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# A Dynamic Roadmap for City Logistics

## Designing a dynamic roadmap towards 2025 for the Netherlands

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# A Dynamic Roadmap for City Logistics

Designing a dynamic roadmap
towards 2025 for the Netherlands

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I hope that you will enjoy reading my thesis and that you are inspired by the possibilities of pathway roadmaps.

Jasper Bauwens

Delft, November 2015

# B SUMMARY

The local governments in the Netherlands experience a problem. The distribution of freight in the cities is an important driver of the economy, but it has negative impacts on the liveability of their cities, which affects the attractiveness of a municipality. However, changing the city logistics is not straightforward. Shippers, carriers, city hubs, retailers, consumers and residents all have different objectives and other concerns. Shippers for example, want to meet the expectations of the consumers. The consumers want same-day delivery, deliveries on Sundays, just-in-time, sustainable and affordable services. The challenge of the logistic sector is to increase the logistic operations with less vehicle movements and a decrease of emissions.

In order to achieve this challenge, governments, logistic operators and research institutes signed a covenant, named the Green Deal Zero Emission Stadslogistiek. In this covenant the parties agree to realize zero emission in city logistics in 2025. But in the Green Deal only the ambitions are recorded and not a strategic plan to achieve the ambitions. It results that, despite the Green Deal ZES, people from different parts of the business fail to take appropriate action. Due to a lack of targets in the covenant stakeholders cannot be judged on their behaviour and progress. Since a strategic planning is missing, stakeholders experience little responsibility to take action.

The objective of this research is to deliver a dynamic roadmap for the coming decade that strategic planners can use. This map of pathways should help the strategic planners of city logistics to make a plan, taken future uncertainties into account. To meet this objective, insight is needed in how the good intentions of the stakeholders of city logistics in the Netherlands can be converted to a robust roadmap for the next decade, aiming for an improvement of urban logistics. The research tries to improve the success of the Green Deal Zero Emission Stadslogistiek. Especially the robustness of the roadmap is relevant, since it should be capable of dealing with setbacks and delays of actions.

In order to deliver a strategic planning for realizing the ambitions in the Green Deal the stakeholders are involved in developing strategies. A literature review and interviews with experts provide insight in the opportunities and vulnerabilities of city logistics. The research deals also with four scenarios in order to help professionals anticipate on potential risk and uncertainty in the future. Including the risk and uncertainty in the pathway roadmap helps to make the pathways robust and also applicable in changing environments. Through an interactive roadmapping workshop with professionals of city logistics the foundations of the strategic plan are developed.

The graphical representation of the strategies from the roadmapping workshop results in a map with multiple action strategies. In this map the strategies of market parties and governments are separated, since governments can latter interfere in the process of change. Strategic planners can use the pathway roadmap to select their preferred pathway and use it as a tool in communication. Besides, an important advantage of roadmapping can be derived from the roadmapping process itself instead of the pathway map. Alongside studies on ontologies and stakeholder analysis, a pathway roadmap can help to frame the problem field. Almost in all the policy top sectors in the Netherlands can benefit from pathway roadmapping.

The logistics operators and the municipality should start with the quick wins and begin to cooperate. In order to achieve zero emission zones in 2025 the strategic planners have to be ambitious. High targets will stimulate disruptive innovations, which can be adjusted if necessary. The top sector transport policy should be responsible for the pathway roadmap so that the pathway roadmap is respected and complied with. The pathway roadmap can also be used to assign research budgets. Further research can be done to apply pathway roadmaps on a larger scale, such as at the European or worldwide level.

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# Introduction
## Part 1

# 1 INTRODUCTION TO THE RESEARCH

This chapter introduces the subject of city logistics in the Netherlands. It gives a clear overview of what is studied in the report and what the relevance is. The problems, objectives and the scope of the research are also explained. The chapter starts with some background information of urban logistics in general. This background information is the basis of the research problem. The research problem consists of a knowledge gap, the societal and scientific relevance, and the research objective with the expected deliverable. In the third section the research questions are presented in order to seek for a solution to the problem statement. In the fourth section the methodology is briefly explained, the in-deep description is done in Chapter 2. Finally, the outline of the report is provided.

## 1.1 Introduction to the city logistics environment

This section is about the current situation of city logistics in Europe. A scientific literature review provides some basic knowledge to understand the complexity of urban freight distributions.

Urbanisation is an ongoing trend in the world. People are moving to the cities and leaving the rural areas. In fact, since 2008 the global urban population is higher than the rural population (Bozzo et al., 2014). Currently, more than half of the population worldwide lives in urban areas, and it is estimated to increase to over 60 % by 2030 (DHL, 2013a). According to the Environment Action Programme to 2020 of the European Commission (2014) around 80% of the total population in Europe will live in urban areas. This means that cities are facing a great challenge with respect to logistics. People consume more due to an increase in wealth and consume also an increasing variety of products (Anand et al., 2012).

The cities are the drivers of the European economy since 85% of the EU's gross domestic product (GDP) is created in urban areas (European Commission, 2007). Transport infrastructure and the accessibility have become decisive success factors for regional development (Lakshmanan, 2011; Nijkamp & Abreu, 2009). Efficient urban transport contributes to the smooth functioning of transport networks, which makes it key for the economy and for the needs of the citizens. But city logistics is also becoming a more disturbing factor for quality of life (Lindholm & Behrends, 2012).

Over the past decade policy makers are thinking about an alternative way of supplying urban areas, because the current system is causing more and more problems in densely populated areas (Allen et al., 2007; Anderson et al., 2005; Browne et al., 2005; Quak, 2008). City logistics is a hot topic in the recent years, however, there is not a big shift in reorganising the distribution processes yet. A reason that could explain why no one is taking action is the uncertainty about what city centre will look like in the near future (Bjerkan et al., 2014).

If the population grows and the capacity of infrastructures do not improve, there will be more road congestion and more negative impacts on the environment. To prevent this scenario, measurements in city logistics are required. City logistics solutions help solve problems by making more efficient use of freight vehicles and economic/regulatory measures, since cities depend heavily on trucks and vans for urban distribution. At the moment there are no implemented alternatives transport systems available for freight. Improving city logistics may provide a powerful approach to tackle these issues (DHL, 2013a, pp. 42-43).

The distribution of urban freight distributions is an urgent and interesting research field because it impacts the liveability in the city. Quak (2008) listed the impacts that affect planet, people and profit using multiple sources (Anderson et al., 2005; Browne et al., 2005; Van Binsbergen & Visser, 2001). These impacts include:

- Impacts on the planet: pollutant emissions, the use of non-renewable natural resources, waste products and the loss of wildlife habitat.
- Impacts on people: physical consequences of pollutant emissions on public health, injuries and death resulting from traffic accidents, the increase in nuisance, reduction in air quality and damage of buildings and infrastructure.

- Impacts on profit: inefficiency and waste of resources, decrease in journey reliability and delivery punctuality, potentially resulting in less service to customers and lost markets, decrease in economic development and, congestion and decreasing city accessibility.

In various European cities initiatives arise to deal with these impacts. Metropolitan areas like London, Paris and Barcelona adopted policy measures to reduce the negative impacts caused by urban freight logistics (Dablanc et al., 2011). In London the local authorities set a low emission zone for the city centre in 2008 (Transport for London, 2008). This rule impacts the logistic distribution of freight goods since diesel fuelled trucks have to pay a fee to enter the central area (van Rooijen & Quak, 2014). The City of Paris, has adopted several policies to promote sustainable Urban Freight Transport. Paris has developed, for example, a network of on-street loading and unloading spaces. These spaces are designed specifically for the needs of the freight industry. The municipality of Paris has also introduced regulations to limit access for articulated freight vehicles into central Paris between 07.00 and 22.00, with the exception of car transporters (European Commission, 2012, p. 82). In Barcelona, under the CIVITAS project MIRACLES, was implemented a measure stating that supermarkets should only receive deliveries during the night, i.e. between 22.00 and midnight. This is done with the use of appropriate vehicles to reduce noise emissions (Russo & Comi, 2011, p. 149; van Rooijen & Quak, 2014). London, Paris and Barcelona are just three examples of solutions to improve the urban logistics. Also in the Netherlands there are some examples of smart city logistics. Cities like Amsterdam, Utrecht, Delft and Rotterdam are experimenting with different solutions. However, the truly and fully accepted policy measures take their time. The next section elaborates on the problem of the slow improvements of city logistics in the Netherlands.

