood and Gunn, 1994, p. 48). Besides that, values are seen as unclear, inconsistent and constantly changing (Van Zanten, 1996, p. 50). These characteristics do not match with the rational vision.
4.3 Good decision making

There is no general ‘best’ decision making method. Which method is best to use depends heavily on the circumstances one has to deal with. Either way, some decision making processes are labelled better than others. What is good decision making? This section provides more clarity on that point and contains the first attempt to translate the comprehensive term ‘good decision making’ into practical criteria.

Hogwood and Gunn (1994, p. 57) start by stating that “there may be many circumstances where ‘agreement as the criterion of good policy’ is acceptable”. This may be a good criterion to start with, but it is interesting to dig a bit deeper. Van Zanten (1996, p. 32) distinguishes three decision making criteria:

- **The result of decision making** – This criterion concerns the fact whether the decision making led to the desired effects.

- **Costs of decision making** – This simply means the time and money spent on decision making, but also the opportunity costs.

- **The procedure and methods used for decision making** – This criterion touches aspects like the used methods, the number of alternatives that was taken into account and the satisfaction of participants regarding the decision making process.

Obviously, these criteria are likely to contradict each other, a conclusion also stipulated by Van Zanten. A simple example is the fact that achieving the best results will raise costs. To summarize, good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. This holds for all types of decisions as defined under 2.3.2 (policy decisions, managerial decisions and operating decisions), although the precise trade-off between the three criteria will be different for each category of decisions.

Although Van Zanten speaks of criteria, it is possible to describe ‘good decision making’ in more detail. The research into the success of decision making processes conducted by Nutt (2008) was very useful for this. His discussion of which factors lead to successful decision making was connected to the three criteria Van Zanten mentioned. The result of this is shown in Figure 4.

A decision can be labelled successful when it is implemented, and once implemented, of high value for the decision maker. Costs of decision can be kept low when the financial resources needed in order to conduct the decision making process are as low as possible, and when the time needed in order to make the decision does not take too long. Satisfaction with the process can be achieved through involving the right people and covering the sufficient number of topics (Nutt, 2008, p. 425, 429, 430).

The six criteria defined will be used in the evaluation of the current decision making processes within TomTom and the methods used for the case study (Chapter 5 and 6).
4.4 Gaps in the theory

“A research study calls also for reflecting on whether the topic can and should be researched” (Creswell, 2003, p. 28). This statement contains two important questions. The question whether the topic can be researched is answered in Chapter 2 and 3, where topics like the availability of data, time and resources are mentioned. However, that does not automatically mean that the topic of decision making (within TomTom MS) should be researched. The answer to this question is partly given by Chapter 2, where the added value for TomTom MS is described. This section will describe what gaps were encountered during the literature research. At the end of this report, it will become clear whether this study was able to fill in those gaps to some extent (see Chapter 7.3).

4.4.1 Comparing decision making approaches

Figure 3 may give the reader the impression that the only difference between the eight decision-making approaches are the two factors on the axes: the balance between feelings and rationality and whether the model is suitable for single or multi-actor settings. Indeed, these are two
important factors, but it does not provide a complete understanding of how the different approaches relate to each other. The descriptions (split up in pre-conditions and criticism) are hardly comparable to each other; because they cover different topics. The question arises whether it is possible to compare the different approaches at all.

4.4.2 Practical application

 Besides the difficulty in comparing decision making approaches, there is also a gap identified in the practical applicability: “The policy community often suffers because so little of what goes on in the scientific community is made understandable and accessible to it” (Walker, 2000, p. 3). This observation does not only seem to be valid for the policy community, but for all organizations (including private organizations), when it comes to decision making. The problem seems to find its origin in two things, also acknowledged by Walker. He states that ‘translators’ and ‘bridges’ are needed to close the gap between the policy community and scientific community (Walker, 2000). This also applies to the decision making models described in this chapter. First, they need to be translated into practical steps. Second, people or means are needed to convey the knowledge and feedback to and from the policy community.

4.4.3 Filling in the gaps

 This study will make its contribution to the theory by focusing on the gaps described above. First, by applying rational methods on a case and comparing them to the current decision making approach of TomTom, more can be said about to what extent the methods are comparable. Second, an attempt will be made to develop a generic decision making model, which TomTom employees should be able to use. This will be the contribution with respect to translating the decision making models and build a bridge between the scientific community and the organizations where decisions are actually made.

4.5 Conclusions

 There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints were used to classify eight decision making methods described in this chapter:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models (2)** – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Four models belong to the rational decision making methods:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• Synoptic model – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

By describing the pre-conditions and criticism of each model, it became clear that it is very difficult to compare the models with each other. Each situation calls for another decision making approach. However, it often happens that one method is labelled ‘better’ than the other, which insinuates that some comparison has taken place. This controversy is mentioned as the first gap in the theory, where this study will elaborate later on. In order to make a start with that, this chapter contains a section that describes ‘good decision making’ in more detail. Six criteria were defined that decide whether a decision making method is considered successful:

• Adoption of the decision making results
• Value of the decision making results
• Duration of the decision making process (time)
• Costs of the decision making process
• Satisfaction with the involvement of people
• Satisfaction with the comprehensiveness of the decision making process

Finally, the practical application of the theoretical decision making methods is mentioned. There is still a gap between the scientific community and the organizations where decisions are made every day. Two steps need to be taken in order to close that gap: first, the theoretical models need to be translated into practical terms. Second, the knowledge has to be conveyed from the scientific community to other organizations. This master thesis research will make a contribution to this second gap by the development of a model covering four decision making methods in more (practical) detail (see Chapter 7).
5. Decision making within TomTom

Chapter 2 already gave a brief examination of the type of decisions and problems TomTom (MS) has to deal with. This chapter elaborates on decision making within TomTom in more detail. The first section describes the current decision making within TomTom. It contains a clear connection with the literature on decision making available. Besides just describing decision making, current decision making is also evaluated, by investigating whether these methods were successful for TomTom in the past and for which reason. The second section of this chapter examines another decision making approach; the methods applied to the case study. A summary of the case study results is given, followed by an evaluation of the case study and rational decision making methods. The evaluation of the two decision making approaches (current and the rational approach applied in the case study) results in a comparison of the two decision making approaches and conclusions on which approach fits TomTom MS best and for what reason.

5.1 Current decision making within TomTom Mobility Solutions

In order to describe and characterize TomTom’s decision making processes, a number of interviews was held with TomTom MS employees, complemented by informal chats and personal observations (Personal Communication, 2007b, Personal Communication, 2008c, Personal Communication, 2008b, Personal Communication, 2008d, Personal Communication, 2008a, Personal Communication, 2008i). The author used this information to ‘map’ these decision making processes on the literature available. This section combines theoretical knowledge with the descriptions given by TomTom employees.

5.1.1 TomTom’s decision making ‘mapped’ on the literature

In order to describe and characterize TomTom’s company structure and the corresponding decision making approaches, the organizational configurations model of Mintzberg (1983) was used. The configurations can be used as a ‘tool’ to describe company structures. No company structure will exactly match a single configuration, but some come very close, and hybrids are possible as well.

During the interviews it became clear that a first distinction needed to be made between TomTom Mobility Solutions and the other departments (also called the operating core) and the board of TomTom (the strategic apex).

The strategic apex

Within TomTom, every idea is decided upon by the board. The response from a project manager when he was asked how his project was initiated is characteristic: “That was an idea of Harold (the CEO of TomTom) and Lucien (the managing director of TomTom Mobility Solutions)”, after which he added he saw them as “two real entrepreneurs with a vision”. They had even made already some major project decisions by pointing out which parties should be cooperated with (Personal Communication, 2008a).
The board of TomTom operates according to the mechanisms which Mintzberg classifies as the *Simple Structure*. This organic structure is characterized by the lack of structure and centralized decision making: almost all important decisions are in the hands of the board. This type of companies is often young, small and operating in a dynamic environment. Decision making is described as follows: “Decision making is likewise flexible, with the centralization of power allowing for rapid response. Strategy formulation is, of course, the sole responsibility of the chief executive. The process tends to be highly intuitive and non-analytical, often thriving on uncertainty and oriented to the aggressive search for opportunities. It is not surprising, therefore, that the resulting strategy – seldom made explicit – reflects the chief executive’s implicit vision of the place of the organization in its environment. In fact, that strategy is often a direct extrapolation of his personal beliefs, an extension of his own personality. Handling disturbances and innovating in an entrepreneurial way are perhaps the most important aspects of the chief executive’s work” (Mintzberg, 1983, p. 158).

The description provided by Mintzberg comes very close, but some nuance may be in place. Although decisions are taken very fast, without any proof of rational thinking and research, it does not immediately follow that the decision is based on pure intuition or gut feeling. It is not always clear how much knowledge a decision maker already has on a certain topic, and he may be just as sure about making the right decision as the ‘rational’ decision maker is. With respect to the board of TomTom, it seems they always take decisions on gut feeling, but one must not forget that these people know the company and market they operate in very well. Some (not all) decisions may therefore be based on rational grounds as well, although not spelled out (Personal Communication, 2008f).

Special attention needs to be paid to TomTom’s innovative attitude. Pech and Cameron (2006, p. 69) mention four typical entrepreneurial characteristics, which are all applicable to the board of TomTom:

- Unique values and characteristics such as risk taking and need-achievement
- Opportunity and innovation orientation
- Intuitive ability
- Leadership capability

The board stays in close contact with a large number of managers, which enhances the sharing of ideas. The different project teams use the short lines of communication with the board to get feedback on ideas they come up with in a fast and efficient way. This is very logical from the board point of view (wanting to stay involved), but from an operations point of view, the company is too large to deal with its daily operations as simple structure companies do: it is impossible for the board to have every employee under its direct span of control. It appeared that TomTom shows also some strong characteristics of the adhocracy.

**The operating core**

Within business units and departments, decision making takes place on an ad hoc basis. A manager illustrates this clearly: “The last issue I can recall was decided upon in three minutes”.

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When asked who was involved in the decision making, the answer was simple: “The persons who were present at the office at that moment” (Personal Communication, 2008d).

Within TomTom Mobility Solutions, a team of different specialists is put together for every new idea the board thinks interesting. The teams have much freedom to act according to what they think is best. Decisions are taken within teams in accordance with each other, where the expert’s opinion is taken as a starting-point rather than formal analysis. Although new initiatives on the point of communication are taken (like wiki’s), teams still rely heavily on informal chats, meetings and e-mail for their coordination. The different departments and business units (including TomTom Mobility Solutions) show many similarities with the type of companies Mintzberg calls the Adhocracy. This concerns a highly organic structure, where professionals work together in small, market-based teams. The main mechanism of coordination is mutual adjustment, within teams, but also between teams. This structure of teams enhances flexibility and innovation: “Sophisticated innovation requires a […] configuration, one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams” (Mintzberg, 1983, p. 254).