## 1.2 Research problem of city logistics

This section deals with the research problem of city logistics in the Netherlands. The research problem contains several elements: a problem exploration, a knowledge gap, the research's perspective, the relevancies of the research and the objective of the research. The problem exploration is about the definition and delineation of the project, based on previous research. Secondly, the knowledge gap of the actual and preferred situation is explained. As third the perspective of the research is substantiated. The fourth part of this section deals with the scientific and social relevance of designing a pathway roadmap for city logistics. This final part of this section is about the research objective and the final deliverable.

### 1.2.1 Problem exploration

Urban logistics has various flows of goods that can be distinguished. Ploos van Amstel (2015a) defined nine groups in one of his lectures about improving urban freight logistics: hospitality and food service, construction, waste, retail non-food, retail food, parcel delivery, service and cleaning, governmental services and others. According to him, researchers and policymakers are focussing only on parcel deliveries in urban freight logistics policy making (Ploos van Amstel, 2015b). However, the share of parcel delivery is only 12% by van and just 4% by truck (2015a) of all freight. The increase the relevance of the research this report includes multiple flows of goods. To increase the share of the flow of goods Figure 1 is used. This figure shows the share of each good flow in Dutch cities by truck and by van. These distributions give an indication of the goods transported in urban areas.

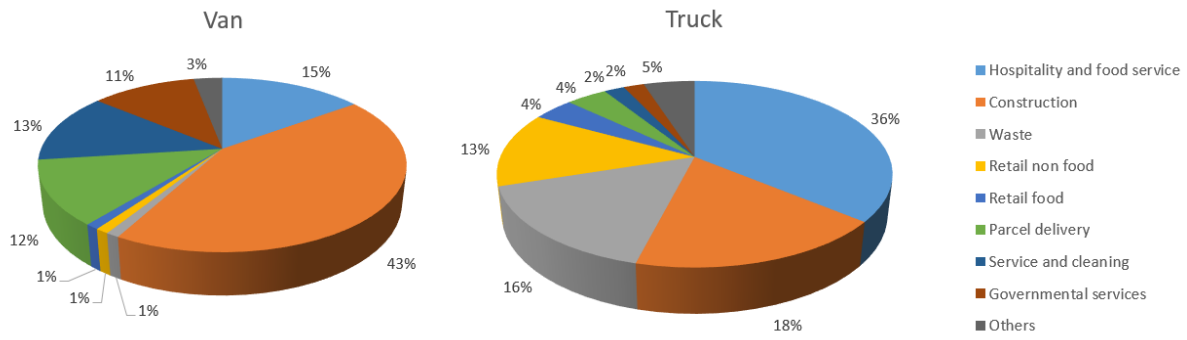


*Figure 1: Distribution of goods in the Netherlands, retrieved from Ploos van Amstel (2015a)*

This research does not focus on all flows of goods in the urban area since it is too complex. In any case, the process of each stream is too diverse to consider as one entity. Waste logistics requires, for example, a different approach than parcel deliveries. Also the construction logistics is a different domain than that of food retail. This research focusses on the following four flows of goods in the cities:

- Hospitality and food services;
- Retail non-food;
- Retail food;
- Parcel delivery.

The four flows have a more or less similar logistic process. The share of vehicles movements that can attributed to the four flows is 30% by van and 57% by trucks in the urban areas (Ploos van Amstel, 2015a). These movements impact the quality of life in urban areas. Urban freight distribution can cause various problems in the city. The problems that are caused by logistics in urban areas are (Lindholm, 2013; van Rooijen & Quak, 2010):

- Pollution (noise and air);
- Safety and nuisance for passengers/bikers/traffic/citizens;
- Damage to the city (roads, buildings);
- Waste of time and energy;
- Reducing availability of (scarce) fossil fuels;
- Congestion.

The impact of these problems increases due to the urbanisation and the recovery of the European economy. To mitigate the consequences of the urban environment changes are needed. Although the problem is urgent, it seems hard to take mitigating measurements. Why this is difficult is substantiated in the problem statement.

### 1.2.2 Problem statement

Urban freight transport is considered of great importance in maintaining the economic vitality of the city, but it also imposes the negative impacts on the urban area (Anderson et al., 2005). Ogden (1992) is one of the pioneers that addressed new concepts in urban freight logistics. He already described that a more efficient urban logistic is needed to secure the existing lifestyle and quality. In this research the definition about city logistics is the one used by the Flemish Institute of Logistics (van Breedam et al., 2008): *"All the freight with the origin or destination in the city, as well from and to the retailers and public institutions in the city as well to the citizen-consumer."*

Urban logistics is causing problems for both enterprises and policymakers. For the business the last mile is considered as the most expensive part of the supply chain. The share of the last mile is up 13% to 75% of the total costs of logistics (Gevaers et al., 2014). A more efficient distribution of the goods can save significant amounts of money. The local governments face multiple challenges in their cities: the amount of traffic flows increases, there is more congestion and there are rising urban environmental issues like emissions, noise and accidents (Anderson et al., 2005).

Urban mobility accounts for 40% of all CO2 emissions of road transport and up to 70% of other pollutants from transport (European Commission, 2015; Lindholm, 2013). Lindholm and Behrends (2012) state that both local authorities and transport operators neglect the problems that arise from freight in urban areas. According to them an overall awareness is needed to understand that a deeper integration of freight transport and urban sustainability strategies can be beneficial for both the efficiency of freight transport networks and for local sustainability (Lindholm & Behrends, 2012). In order to facilitate city logistics and more efficient logistics for cities, the attitude of stakeholders who are involved in urban freight transport should change (DHL, 2013a, p. 43). However, this is a very slow process.

### 1.2.3 Knowledge gap

Various companies and municipalities in the Netherlands are already experimenting with urban goods distribution (Ploos van Amstel, 2015a; Stadslogistiek Delft, 2015). In November 2014 the Dutch government, local governments and various logistics parties signed a covenant: the Green Deal Zero Emission Stadslogistiek, abbreviated Green Deal ZES (Rijksoverheid, 2014). The cooperating parties

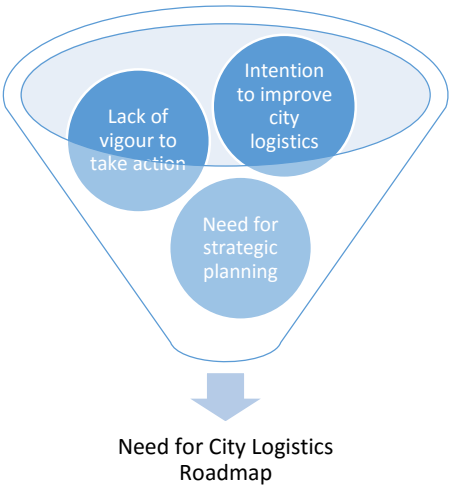


*Figure 2: Problem forming mechanism*

together develop and intensify activities that contribute towards an acceleration of zero emission city logistics. They committed themselves to their own responsibilities and tasks, at least until January 2020 (Rijksoverheid, 2014).

Despite the covenant and the intentions of its parties, there is an absence of significant changes (Ploos van Amstel, 2015b; Tjalma, 2015). The stakeholders are not able to enforce changes in urban logistics to make the urban environment more sustainable. The actions are being postponed, so there is a lack of vigor of the stakeholders. Various studies show city logistic concepts that can contribute to the livability in the city (Slabbekoorn, 2014; van Breedam et al., 2008). However, due to a lack of coordination, it is not clear which stakeholder is responsible for what action and when to act in time.

The current situation is that there is a covenant with good intentions, but the stakeholders are not able to enforce changes in urban logistics to make the urban environment more liveable. The desired situation is that the stakeholders cooperate and align their plans to improve the liveability in urban areas. As such, the current and desired situations are not in line together, so there is a gap (Kingdon & Thurber, 1984). This research tries to eliminate the gap and find a solution for the entrapment. A solution for this knowledge gap could be a roadmap for the city logistics.

The problem formulation mechanism is illustrated in Figure 2. The problem forming mechanism shows the ingredients for the research. The intentions correspond to the covenant that is singed by multiple stakeholders. In spite of the intentions, the actions are being postponed, so there is a lack of vigour of the stakeholders. This can be attributed to a lack of coordination and strategic planning, since it is not clear which stakeholder is responsible for what action and when to act in time. Various techniques are available that have been or are being applied for supporting planning under deep uncertainty, for example Robust Decision Making, decision trees, roadmaps, and several policy planning approaches (Haasnoot et al., 2013). A roadmap for city logistics may help to coordinate the possible actions.

A roadmap provides a structured and graphical means for exploring and communicating the relations between actions for supporting innovation and strategy in a sector (Phaal et al., 2004b; Phaal & Muller, 2009). Roadmaps are mostly represented in a layered structure of solution strategies together with a dimension of time (Lee et al., 2015). Roadmaps can also be used for illustrating the sequence of actions in time (Phaal et al., 2004b; Phaal et al., 2009; Robinson & Propp, 2008).

The mentioned problem of this research is the gap between intention and action. Roadmapping and its many derivatives, is one of the most used management tools for supporting innovation and strategy. Roadmaps are used at companies, sector and national levels (Phaal & Muller, 2009). A strategic plan needs to be developed in order to find a solution for the gridlock. Such well-substantiated plan does not yet exist for urban freight distribution in the Netherlands. The roadmap does not deal with theory development, it is a practice-oriented research project. More specifically, a practical design-oriented approach is chosen, aiming to design map of pathways to support strategic planners of urban logistics

(Verschuren et al., 2010). For the development of the map, a new approach is created based on the Dynamic Adaptive Policy Pathway framework (Haasnoot et al., 2013). A detailed substantiation of this framework can be found in chapter 2.

The perspective of the research is from a local government's point of view. This choice is made since the municipalities have the most means to facilitate or force change in the urban transport. Besides, they are owner of the cities and are representing the residents. An additional advantage of this perspective is that local governments are a relatively neutral party in contrast to logistics providers or shippers since they act based on commercial considerations.

### 1.2.4 Societal and scientific relevance

This part of the research problem is about the relevance of the research. It shows how the research can contribute to societal issues, and what the added value is for science.

#### *Societal relevance*

First the societal relevance, why would someone be interested in reading this research? This research is relevant because people perceive the current problems with city logistics. Residents, retailers and shoppers suffer from the number of transport vehicles in the city. Local governments have a problem with their attractiveness due to a lack of accessibility and air quality. And shippers and carriers deal with an increase of delivery time and higher cost of distribution. Since city logistics impact lots of stakeholders this research can help many stakeholders.

Lindholm (2012a) studied for her PhD thesis the need for urban city logistics from a local authority's perspective. One of her conclusions is that the concept of city logistics offers many municipalities a solution in the decreasing quality of life in city centres. Bigger cities are dealing nowadays with congestions, low air quality, noise and hindrance for visitors, caused mainly by distribution vehicles. A concept where goods are being consolidated just outside the city centre can reduce the number of vehicle movements in the city. This is also the conclusion of Taniguchi et al. (2001).

Not only is the government interested in the changing urban logistic environment, also the retailers are following the shift with great interest. Due to new technology, changing population and economic changes, the wishes of the consumer change. People do value convenience and experience (Ministry of Economic Affairs, 2015). Their challenge is to make shopping in the city centres more attractive, this can partly be done with new city logistics.

To summarize, there is a sense of urgency because if stakeholders do not change their attitude, they will face the following problems: the last-mile logistics will become more expensive for all actors, the liveability of the city will diminish, and the service level will not be sufficient. So improving the efficiency of city logistics is beneficial for a considerable amount of parties. The quest to which improvements are relevant and are achievable can be found in this research.

#### *Scientific relevance*

The scientific relevance of designing roadmaps for city logistics deals with the scientific contribution. Many researchers agree on the fact that city logistics can be optimized (Browne et al., 2005; Lindholm, 2012b; Ogden, 1992; van Duin & Quak, 2007). Recently, new studies points to the problem that urban logistics is not changing fast enough, as such the effects are limited (Bubble Post, 2013; van Rooijen & Quak, 2014).

Governmental authorities initiated new cooperation between parties to speed up the process of smart urban logistics. There are several initiatives taken at European level (European Commission, 2011), national level (Ministry of Economic Affairs, 2015) and local level (Lindholm & Browne, 2013; Municipality of Amsterdam, 2015; Municipality of Delft, 2013). But these authorities do not anticipate on the dynamics in city logistics over years. Despite studies about anticipation of future scenarios, a roadmap has not been made so far. The studies of the Deutsche Post DHL about future scenarios provides lots of useful information to get insight in plausible futures (Bubner et al., 2014; 2012, 2013a, 2013b). To avoid biases, other studies about plausible futures, trends and drivers are used (Bell & Paskins, 2013; McKenzie, 2013; Ministry of Economic Affairs, 2015). However, none of them translated the vulnerabilities from these future studies towards an action plan for city logistics operators nowadays. The translation, backcasting, from future scenarios to actions for stakeholders on the short term is

lacking in literature. A report that provides a study with possible roadmaps perceived by the stakeholders is exactly what can contribute to a game change. A map of possible action strategies can help stakeholders change their attitude and willingness to take action. An extra advantage of such roadmap is that it deals with lock-in situations. These are situations were no policy options are left after adopting measures. By proposing an order of actions can prevent such situations.

### 1.2.5 Research objective and final deliverable

In this section the research objective is described. In order to help the stakeholders of city logistics with improving logistics in urban areas, a clear roadmap with possible pathways can help. With such a roadmap the intentions of stakeholders can be converted into action strategies. The objective of this research is as follows:

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*"The goal of this research is to provide stakeholders a pathway roadmap for city logistics in the Netherlands using future scenarios. With this roadmap the stakeholders can anticipate on what to do or not to do in the coming years, depending on actions of other stakeholders"*

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This objective is relevant for the stakeholders because they can influence the decisions made by other stakeholders. By designing a pathway roadmap, strategic planners can choose which strategic pathway they should take. Since the research is mapping the possible pathways it is a dynamic roadmap, because over time planners can chose different pathways depending on the circumstances. The final deliverable of this research is a map of possible pathways for the next decade.

## 1.3 Research questions

This section is about the research questions of the research. Research questions help to structure the report and to focus on the objective of the research. Each question has a certain contribution and aim for the report. The sub-questions are elaborated separately, discussing the aim and the method of answering the question.

### 1.3.1 Main research question

The objective is to deliver a dynamic roadmap for the coming decade. This map of pathways should help the strategic planners of city logistics to make a plan, taken future uncertainties into account. To meet this objective, the following research question is defined:

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*How can the good intentions of the stakeholders of city logistics in the Netherlands be converted to a robust roadmap for the next decade, aiming for an improvement of urban logistics?*

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This question seeks for an answer to improve the success of the Green Deal Zero Emission Stadslogistiek. Especially the robustness of the roadmap is relevant, since it should be capable of dealing with setbacks and delays of actions. To be able to answer this complex question, sub-questions have been formulated.

### 1.3.2 Sub questions

These sub-question collectively should contribute to give an answer to the main research question and help reach the goal of the research. The sub-questions are also roughly the structure of the thesis, each question has its own chapter where an answer is formulated. The following sub-questions are defined for this research:

1. What is the underlying problem of the lack of actions for improving the city logistics?
2. How can a dynamic roadmap be developed?
3. Which elements of city logistics are relevant for mapping pathways?
4. How can future alternatives help to make the pathway roadmaps more robust?

5. How does the pathway roadmap of city logistics in the Netherlands looks like?
6. What are the strengths and weaknesses of the pathway roadmap?

These sub-questions are used structure the chapters of this report and help to make the main research question understandable. The following parentheses delineates the sub-questions that are formulated. The aim and the methods are described briefly.

*1. What is the underlying problem of the lack of actions for improving the city logistics?*

The aim of this question is to provide some background information about city logistics. Describing the current situation illustrates the need for a roadmap. The background information is relevant for the research scope and provides required knowledge for understanding this report. Two methodologies are used to understand the matter of urban logistics.

The first methodology is a desk research, consisting of a scientific literature review about city logistics. Consulting search engines for scientific papers and internet help to determine the approach. The second method for obtaining information about the current situation of city logistics is by interviewing experts and stakeholders. Experts contribute with additional scientific information and stakeholders can designate problems and knowledge gaps.

*2. How can a dynamic roadmap be developed?*

This question is essential for the sequel of the research. The method to construct a dynamic roadmap is the framework of the report. The framework will be the guideline of analyses performed. An explorative study of developing roadmaps helps to choose the framework that suits best. The chosen framework is the basis the roadmap.

The exploration is done by a literature review. Comparing frameworks helps to decide which one fits best for city logistics in the Netherlands. A wide variety of interests and stakeholders makes it hard to find a matching framework.