Decision making within and between teams takes place in an informal and flexible way. Besides having the responsibility to coordinate a specific team, team managers act as team members as well. “Power over decision making flows to anyone in the adhocracy with expertise, regardless of position” (Mintzberg, 1983, p. 261). Decision making and strategy formulation takes place within teams, although the process is better described by strategy formation. Strategies are formed by decisions that are taken over time, in response to the dynamic environment.

Within TomTom MS, the last years show a tendency towards more structured strategy-formulation. However, it still occurs frequently that this ‘roadmap of the future’ is altered all of a sudden due to unexpected changes in the environment. A typical example is the decision to execute a particular idea within six months, while it was originally planned keeping a time span of eighteen months in mind. This shortened procedure appeared to be necessary after taking notice of competitors’ plans (Personal Communication, 2008d).

The business unit Mobility Solutions has a special position compared to other departments and business units. TomTom MS is a relatively young business unit, employing professionals with more work experience compared to the other departments of TomTom. Hence, the people within TomTom MS have more experience with structuring (decision making) processes and using more formal methods for communication purposes. However, this contribution is not significant enough to assign Mobility Solutions another configuration other than the Adhocracy.

Whole company
The Simple Structure and Adhocracy have many characteristics in common, which also holds for TomTom. TomTom is operating in a dynamic and complex environment. A dynamic environment creates a need for an organic structure. This is closely related to the value that is attached to flexibility and innovation within TomTom. Besides that, an entrepreneurial spirit can be found throughout the whole company as well. A good example is the presence of a typical element of entrepreneurial behaviour: the desire to have fun in the activities that are undertaken (Pech and
Cameron, 2006). However, there are also significant differences between the strategic apex and the operating core. Dynamic and complex conditions ask for a strong connection between strategy formulation and implementation, since strategies may need to be reformulated along the way. In the Simple Structure, this is achieved by centralization: the formulator of the strategy implements it as well. The Adhocracy solves the same problem in an opposite way, instead of centralization, people tend to decentralize. The implementers of a strategy reformulate and adapt it while working on the job (Mintzberg, 1983, p. 186). These are two opposite forces, which causes a dilemma within the organization. The tension between the strategic apex (the board) who wants to centralize, and the operating core (the business units and departments) willing to decentralize, often results in a lack of understanding when it comes to decisions taken by other people.

TomTom is used to make decisions under circumstances of uncertainty. The trade-off TomTom makes between certainty and costs of decision making is depicted below (Figure 5). TomTom MS positions itself on the right side of the range indicated for TomTom, because TomTom MS has the idea that they are more willing to invest in decision making in order to reduce uncertainty compared to other business units and departments.

In some cases, TomTom makes use of external parties like consultancy firms in decision making processes. The satisfaction with the results delivered by these companies is debatable. Experiences from the past proofed that consultancy firms were able to reduce uncertainty (at high costs), but never came with solutions TomTom had not already an idea of before hiring them. The added value of consultants is illustrated in Figure 5 as well; it only caused a shift upwards the curve (Personal Communication, 2008i).

![Figure 5 - certainty curve for TomTom](image)

**TomTom’s decision making model**

To summarize, TomTom’s decision making processes can be classified as ad hoc and strongly influenced by entrepreneurial aspects like intuition. Comparing the findings of this section to the
decision making models presented in Chapter 4, it may be concluded that the entrepreneurial model fits TomTom’s current decision making processes best.

5.1.2 TomTom MS’ experiences with current decision making methods

In order to evaluate the current decision making within TomTom Mobility Solutions, the six criteria of decision-making mentioned under 4.3 will be used. It was very difficult to ask TomTom MS to make objective estimates for all six criteria, simply because decision making is usually not a demarcated activity, but entwined with different activities and topics. Therefore, the interviews were more focused on TomTom’s experiences with current decision making and the question whether it meets their expectations.

Results: TomTom’s experiences

TomTom’s very first impression on whether the currently used decision making methods deliver the results TomTom is looking for is positive: “Just take a look at our annual figures” (Personal Communication, 2008d).

- Adoption / use – TomTom only starts up a decision making process or a meeting when there is an issue where they need to decide upon in a short time. TomTom acts upon the decisions taken fast, as often the circumstances do not allow for any delays. In this regard, one could say that most decisions are adopted.

- Value – The greatest advantage of decision-making as it occurs currently is the flexibility, which results in innovation and the power to deal with competitors. However, there are also drawbacks. TomTom acknowledges that this intuitive way of decision making sometimes decreases the quality of decisions since not everything is taken into account, emphasizing that this is certainly not always the case.

   It is not always possible to measure the value of decisions taken in the past, since of meetings where decisions are made are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time.

Costs: TomTom’s experiences

- Duration of the process – The time spent on decision making is short. Extremely short. This aspect is the biggest advantage of this type of decision making for TomTom. Decisions are made very fast, which keeps the organisation at speed. This is very important considering the dynamic environment and TomTom’s innovative approach. The drawbacks are obvious: there is always a risk of hurrying and making mistakes. Practical examples mentioned are the lack of testing and documentation, typical processes located at the end of the chain, where there is no time left (Personal Communication, 2008d).

- Costs – It is hard to make a precise estimate of the costs. The number of people involved varies strongly, just as the type of people (board members or other employees). But considering the time (and thus resources) spent is minimal and there is a low use of external resources (like consultants), one could conclude that costs are relatively low.
Process: TomTom’s experiences

The decision making processes within TomTom are very dynamic and therefore never experienced as dull. “You never know what this day has in store in for you, that is what makes working for TomTom so exciting”, is an often heard remark within TomTom. However, it is also something that could be mentioned as a disadvantage by some employees. Not everybody is able to deal with the uncertainty and unpredictability. It could mean that a project somebody is working on for months may change within one day (Personal Communication, 2008d).

Employees do also experience the decision making methods used currently as ‘chaotic’. This finds its cause in the fact that it now and then occurs that people are working on the same subject (especially when it concerns people from multiple departments and business units). The only way to avoid this is to talk with a lot of people in the organization, since there is no other way to get the information (strongly related to the lack of documentation of decision making).

- **Satisfaction with involvement** – The number of people involved in decision making differs per day, since it is dependent on the employees present at that moment. This means that sometimes decisions are taken with too many people, which results in discussions about (unimportant) details. However, since TomTom Mobility Solutions is divided over three separate offices (Amsterdam, Berlin and Edinburgh), it also happens that decisions are taken with too few people. In that case, the decision is taken nevertheless. In situations where it is clear that a colleague not present at the moment has crucial knowledge or information, TomTom relies on communication means as teleconferencing and telephone calls. The experiences with these means of communication are very good. However, there is one disadvantage to mention; the people of TomTom are not always aware that they need to consult a particular colleague.

- **Satisfaction with comprehensiveness** - Overall, all topics relevant are identified and dealt with by TomTom. The respondents could not come up with big issues that were ignored or not detected by TomTom. On the other hand, the problem may not be related to the identification of issues, but has sometimes much more to do with to what extent these issues are worked out. Time to come up with robust decisions and solutions is sometimes lacking.

5.2 Rational decision making methods within TomTom MS

This section elaborates on the case study as described in Chapter 2, solved using the methods touched upon in section 3.2. First, the case study results are discussed, followed by a second part that describes TomTom MS’ experiences with the methods applied.

5.2.1 Case study results

A total number of twenty interesting market segments were defined who had a potential interest in a specific type of traffic data available within TomTom Mobility Solutions. This was the result of ideas already available within TomTom and desktop research. The match between a market segment and the type of data that could fulfill a need of this segment was labeled an opportunity. This approach led to a list of twenty single opportunities. Of course, segments with the same type
of need could be identified. These segments were grouped together in so called clusters of opportunities, which resulted in a total number of eight different clusters. So far the identification of (viable) B2B and B2G opportunities.

The assessment of these opportunities started with the use of rational methods like an objectives analysis and causal analysis in order to provide more clarity on TomTom’s objectives and how these opportunities could contribute to achieving those objectives. The link between the opportunities and TomTom’s objectives are seven criteria: additional revenue; scalability; brand improvement; extra information sources; a minimum of costs, sufficient human resources available and technological feasibility. The opportunities, clusters of opportunities and criteria formed the input of the assessment that was conducted using scorecards and the SMART-method. Five clusters were labelled as ‘most promising’.

5.2.2 TomTom MS’ experiences

After the case study was completed, an evaluation of the methods applied was held with employees from TomTom MS who were mostly involved. This section contains the experiences of the people from TomTom MS with the rational decision making methods used for the case, structured according to the six criteria defined in section 4.3. The evaluation is a combination of the interview results and the author’s observations. During the interviews, people from TomTom were asked to make objective estimates for all six criteria. The measurement of the scores on the criteria could be an evaluation in itself, but it is interesting to make an additional contribution by including TomTom’s perception of these scores as well. For example: costs will not only be measured in terms of Euros, but TomTom is also asked whether they perceive these costs as low or very high and how important they consider that particular factor.

Results: TomTom’s experiences

- Adoption / use – From the twenty segments that were defined, TomTom is already in contact with parties from eight different segments. For some parties this concerns first and exploratory meetings, while others are already in negotiation with TomTom. Most of these developments took place while the author worked on the case study, which makes it difficult to say whether the eight opportunities were adopted due to the case study (results) or not. On this point, the author and respondents from TomTom share the same opinion. The adoption of eight opportunities was mainly the result of the current decision making processes that kept on going within TomTom MS, even while the case study was performed. However, TomTom’s “gut feeling” was influenced by the case study, since the decision makers were informed on the progress of the case study from time to time. Consequently, the case study (results) decreased uncertainty and strengthened the TomTom employees in their conviction that they were on the right track with respect to the B2B and B2G opportunities.

- Value – TomTom MS thinks the case study (report) is very valuable. Two specific reasons were mentioned. First, the case results give TomTom MS a very good overview of the B2B and B2G opportunities as they exist today. But the case study will also be of value over a longer period of time. Because the case study is documented in a clear report, TomTom MS will always be able to look back, defend particular decisions taken and to evaluate them.
Costs: TomTom’s experiences

- Duration of the process – The time it took to perform this case study was 5 months. This number is directly related to the fact that only one person was working on the case study, a higher number could have decreased the time needed. However, the saving of time is limited due to the sequential character of the steps that need to be taken in a rational decision making process. Or to put it this way, using a quote from George de Boer: “Nine women are not able to give birth to a child in one month” (Personal Communication, 2008e).

TomTom’s opinion on the duration of the process is very clear and simple: “Much too long” (Personal Communication, 2008d). This is clearly illustrated by the fact that some opportunities were already negotiated on, while the case study was not even finished yet. TomTom had not the possibility to postpone these negotiations, due to market circumstances (the need to respond to competitors’ plans) and unforeseen opportunities (like third parties willing to cooperate).

- Costs – Costs made included the salary of the author and the time and resources spent on supervision. The investment of € 10,000 (a rough estimate) is perceived as extremely low by TomTom, especially because it is not possible to hire a consultant or conduct the research themselves for the same amount of money. However, it must be noted that the salary of an intern is not comparable with the salary of a regular employee or consultant. Therefore, it is very likely that this estimate may not be representative of applying rational methods within a company.

Process: TomTom’s experiences

- Satisfaction with involvement – The number of people (eleven) and also which people involved in the case study is sufficient according to TomTom. An additional remark must be made about the future involvement. Because of the detailed documentation of the case study, it will be very easy to involve new people by sharing the case study report.

- Satisfaction with comprehensiveness – TomTom was satisfied with the comprehensiveness of the study. They were able to get a good and complete overview of the opportunities.

In general, TomTom was pleased with the case study; the way it was conducted and the results. The structured identification of opportunities was very valuable in order to get a complete overview of the opportunities. The assessment of opportunities was of relatively less use. TomTom MS had already some strong feelings about the most viable opportunities and used the assessment primarily as a confirmation of their intuitive feelings. In addition, TomTom MS emphasized the biggest disadvantage and advantage of the methods used. First, the time it took to conduct the case study was too long, especially keeping the dynamic environment of TomTom in mind. On the other hand, TomTom appreciates the way the research was documented. This offers a lot of opportunities for decision evaluation and sharing of information. The first draft report was received with enthusiasm by the manager directly involved, and immediately shared with at least four other employees.
5.3 Improvement in decision making

This section compares the currently used decision making methods with the rational methods as applied in the case study. This comparison should answer the question whether the use of rational decision models lead to a better decision making process and results for TomTom.

5.3.1 Results

The decisions recommended by the case study did not differ much from the opportunities TomTom MS had already chosen themselves. Although acknowledging that the case study had an influence on the decisions made by the people from TomTom MS, there is not enough evidence to state that the rational decision making methods resulted in a significantly better or worse decision than was the case with the current (intuitive) decision making methods TomTom used before.

Not only the final decision on what to do, but also the report is part of the results. The report, containing a clear list of opportunities defined, is very valuable for TomTom MS. It enables them to share the information easily and to use it over time. This is a clear improvement compared to the intuitive methods used before, where minutes are drawn up occasionally and the only way to retrieve information from the past is to contact the persons involved at the time. This lack of (written) information is a barrier for sharing information, especially over time, when people may leave the company or tend to forget the details around certain decisions.

5.3.2 Costs

As stated earlier, it is hard to give exact estimate of the financial costs involved. However, it is plausible that the intuitive way of decision making is much cheaper than conducting extensive analysis for a couple of months. When comparing the time it took to come to a decision, it must be mentioned again that the time rational decision making took is much longer than intuitive decision making which is seen as a major drawback of rational decision making.

5.3.3 Process

There is not much difference in the number of people involved or the topics dealt with and the satisfaction with these factors.

In the decision making process concerning B2B and B2G opportunities, the case study was not a replacement of "gut feeling" decision making. Unconsciously, it was more seen as an extension of the existing processes that kept going on. In this sense, the role of the case study in the decision making process is perfectly comparable to that of the consultancy firms: as a means for uncertainty reduction (see Figure 6).
5.4 Conclusions

This chapter provided a description of the decision making processes currently used within TomTom (MS). It appeared that there is a difference between the strategic apex (the board) of TomTom and the operating core (including business units like TomTom Mobility Solutions). The strategic apex is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator becomes also the implementer), the Adhocracy uses a reversed structure (the strategy implementer becomes also the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. This type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

TomTom MS is also very satisfied with the case study conducted and the rational methods applied. However, it would be too short-sighted to label one of the approaches (the methods currently used and the rational methods applied to the case) as better than the other approach. It is hard to compare both approaches, since TomTom used the rational decision making methods rather than as an extension of currently used methods, instead of a replacement. TomTom MS still made decisions concerning B2B and B2G opportunities as they used to do, and used the results of the case study to check their own feelings and to decrease uncertainty. For some reason,
TomTom MS is not able to let go of old ‘gut feeling’ decision making, which is not surprising considering its earlier success. This does not mean that the currently used decision making methods are perfect. Even when it is difficult to appoint one approach the best approach, it is possible to distinguish certain parts or aspects of the approaches that are advantageous or not. TomTom thought the whole process of applying rational methods took too much time, but was pleased with the way it was documented. This will make it easier to share the results with other people and makes it more transparent. TomTom MS is also happy with the fact that they will be able to look back on what is decided and how, which creates opportunities for evaluation and re-consideration over time. All advantages and disadvantage are summarized in Table 3.

Table 3 - decision making approaches compared

<table>
<thead>
<tr>
<th>Results: TomTom's experiences</th>
<th>Current</th>
<th>Rational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adopt</strong>/ <strong>use</strong></td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>✗ Quality risk: too fast</td>
<td></td>
</tr>
<tr>
<td>Costs: TomTom's experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Duration of the process</strong></td>
<td>✓ Fast</td>
<td>✗ Time consuming</td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td>✓ Very low</td>
<td>✗ Higher than current</td>
</tr>
<tr>
<td>Process: TomTom's experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction with involvement</strong></td>
<td>✗ Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td><strong>Satisfaction with comprehensiveness</strong></td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>
6. Improving TomTom’s decision making

This chapter will describe how to improve decision making for TomTom, by bringing the lessons learned from the case study (the conclusions from Chapter 5) and the literature together. The first section will sketch the future of TomTom by using the same approach as used for describing the current decision making (5.1.1). Future trends are defined and its influence on decision making processes is described as well. After this, these (theoretical) findings are combined with the conclusions from the case study, in order to advise TomTom on how to improve decision making, described in section 6.2. The third section contains practical examples on how to implement the advice. This chapter ends with conclusions derived from this chapter.

6.1 TomTom’s context: past and future

TomTom’s context changed over the years, something which had its influence on the company structure and decision making. Here, the configurations model of Mintzberg is very useful as well. This section contains three parts. First, TomTom’s past context and development will be described. Second, three forces that drive TomTom towards new company configurations these days are defined. This section ends with a preview of TomTom’s future company configuration.

6.1.1 The past

When TomTom was founded in 1991, the company started as a typical Simple Structure. At that time, TomTom employed less than 50 people (TomTom, 2008b). The simple structure is the configuration that fits small, young companies best: “The new organization tends to adopt the simple structure, no matter what its environment or technical system, because it has not had the time to elaborate it administrative structure. It is forced to rely on leadership to get things going. Thus, we can conclude that most organizations pass through the simple structure in their formative years” (Mintzberg, 1983, p. 159). In the years following 1991, demand grew exponentially, as did TomTom’s company size (see also Appendix A). At the same time, TomTom faced more competition. The environment became more complex and dynamic, which made innovation an essential weapon in order to survive. Mintzberg mentions two configurations suitable for innovation: “The simple structure also retains an organic structure, and so is able to innovate as well. But that innovation is restricted to simple environments, ones that can easily be comprehended by a central leader. Innovation of the sophisticated variety takes place in environments not easily understood. So another kind of organic structure is required, one that relies on the application of sophisticated expertise. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programs” (Mintzberg, 1983, p. 255). The need for innovation in a complex and dynamic environment drove (the operating core of) the company towards adopting a typical adhocracy structure, as described in 5.1.1.
6.1.2 The future

Three future trends can be identified, having their influence on TomTom’s structure and hence, decision making processes.

- Success and growth

Especially during the last five years, TomTom has faced a tremendous growth. Revenue increased, together with the number of employees. Appendix A contains some graphs showing these trends. In its annual report of 2007, TomTom emphasizes the will to keep on growing through success and making acquisitions (TomTom, 2008c, p. 6).

- Increasing external control

Being listed on the stock exchange influences the company directly. It has consequences for the way the company is behaving and reporting. For example, the annual report had to meet not only the requirements stated by accounting standards, but also the stock exchange requirements of Euronext Amsterdam (TomTom, 2008c, p. 30). The growth of this factor is directly related to the growth of the company; it requires an additional effort to inform all shareholders on decisions taken.

Another trend that relates to external control is the increasing societal responsibility. TomTom has become a major player in navigation services and is therefore often mentioned in discussions about large societal issues like the traffic congestion in the Netherlands. TomTom does not want to avoid its role in society, but wants to demonstrate its commitment to the public. The increasing societal attention can also be seen as a form of external control (Personal Communication, 2008e).

- Complexity and growth of competition

TomTom describes the market in which it operates as follows: The market for satellite navigation products in each of the geographic markets in which we operate is highly dynamic and competitive. Convergence in the Technology, Media, and Telecommunications industries leads to increased competition and associated new business opportunities. There can be no assurance that our products will compete successfully against current or new market entrants or competing technologies. Our markets are characterized by rapid technological change, which could render our products obsolete and cause us to make substantial expenditures to replace our products” (TomTom, 2008c, p. 31).

Appendix A illustrates the competition with the main existing competitors. But a large share of the increased complexity and competition is caused by the activities of telecommunication companies like Nokia, who acquired NavTeq (a map maker) and wants to integrate navigation in its mobile phones. On top of that, the boundaries of the market are changing. On the one hand, a large number of small (price) competitors are not able to keep up and are forced to merge with other companies or to give up. A small number of large players remain, which makes it easier to monitor the competitors’ actions and results in more transparency and less complexity. On the other hand, a shift away from the core business can be noticed. An increasing emphasis on services leads towards complex product combinations involving hardware, software and services. This trend makes the market less transparent and more complex (Personal Communication, 2008e).
6.1.3 The future configuration

Figure 7 is derived from Mintzberg’s pentagon, which is described as “bounding a reality within real structures and situations can be found” (Mintzberg, 1983, p. 284). There are five forces that pull organizations towards a certain configuration. The block arrows represent these pulls and describe the type of pull. The grey arrows between configurations show the transitions that are possible. For example, starting from a simple structure, an organization could be pulled towards the machine bureaucracy, the professional bureaucracy and the adhocracy. A direct transition towards the divisionalized form is very unlikely. There are different factors that call for a particular transition. The arrows and factors relevant for TomTom are coloured red.