*3. Which elements of city logistics are relevant for mapping pathways?*

A more detail study to the elements that are needed for a roadmap is done here. This question will help to demarcate the problem. A system analysis and a stakeholder analysis give insight into the complexity of developing a policy pathway for urban logistics. It will also help to understand the system and its relevant elements.

The relevant elements for making a roadmap are obtained by a literature review and by expert interviews. In literature many studies can be found on the relevant relations and determinant factors in the system. But the interviews with experts are needed since there is no information in scientific literature about crucial elements for the roadmap. These experts can help with new insights, but also safeguard that useless research is done. The aim of the stakeholder analysis is to gain understanding in the pros and cons for each single stakeholder towards city logistics. This stakeholder analysis elaborates on the power positions of the parties involved.

*4. How can future alternatives help to make the pathway roadmaps more robust?*

The roadmap should be robust, since it has to deal with future events. In order to get more input that takes future developments into account, a scenario study is done. The scenarios help to emphasize in plausible future and their implication for logistics. The theory of backcasting will be used later to identify tactics and strategies of stakeholders (Schwartz, 1991).

There are many ways for generating future scenarios (Schnaars, 1987), the approach will be discussed here. Scenarios can be designed by using the drivers and trends, which are specified in the previous question. Frameworks for designing future alternatives are described by several scientists (Bishop et al., 2007; Burt & van der Heijden, 2003; Schnaars, 1987; Schwartz, 1996; Swart et al., 2004; Wilkinson, 2009). Also the future studies of the Deutsche Post DHL are used (DHL, 2012, 2013b).

*5. How does the pathway roadmap of city logistics in the Netherlands looks like?*

The objective of this research is to activate stakeholders in the urban distribution by making a roadmap. Mapping the actions in a roadmap is the aim of this sub-question. A Dynamic Adaptive Policy Pathway maps the several strategies for the next decade, with the additional feature that it is dynamic. It deals with uncertainty and changing attitudes of the stakeholders.

The method that is used to develop a Dynamic Adaptive Policy Pathway is a workshop. During the workshop its stakeholders have to discuss and interact about the actions that should be taken. Using the pre-defined futures enables us to think about the plausible implications for logistics. An interactive environment forces the stakeholders to discuss and understands one another's problems and means. This understanding gives insight in the interdependencies of actors and the sequence of actions. This sequence is interesting since it can avoid lock-ins.

*6. What are the strengths and weaknesses of the pathway roadmap?*

A reflection on the research will provide additional insights in the opportunities of developing dynamic roadmaps for logistics. On one hand, new insights about using and developing dynamic roadmaps is interesting. On the other hand, suggestions can be done about improvements for future research to logistic roadmaps. A critical evaluation of this approach can support the Dutch government to do an improved and more detailed study on city logistics.

## 1.4 Research methods

This section describes briefly which methods are used during this research. The research methods give insight into the approach and the sources of the information used. A more detailed substantiation of the chosen methods can be found in Chapter 2. In Figure 3 a brief overview of the used methods is displayed. The methods distinguish the globally the different phases of the research. The methods result in deliverables that combined make up the storyline of this report.

The desk review, where the literature review is done, results in a research proposal. This proposal is the basis for selecting the experts to add relevant information. These new insights are mainly trends and drivers of city logistics. These trends and drivers are in turn used to design future context scenarios. The scenarios function as a trigger during to the workshop in order to perceive actions and strategies for dealing with the implications of the scenarios. The results of the workshop form the basis of the Adaptive Pathways. The possible pathways can be incorporated, resulting in a roadmap for the city logistics. Finally, this roadmap is the final deliverable of this research, with the aim of improving the liveability in the city. Chapter 3 elaborates more on the research approach and the used methodologies.


*Figure 3: Overview of methods and deliverables*

## 1.5 Thesis outline

This section is about the outline of the report. It shows the structure of the research and helps to understand the consistency of the chapters. As mentioned earlier, the structure of the report follows roughly the sub-questions. Answering these sub-questions step by step will explain the process of the research. The study can be divided in three different design phases: *introduction, methodologies, and pathways map design*. The outline of the report is graphically represented in Figure 4.

The first phase is the introduction to the problem field of city logistics. This phase presents the background information and the knowledge gaps of city logistics. It scopes the research and introduces

the goals and methods. The system design phase consists of two chapters: *Introduction* and *Framework and Methodologies.*

The second phase is about the underlying analyses for mapping pathways for city logistics. This phase is divided in three chapters: *Stakeholders' perspectives, System Analysis,* and *Developing Future Scenarios*. The first chapter in the methodology phase is about the considered stakeholders in city logistics. The system analysis provides a system diagram that sets the boundaries of the system that is considered in this research. The third and final chapter in this stage is dealing with the method of constructing future alternatives. This results in four possible dimensions of the futures, and describes these futures briefly and shows the changes with respect to the current situation.

The third and final phase is about the design of the pathway roadmap until 2025. This phase is split up in three separate chapters: *Actions and Measurements, Dynamic Pathways,* and *Conclusion and Recommendations.* Chapter Actions and Measurements is partly the report and interpretation of the workshop 'City logistics in 2025'. In the chapter "Pathway roadmap Design" the conversion from actions to pathways is explained and presented. With the pathway roadmaps, the conclusions are drawn in the eponymous chapter and some recommendations are done. This chapter proposes the future research that can be done and reflects on this research.

The graphical representation of the outline of the research is illustrated in Figure 4. The introduction and the framework of the Dynamic Roadmap determine the research setup. The stakeholder mapping, the system diagram and the future design are the supporting building blocks for city logistic roadmapping. And the actions and measurements, the pathway roadmap and the conclusions and recommendations are the ingredients for the roadmap. Analysing the roadmap and the reflection results in the contribution of the research: a methodology for levelling the gap between the intentions (Green Deal ZES) and the actions.

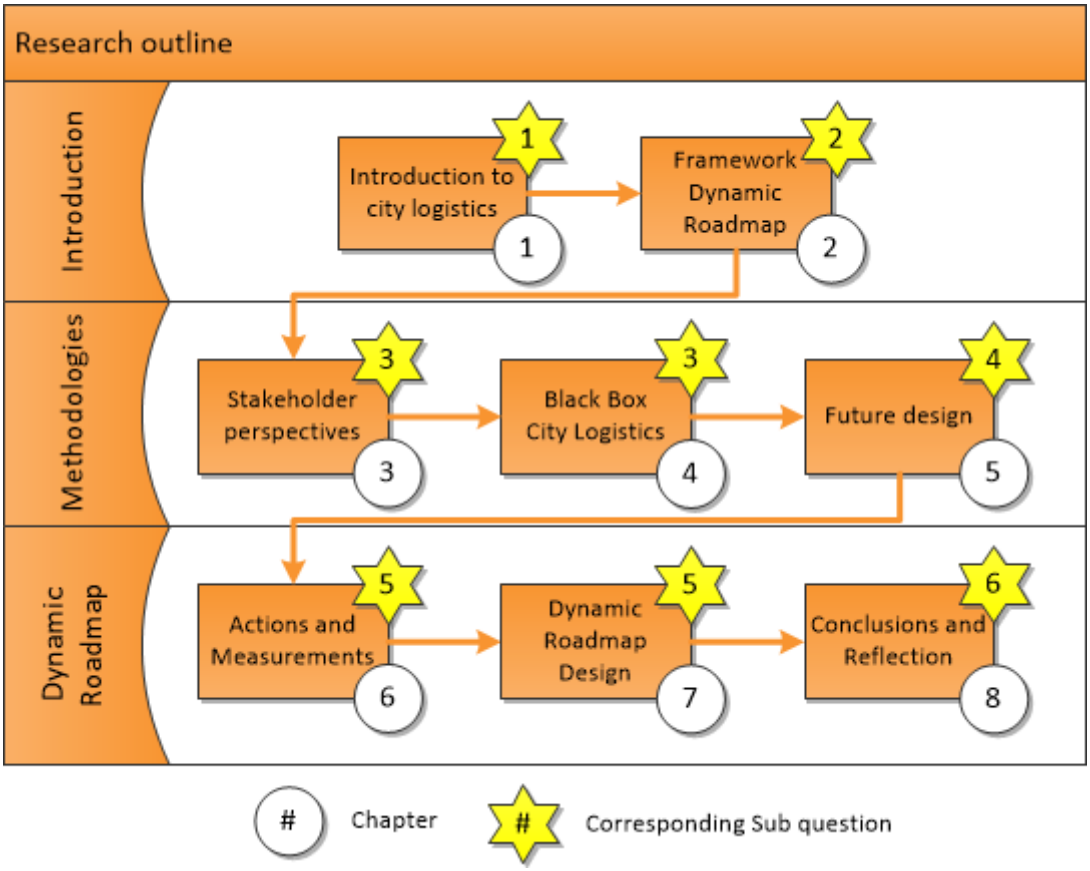



*Figure 4: Thesis outline*

# 2 METHODS AND TECHNIQUES TO DEVELOP A DYNAMIC ROADMAP

This is the chapter about the methodologies that are used to develop a roadmap. Is follows after the introduction of the subject where the research objective and research problem are presented (chapter 1). This chapter explains the approach of the research to deal with the problem and to contribute to the objective. The framework is used in chapter 3 to 8. The chapter starts with a description of the research approach, where the Dynamic Adaptive Policy Pathway framework is elaborated. This framework is translated in a Dynamic Roadmap framework. Afterwards the chapter provides an overview of methodologies that are used for processing the framework. The methodologies that are used in this research are a literature review, interviews, scenario development, a workshop, and a roadmap.