TomTom started as a simple structure. The environment of TomTom was classified as complex from the start. Together with its sophisticated technology and need for innovation, (part of) the organization was driven towards the adhocracy configuration. The red arrow in Figure 7
represents this transition TomTom made in the past. With respect to the future, the three forces defined in the previous part are translated into four pulls that could drive TomTom towards other structures:

- **Success and growth – creating a pull to standardize (1) and professionalize (2)**
  Aging and success will drive TomTom in two ways: there is a call for standardization, especially when it concerns a single innovation or product TomTom is successful with. A good example of this is the way TomTom plans to mitigate the risk of price erosion: by “cost engineering our products and seeking operational cost leverage from increasing sales volumes” (TomTom, 2008c, p. 39). Cost engineering and looking for economies of scale are methods associated with large, standardized companies.

  The rate of success could also urge TomTom to professionalize. TomTom acknowledges that growth, success and globalisation demands for more and qualified human resources. TomTom wants to mitigate the risks caused by internal expansion by “hiring more experts and educated people” (TomTom, 2008c, p. 38). This is a good example of the existence of the pull to professionalize TomTom encounters.

- **External control – creating a pull to standardize (3)**
  With the involvement of shareholders and society, external control has become increasingly important. This factor causes a pull to centralize and formalize (Mintzberg, 1983, p. 174). This holds especially when it concerns the requirements with respect to reporting and transparency of decision making.

- **Complexity – creating a pull to collaborate / innovate (4)**
  The environment TomTom operates in will remain complex and dynamic. The only way to deal with this environment is through (sophisticated) innovation, achieved by collaboration in decision making and mutual adjustment. This pull will keep TomTom close to the adhocracy configuration. This strategy of innovation is also formulated by TomTom (TomTom, 2008c, p. 38).

  The four pulls all have their influence on the organisation, but are not equal in strength. The pull to standardize (aspects of) decision making due to increased external control (nr. 3) is undeniable, since TomTom’s listing on the stock exchange is a hard fact. The pull to innovate is also very strong, since TomTom cannot ignore its environment and complexity will only increase. The pull to innovate (nr. 4) contradicts the pull to standardize (as a result of success, nr. 1). The latter will pull TomTom towards the Machine Bureaucracy, a configuration that “cannot tolerate an environment that is either dynamic or complex” (Mintzberg, 1983, p. 187). Therefore, the strength of the pull to standardize (nr. 1) will grow weaker, and TomTom’s success is more likely to benefit the pull to professionalize (nr. 2). The strength of the first pull (nr. 1) is considered negligible compared with the other three pulls, which is the reason the next section will elaborate only on the three strongest pulls (nr. 2, 3 and 4).

### 6.2 New requirements

The theoretical model presented in the previous section is descriptive; it shows which journey TomTom made in the past and where TomTom finds itself now. Three pulls that will influence the
company in the future are defined, and TomTom has to find a way to anticipate on these future trends properly.

Besides from the theory, there are also lessons learned from comparing the case study results with the decision making process TomTom MS used before. There were certain aspects TomTom liked in both approaches for decision making. These aspects contribute to good decision making for TomTom.

This section combines both viewpoints in order to arrive at a clear advice on what TomTom should certainly integrate with its decision making processes. It will become clear that both viewpoints lead to the same requirements, albeit for different reasons. The relation between these three recommendations, the future trends and (case) experiences are depicted in Figure 8. The reasons for each of the three requirements, derived from literature and case study evaluation, are clarified in the following sections.

**Figure 8 - decision making requirements**

### 6.2.1 Involvement

Good decision making is closely related to involving the right people. The success and growth of TomTom drives TomTom towards hiring more qualified people. But it is not just about hiring them, it is also crucial to have the right people at the right place when it comes to decision making. Right now, the number of people and who is involved heavily depends on who coincidentally
present when a decision is made. This has a strong influence on the process (the time it takes and the level of detail chosen) and the results (the quality of the decision). TomTom could optimize the decision making process and results by making sure that the right people are involved for certain decisions. TomTom has to make sure that the experts hired are involved and that knowledge and information available within the organisation is used and shared.

Paying more attention to involving the right people could also help to decrease the tension described in 5.1 (the board wants to centralize decision making, whereas the operating core tends to decentralize it). By choosing people from different departments and levels of the organisation, more understanding and support for decisions throughout the organisation can be created.

6.2.2 Documentation

The increasing external control puts its demands on the organisation. TomTom is more and more accountable for decisions taken, which results in an increasing demand for transparency and documentation. This is not the only reason to invest in more and better documentation. The case study showed that decision making that was clearly written down can also be used in a later stage, for decision making evaluation for instance. The ability to look back increases the time robustness of decision making results. Documentation has another advantage: it enables TomTom to share information easily, which enhances the understanding of decisions taken. This effect is also underlined by the literature; Van Zanten (1996, p. 61) argues that the rational model (as applied in the case study) is very useful for founding decisions in an objective manner, which increases legitimacy significantly. This effect will also increase understanding between the board and the operating core with respect to decisions taken by other people.

6.2.3 Flexibility

The only way for TomTom to deal with the dynamic and complex environment of TomTom is through innovation. This puts specific demands on decision making; the flexibility to make decisions in a way that seems most appropriate and is as quick as necessary (see also Chapter 7 on this). This is the only requirement that is found in the literature and practice for the same reasons.

6.3 How to achieve them

The previous section described why the three requirements are needed in order to improve decision making within TomTom. This section elaborates on how to achieve them. A couple of (practical) examples are given. This does not mean that the complete number of possible solutions is reached by that. Not unfamiliar for TomTom, creativity is needed to implement the requirements as stated above. Therefore, it is strongly recommended to keep thinking about it and explore the solutions that are out there.
6.3.1 Achieving involvement of all relevant people

The fact that TomTom employees are spread out over a number of (international) offices is not such a big problem, since it appeared that telecommunication means can overcome this. The challenge is to know which people should be involved for which decisions. There is plenty of knowledge and information available within the organisation, but it is difficult to find out which person has expertise on which field. Up till now, employees had to rely on mutual adjustment and their social network within the company for this purpose. Taking the exponential growth of the organisation into account, it will be clear that his method won’t do for the future.

In order to facilitate employees in finding each other, more structure in this process is needed. Human Resources systems have to focus more and more on providing more information on employees and to stimulate employees to use this information in order to get in contact with the right people. An overview of employees is already available on the intranet; however, information is often incomplete.

- Ask every employee to come up with five specific keywords which describe his personal expertise. This could be related to his education, but also former employer. When it appears that there are too many people with the same keywords, ask them to describe their field of expertise on a more detailed level.
- Develop a search engine that enables employees to find other employees through keywords or questions.
- Monitor which keywords are looked up most and which employees are contacted most. This is important information which tells Human Resources which fields of expertise are lacking within the organisation. It is also important to avoid some employees to become too busy with helping other employees instead of doing their actual job.

Another, less automated approach relies on the already existing social networks within TomTom. In this case, every department or business unit is asked to appoint a ‘department contact person’.

- His first task is to investigate what the qualities and fields of expertise are of the employees of his department.
- When a specific decision needs to be taken, every employee can contact a contact person of another business unit with his problem. This can be done in an informal way (telephone or e-mail), but it is also possible to develop a forum where an employee can post his request. The contact persons from different departments should read the forum requests and function as an intermediary between the employee (having posted the request) and the employees from their department with the expertise that could be of good use.

These systems only work when people are clear in formulating their fields of expertise. It is also crucial that employees respond within a certain time after they are contacted by another employee. More ideas can be generated when investigating the products available in the field of collaborative engineering.

6.3.2 How to document

This is one of the recommendations TomTom is already working on. A number of new means of communication are introduced: the intranet (containing practical information per department and
business unit), and the TomTom wiki (where information on the progress of each project can be found). These are good initiatives; however, they do not function properly yet (explained by the three aspects listed below). TomTom could improve this by paying attention to the following aspects:

- **Quality of information** – The amount and quality of information differs strongly per department. In order to stimulate the use of the intranet and the wiki, TomTom has to make sure that all information can be found, and people are not disappointed.

- **Summarize** – It is easy to put all the information available on the intranet, but people have to actually read it as well. Due to the high workload within TomTom, employees should be able to get the information they want in a short amount of time. This calls for writing and posting good summaries of projects and processes, instead of sharing the information available in full detail. The writing of these summaries may take some time from the writer, but it saves time of multiple readers as well.

- **Improve searching** – All necessary information should be available, but that does not mean that every employee needs all information. Often, what is really needed is only a small selection of information. A search engine, offering all search functionalities combined with ease of use is crucial.

These are some ideas; it is also recommendable to ask more experienced team leaders within TomTom for their ideas and the feasibility of those ideas.

### 6.3.3 Flexibility that works

Due to the competitive and dynamic environment, TomTom faces a variety of problems. Each problem has different characteristics and it depends heavily on these characteristics which decision making method will deliver the best results. TomTom should be flexible in choosing which decision making methods to use for which problems. How TomTom can achieve that is described in more detail in the next chapter.

### 6.4 Conclusions

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that drives TomTom to another company structure and decision making processes:

- **Success and growth** – Success and growth create a pull to standardize certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.

- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal problems like traffic congestion.
• **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

Together with the lessons learnt from the case study, these future trends led to three recommendations on how TomTom could improve its decision making processes on all three dimensions; results, costs and satisfaction with process.

• **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.

• **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the time robustness of documentation; the possibility to look back on decision making processes and results over time.

• **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue.

This chapter also contains some practical guidelines on how to implement the three recommendations. The last recommendation (flexibility) is elaborated on in much more detail, described in the next chapter.
7. The meta-decision making model

Chapter 6 ended with the recommendation to remain flexible in choosing how to decide a particular problem. Deciding how to decide is also called meta-decision making. The first section explains why meta-decision making is necessary and what factors influence the decision on how to decide. This information is captured in a meta-decision making model, presented and explained in the second section of this chapter. Four specific decision making approaches are part of the meta-decision making model; explained in more detail in the third section of this chapter. The fourth section attempt to improve the meta-decision making model, and describes to what extent the model can be used by other organizations (besides TomTom) and how they should apply the model. The last section contains the conclusions.

7.1 Why meta-decision making?

This section first sketches the reasoning that led to thinking about meta-decision making. After that, the process of deciding how to decide is looked on in more detail, distinguishing problem characteristics that ask for a particular method and the influence the decision maker has on the choice for a method.

7.1.1 Deciding how to decide

There are some cases, where it appears that costs for making time-consuming rational decisions are higher compared to the costs one may bear for taking the risk of making a bad decision. It depends on the type of problem which decision making method fits best. One of the first persons to acknowledge that was Dror, who introduced terms as meta-policymaking or ‘deciding how to decide’. “Dror emphasizes the costliness of analysis in his ‘economically rational model’ which says that the various phases of pure-rationality policy-making should be developed in practice only so far as the cost of the input into making policy-making more rational is less than the benefit of the output (in terms of the marginal improvement of the policy’s quality)” (Hogwood and Gunn, 1994, p. 56). This concept became the basis of the meta-decision making model.

7.1.2 Factors influencing the choice of how to decide

When diving deeper into the concept of meta-decision making, it is interesting to find out what influences this choice. This is done by reviewing literature about choosing a decision making method and combining all the findings in a systems diagram, visualized in Figure 9. Core of the picture is the rectangle (representing the system of deciding how to decide), filled with ovals (factors). This system has two types of factors that form the input: external factors and instruments. The output (on the right side) of the system is measured by the criteria. The decision maker can influence the system (and its results) by using the instruments. The external factors are beyond the reach of the decision maker, as they are determined by the environment. The arrows, connecting the factors, show how each factor influences other factors. When factor A has an outgoing arrow to factor B, this means that A influences B directly. This model is of good use to get a better understanding of what factors influence the choice of how to decide, valuable
input for the meta-decision model to be developed. The factors (criteria, external factors and instruments) are found by literature research and explained in this section.

**External factors**
Deciding on how to decide a particular issue depends heavily on the type of issue. Each issue has different characteristics. Van Zanten (1996) already distinguished between three incentives that could lead to decision making: opportunities, crises and problems. The difference between them can be found in the impact and time available to deal with the incentive. When facing a crisis, the impact is very high, while there is very little time to solve the situation. Besides impact and time, a third characteristic can be derived from a type of uncertainty, identified in 2.3. As described, one source of uncertainty lies within a lack of knowledge or information, especially with an eye on the future. For each problem, there is a difference in how much information or knowledge about the content of the problem is available. Time, impact and information available are mentioned in Figure 9 as external factors.

**Instruments**
The type of problems a problem owner has to face cannot be influenced by the problem owner. That does not mean that the problem owner cannot influence the end situations these problems lead to. A problem owner has three key instruments at its disposal. First, he can select the people who take the decision, keeping an eye on the skills these people possess. One can imagine that having a good entrepreneurial intuition is very important when solving a problem using the entrepreneurial approach. However, other persons may be more capable solving a problem according to the rational decision making approach, where rational thinking is more important. Second, he can decide how much money is allocated to a particular decision making process. This also influences the number of people that is available for the process. Third, he should decide on the preferred level of risk he is willing to take on a particular decision. Of course, this will be influenced by the impact of the decision, but it cannot be completely explained by that. A problem owner’s attitude towards risk and uncertainty is important as well in setting the preferred level of risk.

The three instruments can also be seen as constraints. Although a problem owner can decide on the budget, an allocated budget could also be a constraint, limiting the range of possibilities. An organization can influence the type of people employed through its Human Resources strategy, but once employed, the type of people within the company can become a constraint as well. When there are no people with good developed rational skills, solving a problem using the rational approach will be no option anymore.

**Criteria**
Given the external factors, and the decision making method used by certain employees, the problem situation will result in a decision. The quality of this decision can be measured by the criteria, summarized in the three main parts (see 4.3): results, costs and (satisfaction with the) process. This holds for all types of decisions (policy, managerial and operating).


**7.2 The meta-decision making model**

The goal of the meta-decision making model is to provide organizations (especially TomTom MS) with more insight into the relationship between the type of problems, instruments and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue.

The model is visualized in Figure 10. It is based on the curve used in Chapter 5 and described by Hogwood and Gunn (1994) as well. Two axes can be distinguished. First, the comprehensiveness of the research (which is part of the decision making process) at the horizontal axe, and second, the costs of decision making (which also includes time) on the vertical axe. Comprehensiveness can be achieved by including a large number of related topics, or by looking at them in more detail. Investigating a problem in more detail does not automatically mean that uncertainty decreases (since uncertainty can increase over time as well and nullify the research results). However, it is also possible that even when certainty on the content does not increase, a decision maker still gains knowledge on the risk that he is taking. The curve shows the trade-off between increasing comprehensiveness and the costs that it brings. On the curve, four different points are marked, each representing a decision making approach. Which approach and position on the curve is best, depends on the type of problem.

**External factors**

The set of external factors and instruments are integrated in Figure 10 as well. On the one end of the spectrum, there is the situation of a problem situation having a great impact on the organization, and offering it enough time to find and interpret the information that can bring more clarity on what to do. This situation pulls the choice for a decision making method towards a structured, rational approach. On the other side there is the situation of little time to take a decision, combined with an impact that is negligible and there is no information out there that
could bring more certainty. Actually, there is no reason to invest more in decision making. In that case it is best to take the decision right away, based on ‘gut feeling’. It is also possible that there is enough information out there that could decrease uncertainty, but that the decision maker is willing to take the risk of making a bad decision. In that case, costs of taking the risk are estimated lower than the investments needed for additional information searching and decision making. These are two extreme situations described. Most of the time it will occur that the problem situations are not that clear and a decision maker has to choose a position between those two ends.

![Diagram of decision making model](image)

**Figure 10 - meta-decision making model**

**Instruments**

The selection of an approach is not only dependent on the external factors. There are also forces that can be influenced by the decision maker, the so called instruments. One of them involves the people available within the organisation. There is a pre-condition that holds for all approaches: the right people with the right skills should be available for taking the decision. In case of the entrepreneurial approach, a decision maker needs people with entrepreneurial skills. When he decides to follow the rational decision making approach, people having analytical skills should be available. It also works the other way around; the presence of people with good entrepreneurial skills will pull the chosen decision making approach towards the left side of the curve.

The selection of an approach is also dependent on the budget that is available (in case the organization works with a budget). This is visualized by the blue horizontal line in Figure 10. All decision making approaches above this line are excluded from the possible decision making
approaches. At last, the decision maker should decide on the level of risk. Taking a decision on gut feeling brings more risk than going through all the alternatives in detail beforehand. When a decision maker wants to avoid the risk that is taken on an issue as much as possible, selecting a decision making approach on the right side of the curve is a logical step.

The next section provides practical guidelines on how to use each of the four decision making approaches.

7.3 Four decision making approaches

From the eight decision making approaches defined in Chapter 4, four were selected for the meta-decision making model. A similar structure in their decision making steps could be seen - identification of alternatives; assessment of alternatives and making the decision. The type and number of sub processes differed, but the identification of the same structure made it possible to compare them and to position them on one curve. This means that four other approaches were not included in the meta-model.

The routine approach is only applicable to repetitive problems and is therefore considered less relevant. Of course, some TomTom employees face repetitive problems. However, due to the complex environment TomTom faces, the number of non-repetitive problems is much higher. For this reason, the routine approach is left out of consideration for the meta-decision making model. The second approach that did not make it to the model is incrementalism. One of the pre-conditions for this approach is satisfaction with the status quo. This is certainly not always the case within TomTom. Fierce competition sometimes asks for rigorous changes. Finally, the two political models are considered less relevant as well. Section 2.3.1 described that uncertainty that come from typical multi-actor settings is not the biggest challenge for TomTom. In fact, the recent take-overs and withdrawals of competitors make it even easier to monitor competitors (Personal Communication, 2008g). That does not mean that TomTom does not encounter any political games, but this aspect is much smaller compared to the other types of uncertainty.

The four approaches that remained are adopted by the meta-decision making model as depicted in Figure 10. The next sections clarify the four approaches in more detail and provide a list of basic steps to take for each approach. These steps are captured in flowcharts. The similar structure in decision making steps is depicted in all four flowcharts as well.

Figure 11 - flowchart legend

The flowcharts contain four basic elements (see Figure 11). Each decision making process is clearly demarcated by a “start” and “end” sign. In between, the process is described by successive building blocks, connected to each other with arrows. Process blocks describe a sub-
process, which results in data, or makes use of data stored earlier. It can also happen that a choice needs to be made, or a particular question answered. The continuation of the process depends on the answer, visualized by two outgoing arrows, leading towards different building blocks.

7.3.1 Entrepreneurial approach (1)
Since entrepreneurial decision making is closely related on gut feeling or intuition, it is hard to capture this process in some clearly defined steps. However, two basic steps were identified: the listing of alternatives and the actual decision making.

![Figure 12 - Flowchart Entrepreneurial Decision Making](image)

7.3.2 Mixed scanning (2)
The mixed scanning approach combines different levels of decision making. It starts with fundamental, strategic decision making and ends with lower order decisions that elaborate on the higher order decisions. It promises to have the best of both worlds: the broad scanning is more economical than scanning every option in detail. On the other side, the detailed analysis prevents the loss of information that occurs when only broad scanning is applied (Etzioni, 1986).

Etzioni (1986) listed all the steps that need to be taken, which can be used as a guide for decision makers. These steps were used as an input, which resulted in the flowchart represented by Figure 13. This approach is characterized by the iterative approach. First, all people involved are asked to list the alternatives that come to mind (this does not include extensive information collection beforehand). After the listing of the alternatives, they are briefly examined and compared to the company’s standards. This results in the rejection of a number of alternatives that do not seem feasible. After this step, the remaining alternatives are examined again, this time in greater (but not in full) detail. At the same time, the standards are increased as well. This sequence of steps is repeated until there is one alternative left. This alternative is chosen as the final decision or solution and the decision making process comes to an end.
7.3.3 Satisficing (3)

The model of satisficing as it was developed by Simon was not intended to serve as a prescriptive model; it was rather descriptive, clarifying how people make decisions in circumstances of bounded rationality. However, Belton and Stewart (2001) acknowledge that this heuristic (as they call it) is a good basis for decision making models. A good example of a prescriptive application of satisficing is the multi-criteria decision method ‘goal programming’.