An extensive substantiation is used to explain the research approach. A literature research resulted in multiple frameworks for roadmapping. The aim of this chapter is to choose the best suitable framework for developing a dynamic roadmap. This chapter answers the second sub-question: *how can a dynamic roadmap be developed?*

## 2.1 Approaches for pathway roadmapping

The research approach addresses the question of how we are going to deal with the knowledge gap and how can we contribute to the goal of the research. As shown in the first chapter the research objective is to provide stakeholders a dynamic roadmap for city logistics in the Netherlands, so they can anticipate on what to do or not to do in the coming years, depending on the actions of other stakeholders. To get a structured research approach for meeting the objective, a literature review is done in order to seek a framework that complies with the objective.

In literature many purposes of roadmapping can be found. Roadmapping and its many derivatives, is one of the most widely used management techniques for supporting innovation and strategy. It is used at firm, sector and national levels (Phaal & Muller, 2009). Roadmapping techniques are used to draw together key themes from the technology, strategy and transitions literature. This is mostly done via a layered structure in together with the dimension of time (Lee et al., 2015). An overview of the different purposes of roadmapping is illustrated in Figure 5, retrieved form Phaal et al. (2004b). Studies can be found on proven frameworks used to deliver a process or policy design. The aim of the research is to move from the intentions (Green Deal ZES) to actions that pursue liveable cities. This corresponds to the strategic planning roadmap (example C) in Figure 5 since the purpose of the roadmap is to move from intentions (current) to liveable cities (vision).

The approach of strategic roadmapping exists in two forms: qualitative and quantitative approaches. For each approach there are different purposes. Regarding the qualitative one there are the following approaches: List (2004) developed a network-based scenario approach to enable the consideration of multiple views of the present and the past, Saunders (2009) uses a visual technique to collect scenario planning information based on collage construction. Robinson and Propp (2008) addressed multi-path mapping as a means of aligning emerging science and technology. These qualitative studies are useful for other purposes. A qualitative roadmap remains conceptual and relies on graphical mapping tools. However, these are incapable of providing a concrete way to facilitate decision making against different future conditions (Ilevbare et al., 2010).

Regarding the quantitative approaches, Haasnoot et al. (2013) designed a Dynamic Adaptive Policy Pathway. The strength of this approach is that it supports the exploration of a wide variety of relevant uncertainties in a dynamic way, connects short-term targets and long-term goals, and identifies short-term actions while keeping options open for the future. But this approach needs large amounts of data to analyse the system. Nevertheless the Dynamic Adaptive Policy Pathway is used in a quantitative way, since it provides a step-by-step approach to map dynamic actions. The stakeholders involved in the research are aware of the vulnerabilities in the system. However, they need guidance to turn these insights into actions, and therefor the roadmap is used.

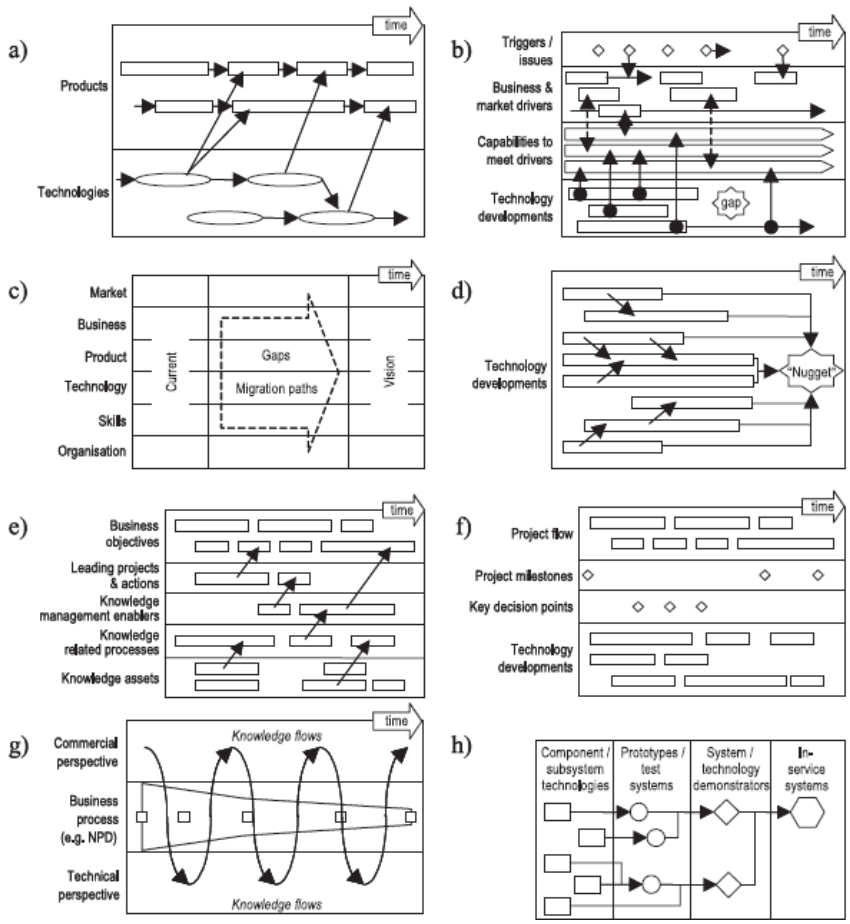



*Figure 5: Examples of roadmapping purposes: (a) product planning; (b) service/capability, planning; (c) strategic planning; (d) long-range planning; (e) knowledge asset planning; (f) program planning; (g) process planning; (h) integration planning. Retrieved from Phaal et al. (2004b, p. 12)*

## 2.2 The Dynamic Adaptive Policy Pathway Framework

This section is about the framework that is used in this research. Haasnoot et al. (2013) have developed a method to deal with robust decisions in an uncertain world. Their Dynamic Adaptive Policy Pathway framework is based on a quantitative analysis. This section elaborates on the translation of the framework of Haasnoot et al. (2013) to the framework that is used in this research. The framework should meet the objective of the research: provide a dynamic roadmap for city logistics stakeholders in the Netherlands, using future scenarios.

### 2.2.1 Background of the Dynamic Adaptive Policy Pathway

To address plans in deep uncertain environments, one needs to design dynamic adaptive plans (Haasnoot et al., 2013; Haasnoot et al., 2011; Hallegatte et al., 2012; Ranger et al., 2010; Swanson et al., 2010). To create a dynamic plan, a strategic vision of the future is required, and short-term actions will guide future actions. The framework of Haasnoot et al. (2013) meets the following criteria:

- It deals with policy design;
- It is able to deal with multiple actors;
- It is able to deal with future developments;
- It functions in a dynamic environment.

In this thesis two methods for developing a dynamic adaptive policy pathway are used: a backcasting approach and a roadmap approach. The backcasting approach aims to describe various futures, and the looks backwards from those future to present a pathway of actions needed to realize those futures (Höjer & Mattsson, 2000; Quist & Vergragt, 2006). Roadmaps can be used to illustrate the sequence of actions (Phaal et al., 2004b; Phaal et al., 2009; Robinson & Propp, 2008).