The key point of satisficing is that only alternatives that satisfy certain standards are passed through, while the others are rejected. The first steps are much like the rational synoptic approach. The process begins by identifying which standards should be met by a solution. By collecting information on the problem field, the decision maker is able to make a first list of alternatives. The alternatives are calculated through, and compared to the predefined standards. At the moment there is one alternative found that meets the standards, that alternative is adopted as the final solution and the decision making process stops. As long that is not the case, more alternatives are identified and assessed, just as long until there is a satisfying solution found.
7.3.4 Rational synoptic (4)

This decision making approach is the most extensive of all. It starts by thinking about the company’s objectives and listing criteria derived from those objectives. After this, the process starts with collecting information focused towards the problem. This results in a complete list of alternatives. All these alternatives are fully examined, by calculating all the consequences like costs and benefits. When the consequences are evaluated using the criteria, it becomes possible to select the highest scoring alternative. This alternative is adopted as the decision or final solution (based on Hogwood and Gunn, 1994).
From a theoretical viewpoint, there always has to be an optimal solution. In case there is not a solution at the end, it is recommendable to go back to the beginning of the decision making process and to have a closer look at the problem the process started with. One has to make sure that there is actually a problem and that this problem is defined properly.

![Flowchart Rational Decision Making](image)

**Figure 15 - flowchart rational decision making**

### 7.3.5 Outsourcing of decision making

It is possible for TomTom MS to decide not to execute these processes themselves, but to hire a third party like a consultant to solve a particular problem. Factors important for this decision are time available for solving the problem, the (type of) people (not) available within TomTom and the budget that can be spent on a certain topic. These factors show an overlap with the factors identified in Figure 9. However, there is one specific factor that deserves special attention with respect to the use of consultants; the level of confidentiality of the topic. When working with third
parties, there is always the danger of giving away too much intellectual property (Personal Communication, 2008e).

7.4 The meta-decision making model improved

The models presented in this chapter are all based on literature. It is interesting to go a bit further and to see how the meta-decision making model can be expanded and improved. The experiences gained while performing this research are used to enrich the model.

7.4.1 New factors

The improvement was sought in the foundation of the model; the systems diagram (Figure 9). It seemed a good idea to try to fill in the rectangle, central in the systems diagram. This is done by taking the same instruments, external factors and criteria and to define how they influence each other precisely.

Figure 16 contains a causal diagram. The arrows between the factors represent a causal relationship between two factors. An outgoing arrow from factor A towards factor B means that when factor A changes, this causes a change in factor B. On top of that, the arrows contain a symbol. A relationship marked with a ‘+’ means that when factor A increases, factor B increases as well. The reversed symbol ‘−’ indicates a decrease in factor B (by an increase in factor A). In case of a hard to define relationship, the arrow is labelled with a question mark.

**Figure 16 - causal analysis**

The most important finding of this quick causal analysis (Figure 16) is the division between the desired level of comprehensiveness a decision maker wants to have, and the level of comprehensiveness that is possible with respect to the problem characteristics. One can imagine that even when it is possible to do a lot of research into a certain topic (with respect to resources and information available); the decision maker may be satisfied with a lower level of
comprehensiveness considering the impact of the decision. The reversed situation is possible as well; even when a decision maker wants to look in full detail to a certain topic, when he does not have the resources (like time, budget and people), it does not make sense to choose for a decision making method with a high level of comprehensiveness. The desired level of comprehensiveness and the level that is possible regarding the problem characteristics, both influence the actual level of comprehensiveness that is chosen by selecting a specific decision making method. The decision making method selected for a problem is directly related to the criteria.

7.4.2 New meta-decision making model
The new findings are used to improve the meta-decision making model. Still, the curve and two axes (costs and comprehensiveness) remain central components of the model. The difference is in the division between the position where comprehensiveness is (less) possible, and (less) desired.

![Figure 17 - meta-decision making model improved](image)

The external factors and instruments still differ in colour, but are grouped differently. It states that when there is much information, time and budget available, comprehensiveness is possible. When that matches with a high impact and a risk avoidant attitude, the desired level of comprehensiveness is high as well. The combination between comprehensiveness possible and desired will make a decision making method like the rational approach become feasible. The
same argumentation can be applied to little information, time and budget available, combined with a low impact of the decision (which will result in a more intuitive decision making method).

The role of people within an organization is a special one, since it influences the system in two ways. People with certain skills (entrepreneurial or rational) should be available in order to make a certain level of comprehensiveness possible, but people possessing those skills will also have a preference for a specific decision making method, which influences the level of comprehensiveness that is desired.

The four decision making approaches are still part of the meta-decision making model. However, they are less a result of the model, but much more illustrative. They are an example for a decision making method with a certain level of comprehensiveness.

7.5 Practical use of the meta-decision making model

The systems diagram and meta-decision making model were developed with TomTom MS in mind. However, this does not mean that the model can only be used by them. It is very likely that decision making in other organizations shows great similarities and the model could be valuable for them as well. This section explores which organizations may find the model useful and for what reasons. But first, this section elaborates on how to use the model and for what purpose.

7.5.1 How to use the model?

The initial goal of the model is to support decision makers in choosing the best decision making method, with respect to the type of problem they are dealing with. It is not meant to serve as a mathematical formula: with a certain input, a decision making method will be the answer. Moreover, it is an overview of existing formulas. The decision maker still has to choose a decision making method himself, but knows better what information to take into account and in which direction to look for a decision making method.

TomTom MS, already familiar with the model to some extent, thinks the model will be very valuable for communication purposes. When a decision on a certain topic needs to be made, they know they should first get the problem characteristics clear. The model helps TomTom MS in communicating these factors to all employees involved and to choose a position on the “costs / comprehensiveness” curve together (Personal Communication, 2008g).

That’s the first step of using the meta-model, but the model offers more than that. When having decided on a position on the curve, it will become clear which decision making comes most close to that position. Decision makers can use the information and flowcharts described in this chapter to have a first example of what such a decision making approach could look like. The meta-model does not only help decision makers in deciding how to decide, but also offers them a practical tool to start the decision making process.

Both models (the first, based on literature and the second, based on literature and experience) foresee in the functions mentioned so far. Nevertheless, the second meta-decision making model enables a way of using the model which goes further than the initial meta-decision making model. With respect to the long term, it is interesting to compare the level of comprehensiveness possible for a large number of problems with the desired level of
comprehensiveness within a company. When a large share of the problems a company faces ask for a comprehensive approach, an organization needs to adapt its instruments on the long term by allocating a higher budget to decision making and hiring people with rational skills. In this sense, the model provides more insight in the relation between external factors and instruments on the long term, and is prescriptive in the way that it enables organizations to compare the factors and show them how to adapt their instruments to the problems the organization faces. Therefore, the second model is more (practically) useful than the first model, which is more descriptive.

7.5.2 Who may use the model?

It is assumed that other private companies have the same freedom of action as TomTom has when it comes to setting the preferred level of risk, hiring and selecting people and deciding over the budget. This is different compared with public organizations. These organizations are limited in their flexibility by the nature of the organization. Due to the public accountability they are not able to prefer a high level of risk; budgets are often decided on long before and above all; decision making should be transparent and communicable. This often excludes the typical entrepreneurial way of decision making, even in situations where this would be the most appropriate decision making method. For these reasons, the model is considered useful for all other private organizations, and less applicable to public organizations.

Within the group of private organizations, there are differences too. TomTom was classified as having a typical entrepreneurial attitude, whilst other organizations may be more rational oriented. The model covers both approaches, and states that the same type of factors influence the choice for a more entrepreneurial or analytical approach. Since the broad coverage of decision making styles the model can be used by all types of private organizations.

A last remark needs to be made on the point of the involvement of multiple actors. When a number of actors is involved, having different opinions on the type of problem and solutions, special attention is needed. When all actors prefer the same direction of decision making approach (albeit for different reasons); there is no problem in using one of the approaches of the meta-decision making model. When this is not the case, agreement on the type of problem needs to be reached first (using political debates or group support systems for example). Once agreement on the problem is there, the group can still decide to use the meta-decision making model for taking the next step in the decision making process.

7.6 Conclusions

TomTom should be able to select a proper decision making method for each issue it encounters. This chapter tried to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker's own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors the decision maker could influence: the budget that is allocated for the decision making process; the people
that are selected to make the decision and the level of risk the organization is willing to take with respect to the particular problem. These six factors determine the decision making method chosen and the results of the decision making process.

The six factors are captured in two meta-decision making models, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

Chapter 4 already stipulated two gaps in the theory. The meta-decision making model as described in this chapter addresses both issues. First, it was concluded that it is very hard to compare the eight decision making models as defined in Chapter 4. That was the exact reason why it was not possible to cover all eight decision making models with the framework. However, four of them appeared less or more comparable. When breaking down the methods into sub-processes, an overlap in processes could be identified.

Second, the meta-decision making model is a clear attempt to translate the theoretical decision making models into more practical applicable guidelines. Therefore, the processes were split up in sub-processes and visualized using flowchart models. The meta-decision making model also combined different pieces of theory, creating more insight in their coherency. It is aimed for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods.
8. Conclusions and recommendations

This chapter will present the main conclusions of this research in the first section. Since there was an additional research question, there is also a section containing the answers to this question. The third section contains recommendations for further research. The last section reflects on several topics of the research: the research methods, the case study, the scientific value of this research and a final personal reflection.

8.1 General conclusions

The main research question as presented in the first chapter is:

**Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come?**

Six sub-questions were formulated. First, the answers to the sub-questions are summarized, followed by the answer to the main question.

8.1.1 Sub-question answers

1. **Which theories on (rational) decision making are available within the scientific literature?**

The scientific literature was used to provide a theoretical background for two parts of the research question. First, rational decision making models were described, and compared with other decision making models. Second, literature was used in order to provide more clarity on ‘better decision making’. Criteria were defined in order to measure the quality of decision making.

**Eight decision making models**

There are three ways of interpreting uncertainty: uncertainty as feelings, uncertainty as analysis and uncertainty as politics. These viewpoints led to the description of eight decision making methods:

- **Entrepreneurialism** – decisions are made using intuition and ‘gut feeling’.
- **Political decision making models** (2) – decisions are a result of comprise, conflict and negotiation between multiple actors with different viewpoints and interests.
- **Routine** – repetitive decisions can be made using predefined algorithms and procedures.

Rational decision making is briefly described as "a continuous proactive search to identify problems and opportunities, conducting extensive analyses, and using a formal planning process. It also emphasizes participative and comprehensive decision making" (Goll and Rasheed, 2005, p. 1005). Four specific models belonging to the rational decision making group were identified:

- **Incrementalism** – decisions are made by altering the status quo with small steps.
- **Satisficing** – a decision is based on the first alternative that is found that meets certain standards.
- **Mixed scanning** – a solution is found by combining a broad scan with detailed analysis of the alternatives.
• Synoptic model – the full rational way of decision making comprises the complete identification and scanning of alternatives, making use of full information and clear criteria.