In urban logistics it turns out that people's opinions change over time. To deal with these dynamics, adaptation pathways can be useful. Haasnoot et al. (2013) used a combination of two different adaptive plans to deal with the dynamic circumstances. One is the *Adaptive Policymaking* (Kwakkel et al., 2010; Walker et al., 2001), and the second is *Adaptation Pathways* (Haasnoot et al., 2012). Adaptive Policymaking provides a stepwise approach for developing a basic plan, and contingency planning to adapt the basic plan to new information over time. Adaptation Pathways provide insight into the sequencing of actions over time, potential lock-ins, and path dependencies (Haasnoot et al., 2013, p. 486). The following paragraphs describe both approaches briefly.

#### *Adaptation Pathways*

Adaption tipping points are central for Adaptation Pathways(Kwadijk et al., 2010), which are the conditions under which an action no longer meets the clearly specified objectives. The actions and the time during which they are effective are scenario dependent. After reaching a tipping point, additional actions are needed. Putting these actions in a sequence, an action pathway emerges. The Adaptation Pathways approach presents a sequence of possible actions after a tipping point in the form of adaptation trees (e.g. like a decision tree or a roadmap). The Adaptation Pathways approach is illustrated in Figure 6 (Haasnoot et al., 2012; Haasnoot et al., 2011).

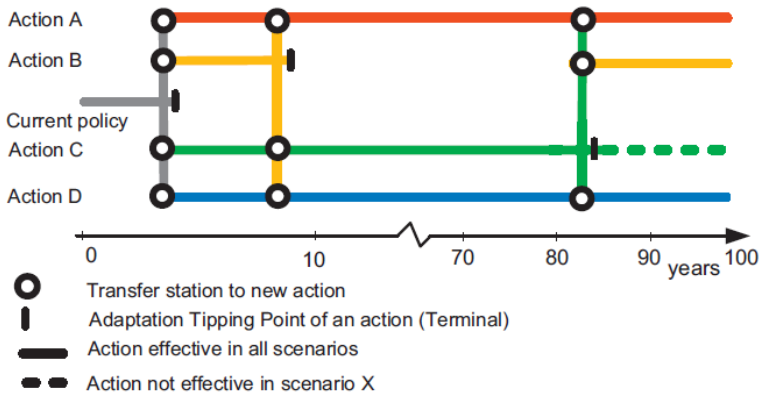



*Figure 6: An example of an Adaptation Pathways map (Haasnoot et al., 2013, p. 488)*

The example adaptation pathway map in Figure 6 should be read as follows. The maps starts from the current situation. The grey line shows that targets will begin to be missed after about four years. After four years, the tipping point is reached. Policy makers have four options following the grey lines: Actions A, B, C, and D. Actions A and D should be able to achieve the targets for the next 100 years in all scenarios. However, if Action B is chosen a tipping point is reached within about five years. To achieve the targets a shift to one of the other three actions will then be needed (follow the orange lines). If Action C is chosen after the first four years, a shift to Action A, B, or D will be needed in the case of Scenario X (follow the solid green lines). In all other scenarios, the targets will be achieved for the next 100 years (the dashed green line). A map like this is also used in this research to map policy pathways.

#### *Adaptive Policymaking*

The Adaptive Policymaking is a generic structured approach for designing dynamic robust plans (Kwakkel et al., 2010; Marchau et al., 2008; Ranger et al., 2010). Compared to Adaptation Pathways it is a more comprehensive stepwise approach for designing a roadmap. Adaptive Policymaking distinguishes many different types of actions that can be taken (e.g. hedging, mitigating, and shaping). *Mitigating actions* reduce the likely adverse effects of a plan, *hedging actions* spread or reduce the uncertain adverse effects of a plan, *seizing actions* seize likely available opportunities, and *shaping actions* reduce failure or enhance success. The main contribution of this approach is to design policy plans that are more flexible. Exploring triggers and the set of actions is key in this approach. It results in a policy plan that is able to adapt to unforeseen events and situations (Kwakkel et al., 2010).

### 2.2.2 Dynamic Adaptive Policy Pathways

A combination of both approaches results into a Dynamic Adaptive Policy Pathway (DAPP). Since Adaptation Pathways and Adaptive Policymaking each have their advantages and disadvantages, the

strong elements were integrated. The DAPP approach assists in designing a dynamic roadmap. From the concept of Adaptive Policymaking the ideas of thinking beforehand of ways a plan might fail and designing actions to safeguard against such failures is used. From Adaptation Pathways in turn, is used the idea of an Adaptation Pathways map, which visualizes the sequences of possible actions over time, and includes uncertainties concerning societal values

One of the strengths of the integrated approach is that it stimulates policy makers to keep the dynamics of the circumstances over time into account. This results in flexibility, since the policy makers explicitly think about actions that may need to be taken now to keep options open, and decisions that can be postponed. With respect to decision making, the DAPP provides insights into options, lock-ins, and path dependencies. In other words, the roadmap provides a starting point for decision making on short-term actions, while keeping options open and avoiding lock-ins. Dependent on perspectives and circumstances some pathways are more attractive than others. Adding preferred pathways can help to select the most likely or preferable route in the map (Haasnoot et al., 2013, p. 495). The visualization of the pathways is seen as attractive by policymakers (Phaal et al., 2009). This visualisation is also used to map the possible pathways for city logistics in the Netherlands.

The framework that is used for developing a DAPP is illustrated on the left in Figure 7. This framework is used in this research as an underlying approach. For the purpose of this research some modifications in the approach are made, since Haasnoot et al. (2013) used it as a quantitative analysis. The approach is composed in a loop with ten steps. Figure 7. Illustrates these ten steps for developing a Dynamic Adaptive Policy Pathway (DAPP).

1. The first step is to understand the current situation and the objectives of the stakeholders.
2. The second step is to identify the vulnerabilities and the opportunities that should be mapped, this can be done by using scenarios.
3. The third step is brainstorming about actions that are needed to achieve the targets.
4. The fourth step describes the sell-by date of the actions and tests the impact of the actions.
5. The sequence of actions is determined in step five of the framework, it puts the measures in a preliminary order to prevent lock-ins.
6. In step six the perspectives and preferences of the stakeholders are integrated.
7. In this framework are also triggers included, these are described in step 7. The triggers will affect the attitude of the stakeholders towards the dynamic pathways and are used by strategic planners to interfere the process. Defining these pathways will result in a roadmap for the urban logistics in the Netherlands.
8. Step 8, 9 and 10 are for the strategic planners of logistics and are not in the scope of this research. Step 8 determines the strategy by the planners. Step 9 and 10 are about the implementation and monitoring of the roadmap.

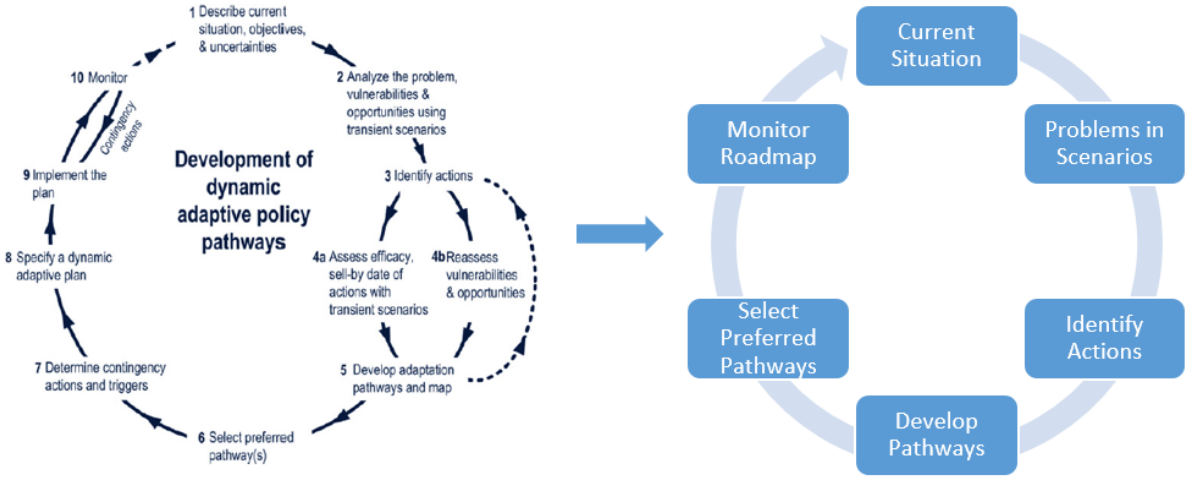



*Figure 7: Translation from a DAPP framework to a Dynamic Roadmap approach*

## 2.3 The Dynamic Roadmap approach

This section is about the approach that is used for this research. The approach is based upon the Dynamic Adaptive Policy Pathway framework of Haasnoot et al. (2013). Some changes relative to the DAPP are made because that approach is based on a quantitative analysis. Due to a lack of quantitative data, this research uses a qualitative approach to determine a dynamic roadmap. It serves the purpose of the research to provide a study with possible roadmaps perceived by stakeholders of city logistics.

The previous section dealt with the background theory of the Dynamic Adaptation Policy Pathways. The advantages of this approach are the visualized action map and the insights in potential actions that are available. However, the DAPP approach is too numerical for the purpose of this research. Besides it elaborates on the monitoring part of the roadmap. Therefore some slight adaptions are made to the DAPP framework. The Differences between the frameworks are displayed in Figure 7.

As shown in Figure 7 the number of steps is reduced from ten to six in the pathway roadmapping approach. This reduction is caused by the elimination of the implementation and monitoring part in this research since a general map of pathways is presented. Also there is not an in-depth quantitative analysis done about the consequences of the actions since this research is qualitative. In the adapted approach the first step is also a description of the current situation. Scenarios are used to identify the possible problems that the city logistics is facing in the future. Step 3 and 4 of the DAPP are merged into one step in the new approach: identification of the actions. This is done because the sell-by dates are determined using the transport layer model of TRAIL (Bovy et al., 1994; Evers et al., 1994). In step 5 of the DAPP the pathways are developed by an analysis of the actions and strategies, in the dynamic roadmap approach the development of pathways corresponds to step 4. The fifth step of the dynamic roadmap approach is to investigate whether there are preferred pathways for the different stakeholders with respect to their values. Only the potential pathways are mentioned to help strategic planners anticipate on potential opportunity windows. And the final step, step six, the roadmap has to be monitored. The approach displayed in Figure 7 is the approach for roadmapping the pathways for city logistics. The chapters will contribute to each one of the steps described in the Dynamic Roadmap approach. The methodologies to do so are explained in the following section.

## 2.4 Methodologies

The framework describes the steps to be taken in order to arrive at the final deliverable. To execute each step, the framework can be sub-divided in methodologies. For each aim and the level of validation, another method can be used. This section elaborates on the choices made about the methodologies in this research. Later on, each method is explained in more detail.

In scientific articles and other literature a lot is written about city logistics. Various perspectives and discussion can be found. This is a good basis to determine the scientific relevance of this research, because knowledge gaps can be identified. A contribution of knowledge for these gaps makes a research scientific relevant. Therefore, a literature review is essential as a starting point for an interesting research.

The next step is to verify the identified knowledge gap found in the literature. This can be done by interviewing experts of the research field. They can add more relevant perspectives on the information found and can reflect on the knowledge gap. Also, when specific information cannot be found in literature, the interviewees can provide input. By conducting expert interviews this knowledge gap is addressed.

When these new insights are available, design scenarios can be made. Since making a roadmap is more or less the same as designing a future plan, scenarios can contribute to understand the consequences of future events on the logistics. With input of the interviews with experts, scenarios for the horizon of the roadmap can be designed. They can even help and reflect on preliminary concepts of scenarios and increase the acceptance of scenarios.

Since the purpose of roadmaps is mostly not for one stakeholder, a roadmap should be designed with multiple stakeholders. Actions defined in roadmaps are often interdependent on other actions. Interaction and alignment with stakeholders is essential in this case, therefore a workshop is organized to discuss the basics of the roadmap.

Finally this results in a broadly supported roadmap in which multiple stakeholders are involved. The final step, the conversion of the information, is done by the researcher. Reporting the steps and decisions made in the process results in a roadmap for the upcoming years. Figure 8 illustrates the five methodologies that are used in this research in subsequent order.

This approach and sequence of methodologies corresponds mostly to the framework of Dynamic Adaptation Policy Pathways described by Haasnoot et al. (2013). However, some changes are made compared to that framework, since it supported the findings with a computational scenario-based approach. In this thesis, the scenarios are conducted from literature and interviews with experts. Also the impact of actions is computed using a computer assisted approach to identify tipping point. In the dynamic roadmap approach the tipping points were identified implicitly during the workshop. In short, where Haasnoot et al. (2013) use a quantitative computer approach, this research is based on a qualitative approach. In the following sections, these methodologies are explained in more detail.

### 2.4.1 Desk research

One main source to extract information is via books, online scientific databases and open access articles. This section deals first with the databases that are consulted, and what kind of keywords are used to extract the data. Afterwards, the found literature is clustered to indicate for what analyses it is used.

The purpose of a desk research is to condense the existing literature in a field and accordingly to identify areas in which further research would be beneficial (Rowley & Slack, 2004). In order to choose high quality publications, it is required to understand the topic area for developing new theories. The aim is to find literature in the field of sustainable urban freight transport and about executing scenario analysis. Focus elements in this information varies from goals to stakeholders and from control elements to criteria.

Multiple search engines are used to find relevant literature regarding urban freight transport, urban freight and sustainability connected to urban freight. For academic papers and reports, searches within academic databases were performed; Scopus (www.scopus.com) and Science Direct (www.sciencedirect.com). For reviewing references of relevant papers Google Scholar (www.scholar.google.com) is used. Besides these search engines, the internet is used for online available books, reports, journals, conference proceedings and theses, these are used in the literature review as well. Google is used to find Internet pages for projects and consultancy reports. Table 1 shows the number of hits for comparable keywords in two search engines.

The search for literature has been limited to the last 15 years (2000-2015) in order to make the references more relevant, even though some important references from earlier research have been included in the review (e.g. for definitions of urban freight transport). The search terms were used in various combinations with other terms related to the subject to ensure a limited amount of references will be displayed of the specific topic area. The keywords changed over time, inspired by relevant references in order to reach more appropriate references.

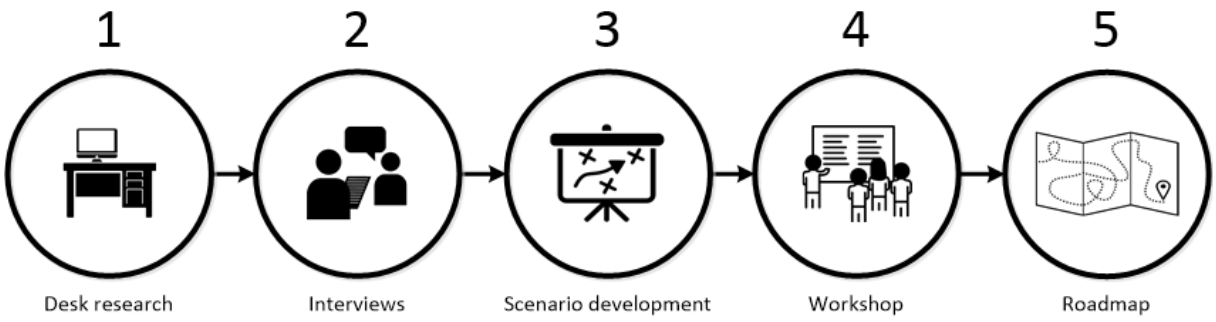



*Figure 8: Sequence of methodologies*

*Table 1: Example of number of hits in one search of (sustainable) urban freight transport and city logistics[1].*

| Search engine | Search term | Hits |
|---|---|---|
| Science Direct | Urban freight transport | 3,621 |
| Science Direct | “Urban freight transport” | 213 |
| Science Direct | Sustainable urban freight transport | 1,739 |
| Science Direct | “Sustainable urban freight transport” | 24 |
| Science Direct | City logistics | 11,419 |
| Science Direct | “City logistics” | 414 |
| Science Direct | Sustainable city logistics | 3,186 |
| Science Direct | “Sustainable city logistics” | 9 |
| | | |
| Scopus | Urban freight transport | 571 |
| Scopus | “Urban freight transport” | 122 |
| Scopus | Sustainable urban freight transport | 115 |
| Scopus | “Sustainable urban freight transport” | 12 |
| Scopus | City logistics | 8,128 |
| Scopus | “City logistics” | 329 |
| Scopus | Sustainable city logistics | 191 |
| Scopus | “Sustainable city logistics” | 4 |

Table 1 presents two samples from the result of the search for (sustainable) urban transport and (sustainable) city logistics during the literature review. To make a selection of the hits, over 200 abstracts were checked for their relevancy, and tables and figures were checked. Since the area of sustainable urban freight transport is broad, there was a need for delimitations. The following notes are made regarding this:

- Only references that handle European cities or European perspectives are included.
- Only urban freight distribution articles are considered, so no literature about people and passenger transport is taken into account.
- Mainly recent literature, so from 2000 and forward, is considered.
- Regarding language there are only references in English and Dutch considered in the selecting process.
- The following categories dealing with urban freight transport were excluded: fuel and fuel technologies, vehicle technologies, impact assessment of current urban infrastructure and land use, and simulation models.