**Good decision making**

Good decision making comes down to making the right trade-off between achieving your goals (effectiveness) with as less as resources as possible (efficiency) where everybody agrees with the procedures followed. These three parts (results, costs and process) resulted in six specific criteria:

*Results of decision making*
- Adoption of the decision making results
- Value of the decision making results

*Costs of decision making*
- Duration of the decision making process (time)
- Costs of the decision making process

*(Satisfaction with the) decision making process*
- Satisfaction with the involvement of people
- Satisfaction with the comprehensiveness of the decision making process (the number of topics dealt with and the detail of the research)

2. **What does the current decision making process and company culture of TomTom (MS) look like?**

With respect to decision making, it appeared that a distinction within TomTom had to be made between the board and the operational departments and business units (like Mobility Solutions). The board (also called the strategic apex) is organized like what Mintzberg describes as ‘the Simple Structure’. All decisions are taken by a small number of people, who base their decision on intuition and experience. The operating core comes close to the configuration which Mintzberg calls ‘the Adhocracy’. Project-based teams make their decisions on an ad-hoc basis, and rely heavily on mutual adjustment. This ad-hoc decision making causes a great variety in the number and type of people involved in decision making. Basically, a decision is taken with the people present at the moment. There is a tension between the two configurations. Where the Simple Structure relies on centralization (the strategy formulator also becomes the implementer), the Adhocracy uses a reversed structure (the strategy implementer also becomes the strategy formulator). Sometimes, a complete lack of understanding in decisions taken by others is the result.

But both configurations have also things in common. They are both organic and decision making can be classified as ‘entrepreneurial’. Decision making is very flexible and happens very fast.

3. **Did the decision making processes used by TomTom MS in the past lead to good decision making (results) and why?**

---

Concerning the issues TomTom (MS) faces there is not much debate about what needs to be done, but more on how it needs to be done. The issues find their origin in a lack of scientific knowledge, not so much in the agreement on the problem definition (which makes them untamed technical problems). This lack of information is particularly caused by the environment TomTom (MS) operates in. The environment is dynamic and competitive, which makes it hard to predict future developments.

The organic and entrepreneurial type of decision making is most suitable for organizations operating in a dynamic and competitive environment. It enables TomTom to remain fast, flexible and innovative. These advantages are the exact reason TomTom has good experiences with the decision making methods used. The speed of decision making sometimes forms a threat to quality, but it never led to real failures. Aside from some small disadvantages, these methods worked out well for TomTom and delivered the results TomTom was looking for.

4. What are the experiences of the people within TomTom MS with the rational decision making models used for the case and their results?

With respect to the results of decision making, TomTom was very pleased with the opportunity identification, while the opportunity assessment was more seen as a confirmation of thoughts they already had. The specific value of rational decision-making concerned the clear structure and documentation of the decision making process. This enables TomTom MS to share decision making results easily with other people (internal and external). Another advantage of documentation is the robustness of decision making; TomTom MS will always be able to look back over time and to perform evaluations.

At the point of costs TomTom was very clear: rational decision making takes too much time. This was shown clearly by the fact that TomTom already made a start with the first negotiations before the opportunity assessment was completed.

TomTom MS was satisfied with the decision making process as it took place. They thought the topics covered were very comprehensive and complete.

5. How did TomTom and its context change?

TomTom started as a small company, organized as a typical Simple Structure. For the last years, the company has been changing rigorously, and it is not likely that will come to a hold in the near future. Three future trends are defined, that shape and change TomTom’s company structure and hence, decision making processes:

- **Success and growth** – TomTom’s enormous success and growth drives the company towards standardizing certain products and processes. This trend expresses itself in another way as well; it also forces TomTom to professionalize, by hiring more well-educated people.
- **Increasing external control** – The increasing external control stems from the fact that TomTom is listed at the stock exchange which brings certain requirements with respect to transparency and documentation with it. Besides that, TomTom has become a major player in the navigation services market and becomes more and more involved in great societal
problems like traffic congestion. Increasing external control brings about new requirements with respect to transparency of decision making and documentation.

- **Complexity and growth of competition** – The market TomTom operates in will become on the one hand more transparent, but is also changing due to a shift towards services and the participation of new (telecom) players. In order to deal with this competitive and dynamic market, TomTom needs to remain flexible and innovative.

### 6. What would good decision making look like for TomTom (MS)?

Combining the lessons learnt from the case study, what to expect for TomTom (MS) in the future and the knowledge from the scientific literature, three points of advice were formulated:

- **Involvement** – TomTom has to make sure that the right people are involved in the decisions they have an expertise in. Only in this way the skills and knowledge of employees are made use of to the most.
- **Documentation** – Documentation of decision making is becoming more important for dealing with the increasing external control, but is also very valuable for internal use. Sharing of information becomes easier, essential for involving other people. A nice addition to that is the robustness that documentation brings; the possibility to look back on decision making processes and results over time.
- **Flexibility** – Because of the variety of issues TomTom faces, flexibility is needed to deal with each issue in another way. This is essential to remain innovative and fast. Flexibility is created by having the freedom to choose the proper decision making method for each issue. With respect to answering this sub-question, this last advice means that there is no single ‘good decision making method’ for TomTom. TomTom should choose the method that fits the problem best.

### 8.1.2 Main research question answer

Making use of the findings from the sub-questions, this section will contain the answer to the main research question:

| Does the use of rational decision models actually lead to a better decision making process and results for TomTom (MS), compared to the currently used decision making methods, given the change in organization and context in the last years and years to come? |

TomTom MS is very satisfied with the case study conducted and the methods applied. However, it would be too short-sighted to label one of the approaches (the methods current used and the rational methods applied to the case) as better than the other approach. This can be stated by reason of two observations:

- While conducting the research, it appeared that TomTom does not see intuitive decision making and rational decision making as two separated (though comparable) methods. It appeared that in their view, rational decision making is more an extension of currently used methods, instead of a replacement. TomTom usually starts by formulating a hypothesis
based on intuition, and after that uses rational methods (as happened with the case study) to check their own feelings and to decrease uncertainty.

- For this research, qualitative research methods were used. Although the evaluation of both decision making methods was structured using clear criteria, the type of results are not fit for labelling one method ‘better’ than the other. Much more it is a matter of aspects of decision making methods that were perceived as better. They are summarized in Table 4, structured using the six criteria defined under sub-question 1. The aspects that are considered most important by TomTom are bold.

The factors which TomTom experienced as positive are integrated in the advice provided under sub-question 6.

Table 4 - decision making methods compared

<table>
<thead>
<tr>
<th>Results: TomTom’s experiences</th>
<th>Current (entrepreneurial) decision making</th>
<th>Rational decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption / use</td>
<td>✓ Yes</td>
<td>✓ Yes</td>
</tr>
<tr>
<td>Value</td>
<td>✓ Flexible</td>
<td>✓ Transparent</td>
</tr>
<tr>
<td></td>
<td>× Quality risk: too fast</td>
<td>✓ Quality: involvement of all relevant people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Robust</td>
</tr>
<tr>
<td>Costs: TomTom’s experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of the process</td>
<td>✓ Fast</td>
<td>× Time consuming</td>
</tr>
<tr>
<td>Costs</td>
<td>✓ Very low</td>
<td>× Higher than current</td>
</tr>
<tr>
<td>Process: TomTom’s experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with involvement</td>
<td>× Quality risk: involvement varies strongly</td>
<td>✓ Easy sharing</td>
</tr>
<tr>
<td>Satisfaction with comprehensiveness</td>
<td>✓ Sufficient</td>
<td>✓ Very complete</td>
</tr>
</tbody>
</table>

With an eye on the future developments, both decision making methods have aspects that TomTom (MS) will need for the future. The documentation and transparency of rational decision making are crucial in dealing with the growth of the company and increasing external control. On the other side, the advantages of entrepreneurial decision making (fast and flexible) are necessary to remain innovative in a dynamic and complex environment.

8.2 Conclusions meta-decision making model

After completing the research necessary to come up with an answer for the first research question, an effort was made to capture this knowledge in a general framework. The second research question, concerning this model, was formulated as follows:
How can the results and experiences of this research be translated into a model supporting private organisations in choosing an appropriate decision making method?

This research question contained two sub-questions:

1. **What are the experiences of the people within TomTom MS with both the rational and currently used decision making methods?**

   The experiences of TomTom MS with both decision making methods are described under 8.1.1. It appeared TomTom liked particular factors in both approaches. It depends heavily on the type of issue which aspects are most important and which approach fits best.

2. **How can these experiences, but also theoretical notions, be translated into a decision making model for all private organisations?**

   One of the most important lessons learned from this research is that there is no ‘best’ decision making method, since it depends heavily on the type of issue which method fits best. This is captured in the third point of advice (sub-question 6 under 8.1.1), stating that TomTom should have the flexibility to choose the most appropriate method for each issue they encounter. Therefore, the goal of the decision making model was to provide TomTom MS and other private organizations with more insight into the relationship between the type of problems and the decision making method that fits best, so that they are able to make a well-thought decision on how to solve a particular issue on the short and long term.

   First, a systems diagram was developed in order to provide more insight into what factors are involved when deciding how to decide. A distinction is made between external factors (the type of problem) and instruments (the decision maker’s own influence on the selection of a decision making method). Three external factors were defined: the impact of the problem; the time available to solve it and the amount of information that could bring more clarity on the matter. There are also three factors a decision maker could influence: the budget that is allocated for the decision making process; the people that are selected to make the decision and the level of risk an organization is willing to take with respect to the particular problem. These six factors determine the level of comprehensiveness that is possible (with respect to the problem characteristics) and the level of comprehensiveness that is desired (determined by the type of problem and company culture). The decision making method chosen is a result of the level of comprehensiveness possible and desired and will in the end influence the decision making results. These factors and insights are captured in a meta-decision making model, showing how the six factors relate to the different decision making methods. It also shows what this will mean for the costs of decision making and the comprehensiveness that is gained with it.

**8.3 Recommendations**

The time for this master thesis research was limited, but that does not mean that there are no possibilities for further research. This section describes three of them.


8.3.1 Evaluation of meta-decision making model

For this research, a meta-decision making model was developed. Unfortunately, it was not possible to test the model within TomTom MS or with other organizations. Applying, evaluating and validating the meta-decision making model would be of great value. It would also be very interesting to see whether organizations are capable of using the model on their own, without the help of the researcher.

8.3.2 Expanding the meta-decision making model

In the future, the multi-actor aspect of TomTom’s environment will only become more important. The decision making methods developed for dealing with different parties and interests (the political decision making models) are not part of the meta-decision making model. It is recommended to expand the meta-decision making model with more decision making approaches, that foresee in multi-actor settings as well.

Involving more methods will become a scientific challenge, since it remains difficult to compare them. The flowcharts used to explain the models captured by the meta-decision making model may not be appropriate for describing other methods as well. More research and effort is needed at this point.

8.3.3 The value of rational decision making

When evaluating the rational decision making methods used for TomTom, it appeared that certain parts were more appreciated than others. This is in line with the experiences of the author as well (see also 8.4.4). Given this finding, a number of questions arise. Will the use of parts of decision making methods (instead of the whole method) be the future of decision making? And which parts are most useful for which situations? It would be interesting pay more attention to these questions in further research.

8.4 Reflections

Throughout the report, demarcations and assumptions were made, having their influence on the research results. This section will reflect on the research methods and case study, pointing out what to take into account when interpreting the conclusions.

8.4.1 Research methods

The qualitative character of the research and data collection methods implies subjectivity. This subjectivity can be found on two sides: on the side of the observer / researcher, or on the side of the respondent (in this case TomTom).

First, decision making (even rational decision making) is a personal matter; it makes a difference who applies the methods. Since rational decision making methods are very structured, it is not very likely that another analyst would have come up with totally different results. However, it is very difficult to say whether TomTom’s experiences with rational decision making would have been exactly the same when the case study was conducted by another person, with other skills. Two specific areas where an analyst makes a difference are distinguished: first, the input
gathered for the decision making. This concerns the number of people interviewed, the questions asked and the way other people respond to that and share their information. Second, there is also a difference in documentation. Writing and communication skills are very personal, but have a great influence on the way a company interprets the results. A solution to overcome this personal bias can be found in using different persons, performed the same case study. Unfortunately, this was beyond the scope of this master thesis research.

Second, for this research, the person who conducted the case study (applying the rational decision making methods) also evaluated the case study results. It is hard to say how this influenced the research results precisely, but it is sure that it happened somehow. Taking the educational background and experience of the author into account, it would be logical to speak of a bias in favour of rational decision making. Because the author was aware of this fact, the evaluation of the case study was set up in such a way that every plus or point of criticism can directly be ascribed to a respondent. Besides, even in the case of a little bias, it is very likely that this preference for rational decision making is balanced by the strong entrepreneurial nature of TomTom. Of course, there is a simple way of avoiding a bias. This can be done by splitting up the role of decision maker and observer / researcher, and providing each of them with incentives to execute their own task as objective as possible. However, this was not an option with respect to the scope of this research. Besides that, the integrated role of the researcher also had some advantages. By executing the case study, the author was able to look from a research point of view during the decision making process and gathered more information than it would have been the case in a pure observation / interview role.

The qualitative nature of the research not only made it difficult for the researcher to remain objective, but also for the subject of research: TomTom MS. As stated earlier in this report, evaluating decision making always has a subjective component. Criteria are often focused on the perception of and satisfaction with the process and results. For this reason, the subjectivity on the side of the respondent cannot be avoided. Nevertheless, an effort was made to structure the evaluation of the case study as much as possible, in order to increase objectivity. However, it still remained difficult for TomTom MS to make objective estimates for the clearly defined criteria, because decision making is entwined with other activities and topics. An easy solution to this would be to use an even better demarcated problem. A major drawback of this is the fact that such a problem is not representative for the issues TomTom is dealing with everyday at all.

It is important to keep the subjective character of the research in mind when reading the conclusions of this research. They provide much more information on perceptions and experiences than hard facts. This does not immediately decreases the value of this research, especially because the quality of decision making is a subjective matter for a large share (see 4.3).

8.4.2 Case characteristics
It is also interesting to reflect on the case that was used for this research. The case concerned a real life case, instead of a case specially set up for research. A real-life case made sure that the problem was just as complex as everyday problems are, and most aspects of decision making
(e.g. the dynamics in the environment and the time pressure) were present. Nevertheless, one aspect was lacking: the involvement of multiple departments and business units. In this respect, the case is not fully representative for TomTom MS. The fact that the case does not deal with real complex multi-actor problems is also important for other organizations. The lessons learnt from this research may not be applicable to their situations. Another implication was the lack of political decision making models in the meta-decision making model. It was less relevant for TomTom MS and there were no research results on this topic that could form the basis for including a political aspect in the meta-decision making model. This implies that the model is definitely not useful in all decision making situations.

The author acknowledges that this is an important shortcoming of the research and model. Using a more representative case would have made a difference, but it is also questionable whether it was possible to maintain the same quality and depth of research within the same amount of time available.

8.4.3 Scientific value

The scientific value of this research is described in two parts. First, the value of the research itself will be described. Second, the specific value of the result of the research (the meta-decision making model) will be examined.

One of the greatest contributions of this research to the field of policy-making is the renewed emphasis on meta-decision making. Instead of focusing on one decision-making approach (e.g. rational decision making) and its pre-conditions, it lifts the discussion up to a higher level, posing questions about the feasibility of the (rational) approach instead of which specific rational method to choose. It also looks beyond the characteristics of one single problem. The choice for a specific decision making method does not only depend on the problem one faces, but is also strongly embedded in the type of organization and its culture. Long term factors like risk attitude and people are important as well.

The knowledge gained with this research is captured in a meta-decision making model. The meta-decision making model contributes to the scientific literate by addressing two issues. First, it appeared that it is very hard to compare the eight decision making models as defined in Chapter 4 (see sub-question 1 under 8.1.1). By breaking down the methods into sub-processes, an overlap in decision making methods could be identified. This made it possible to capture four decision making methods in one model, and to compare them to some extent.

Second, the meta-decision making model is a clear attempt to make the theoretical decision making models more available for organizations, dealing with decision making everyday. The meta-decision making model combined different pieces of theory and aims for being the starting-point for organizations willing to make well-balanced decisions on their decision making methods. The model creates an understanding of the most important factors in choosing such a method. Besides that, it offers a good first step toward practical application of decision making methods. Practical applicable flowcharts are developed (however not tested yet), something that is identified as a problem in the scientific and policy communities.
References


PERSONAL COMMUNICATION (2007b) Verbal conversation between George de Boer and author, December 5. Delft.

PERSONAL COMMUNICATION (2008a) Verbal conversation between Ben Rutten and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008d) Verbal conversation between George de Boer and author, April 10. Amsterdam.


PERSONAL COMMUNICATION (2008g) Verbal conversation between George de Boer and author, May 19. Delft.

PERSONAL COMMUNICATION (2008h) Verbal conversation between George de Boer and author, May 27. Amsterdam.

PERSONAL COMMUNICATION (2008i) Verbal conversation between Ivar Zantinge and author, April 10. Amsterdam.


Management Decision, 42, 243-258.

TOMTOM (2007b) TomTom Mobility Solutions Website.
TOMTOM (2008a) Investor Relations - Historic data.


Appendix A – TomTom respondents

A number of employees of TomTom MS were consulted as a source of information and to evaluate the case study with. This appendix provides more detailed information about them and clarifies the reasons why they were selected.

- **George de Boer – manager Sales and Alliances**
  The majority of the one-on-one interviews were held with George de Boer, manager Sales and Alliances from the sales-team of TomTom Mobility Solutions. He is closely involved in the majority of decisions that are taken within the business unit. His tasks exist of four parts:
  1. Forming alliances with third parties, especially European mobile operators, in order to retrieve traffic information.
  2. The Sales part refers to keeping in contact with external parties like governments and universities. This is also closely related to taking care of the Public Relations of TomTom MS.
  3. Within TomTom, George is the single point of contact for the automotive business unit.
  4. George is also responsible for the marketing and events within TomTom MS.
  To summarize, George has great expertise on the multi-actor experiences of TomTom MS and participates in a great deal of the decision making of TomTom MS. This makes him a valuable source of information.

- **Lucien Groenhuijzen – Managing Director Mobility Solutions**
  Being the managing director of the business unit, Lucien Groenhuijzen was able to provide information on the big picture and the position of TomTom MS with respect to the whole company. He is in close contact with the board, and delivered valuable input on the points of strategy formulation and decision making on top level.

- **Ben Rutten – Solution Manager**
  Ben Rutten is used to manage interdisciplinary teams, working together with people from multiple departments and business units. As a team manager, he has also contact with the board and has a lot of knowledge of the process of idea generation to implementation.

- **Bob Soeters – Software Developer**
  Being a software developer, Bob knows what it is like to be part of a team within TomTom. He was able to provide a lot of information from his operational experience.

- **Jasper Verdooren – Solution Manager**
  Jasper is involved in a number of projects and was able to provide information on the company culture and operations of TomTom (MS).

- **Ivar Zantinge – Manager Sales**
  Ivar has experience with hiring consultancy firms and reflected on that.
Appendix B – TomTom’s future trends

This appendix illustrates with some basic data the forces that drive TomTom new company configurations. The first section shows TomTom’s growth in terms of employees and revenue. The second section elaborates on TomTom’s position within the PND-market.

B.1 Growth

TomTom started as a very small company in 1991, and remained so until 2002. After that, the number of employees grew exponentially (see Table 5, derived from (TomTom, 2007a)).

Table 5 - growth in number of employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of TomTom employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>200</td>
</tr>
<tr>
<td>2003</td>
<td>400</td>
</tr>
<tr>
<td>2004</td>
<td>600</td>
</tr>
<tr>
<td>2005</td>
<td>800</td>
</tr>
<tr>
<td>2006</td>
<td>1000</td>
</tr>
<tr>
<td>2007</td>
<td>1200</td>
</tr>
</tbody>
</table>

The same growth can be seen in revenue, albeit more of a linear trend (see Table 6, derived from (TomTom, 2008b)).

Table 6 - growth in annual revenue

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue TomTom (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>0</td>
</tr>
<tr>
<td>2004</td>
<td>200</td>
</tr>
<tr>
<td>2005</td>
<td>400</td>
</tr>
<tr>
<td>2006</td>
<td>600</td>
</tr>
<tr>
<td>2007</td>
<td>800</td>
</tr>
</tbody>
</table>
### B.2 Competition

The PND-market is a very young market. TomTom's most important competitor is Garmin, an American company. Table 7 (TomTom, 2008a) shows the share prices of TomTom and Garmin, compared to the AEX trend. The PND market grew until mid 2007, after which the share price started to decline. It can be noted that TomTom outperformed Garmin for a long time (until mid 2006), after which Garmin started to take over slightly.

**Table 7 - TomTom's share price**

![Graph of TomTom's share price over years 2005 to 2007, compared to AEX trend, and share comparators including TomTom, Amsterdam, AEX, NavTeq, Tele Atlas, Trimble, SirF, and Garmin.]