After performing this literature review with these rules, a list of 119 references is obtained. The type of the sources is summarized in Table 2. The most used sources are journals (55), books (21) and research reports (16).

### 2.4.2 Interviews

One of the most frequent used methods of obtaining information in qualitative research is the interview. Asking questions to respondents is a logical alternative to get known what people think about certain topics (Monk & Howard, 1998). In this section, the aim of the interviews and the respondents are explained.

*Table 2: Category of references*

| TYPE OF SOURCE | NUMBER OF REFERENCES (N=119) |
|---|---|
| Book | 21 |
| Conference proceeding | 4 |
| Governmental report/document | 4 |
| Interviews | 5 |
| Journal paper | 55 |
| PhD theses | 4 |
| Project report/pamphlet | 16 |
| Web pages | 9 |

Lots of information is obtained during the desk research phase. However some interesting information, cannot be found in literature. Doing an interview can be a way to gain missing information. Interviews can also be used to reflect on the progress of the research and help to validate assumptions. This study uses future scenarios that describes the context in which logistics should function. These scenarios are made by the researcher, but extra input of the experts can help to validate the cohesion of the scenarios. An extra motivation for the interviews is that prominent persons of the field of work are acquainted with the study. So, the goals of the interviews are as follows:

- Getting insight in perceptions and opinions of experts;
- Validations of the concept scenarios;
- Getting acquainted with the study.

There are many experts and interesting people to interview within the field of city logistics. Due to a lack of time, however, a choice is made for a few expert interviews. The final product is a roadmap, therefor input of many stakeholders is needed. To prevent a biased perspective for the roadmap, different stakeholder types are interviewed. In Chapter 3 an in deep stakeholder analysis is done. The following stakeholder groups are identified for the commercial urban logistics: shippers, carriers, city hubs, shop owners and municipalities. In Table 18: Overview of interviewed experts in Appendix B: Minutes of the interviews (Dutch) the five experts are listed that contributed to this research.

Most of the interviewed experts are academic researchers and not practicing professionals. This is done because in a later stage the input of professionals of the business dealing with the operations of logistics are needed for the workshop. In order to not exhaust this group of professionals, the choice is made to interview researchers. In Appendix B the minutes of these workshops can be found. These workshops are held in Dutch, as this was most convenient for the professionals and researcher to express themselves. In order to validate the interpretation of the interviews, the respondents are asked to review the minutes and verify them. This is called a ‘member check’ and increases the reliability of the information (Monk & Howard, 1998).

### 2.4.3 Scenario generation

Developing scenarios is a process of multiple steps. For generating accepted futures several steps need to be taken, in order to explore potential problems for the stakeholders in the future. Schwartz (1991) his view on scenarios is that the future is uncertain, but that the use of scenarios can help to prepare for it. Scenarios assemble possible futures in story form to help you make better decisions.

Scenarios are developed in a few steps. First of all, an understanding of the urban logistics system is needed. Because factors are complex, they interact and influence each other, relations are still relevant in the future. Using literature, i.e. Anand et al. (2012), the system can be described. The external factors determine how the system will be affected over time, so these are relevant to address for scenario development (Enserink et al., 2013).

Developing scenarios is an iterative process (Enserink et al., 2010). Feedback on preliminary scenarios will help to validate the scenarios. This is done by reflection of the supervisors of the research and in the interviews that took place.

### 2.4.4 Workshop

The study about the Rhine Delta in the Netherlands (the case of Haasnoot et al. (2013)) used an interactive session to get insight in possible actions. The development of pathways using stakeholder participation (decision makers and stakeholders) has been explored in a game setting (Valkering et al., 2013). An interactive setting is also used for obtaining pathways in city logistics by means of a workshop.

The aim of the workshop is to get insight in the attitudes of the involved (operational) stakeholders towards different future alternatives of city logistics. To include multiple perspectives in the dynamic roadmap, different stakeholders are invited to participate in the workshop. Roadmapping workshops are essentially a facilitated mechanism that involves a diverse group of participants for their experience and expertise in order to explore the opportunities and challenges facing a sector (Kerr et al., 2012). The function of a roadmapping workshop is to do a group assessment and to build consensus through combining the stakeholders’ cognitive efforts. This represents the concept of ‘*human resource pooling’*

(Dougherty, 1992; Hogg, 2000; Weingart et al., 2005) assuming that a group contains a collection of unique knowledge and perspectives distributed among the participants of the workshop.

Inviting different stakeholder groups to participate the workshop will help to get a broader perspective on policy measures. Not only the measures of local governments are noted in this case, but also actions of the other stakeholders can be named. The more diverse the group of participants are, the more discussion and perceptions are taken into account by designing the DAPP.

The output in turn, is originates only from the small group of participants. To check whether the opinions of the available stakeholders represent the opinion of the whole stakeholder group, an extra check is done. Stakeholders who did not participate, nor were interviewed beforehand, are asked to give feedback on the results of the workshop. They will be asked whether they agree on the statements made, or that the statements should be seen in perspective. This is the validation part of the workshop.

### 2.4.5 Roadmapping

Roadmapping is a flexible technique that is widely used within businesses and industries to support strategic and long-range planning. Roadmaps provide a structured and often graphical means for exploring and communicating the relationships between actions and strategies over time. It could help companies and strategic planners to make decisions in dynamic environments (Phaal et al., 2004b).

Phaal et al. (2004b) defined eight types of roadmaps, illustrated in Figure 5. For this study a roadmap is needed that represents a strategic planning. Strategic Planning roadmaps are suitable for general strategic appraisal, in terms of supporting the evaluation of different opportunities or threats, typically business level. These roadmaps focusses on the development of a vision of the future business, in terms of markets, business, products, technologies, skills, culture, etc. Gaps are identified, by comparing the future vision with the current position, and strategic options explored to bridge the gaps (Phaal et al., 2004b, pp. 11-12).

According to Phaal et al. (2004a) the capabilities of the roadmapping approach must be matched with the sectorial issues being addressed. The main problem in city logistics is that the actions fall behind by the intentions of the Green Deal ZES. Currently no strategic plan exists for city logistics in the Netherlands. A preliminary exploration of potential pathways will help to get insight in the directions that are possible for city logistics. Mapping these pathways (directions) helps to communicate the required actions (Phaal et al., 2009).

## 2.5 Conclusion of the methods and techniques

This section is about the conclusion of the chapter Methods and Techniques. It will summarize what framework and methodologies are chosen to develop a Dynamic Roadmap. This sections gives also an answer on the second sub-question of this research: *how can a dynamic roadmap be developed?*

The research consists of three design phases: the introduction to the research, the underlying analyses for mapping the pathways and the design of the dynamic roadmap. The first phase system design is to determine the approach of the research. The Dynamic Adaptive Policy Pathway framework of Haasnoot et al. (2013) seems to fit to the purpose of providing a study with possible roadmaps perceived by the stakeholders of city logistics. In order to provide a map of potential pathways, a stakeholder analysis, system analysis and a scenario analysis is needed. This is done in the phase with the underlying analysis. The final phase of this study is the roadmapping of the pathways. The goal of this phase is to provide a map that illustrates the possible pathways to move city logistics industry. The underlying aim is to help strategic planners to activating stakeholders to make their business more robust and sustainable to contribute to the liveability in urban areas.

The Dynamic Adaptive Policy Pathway of Haasnoot et al. (2013) suits the purpose of the research. The objective of this research is to provide a study with possible roadmaps perceived by stakeholders for city logistics in the Netherlands, using future scenarios. With this roadmap the stakeholders can anticipate on what to do or not to do coming years, depending on actions of other stakeholders. Since scenarios are considered and included in the roadmaps, strategic planners can take preferred policy pathways into account. This will help to anticipate on windows of opportunities.

Input from authorities of the city logistic industry in the Netherlands improves the usefulness of the dynamic roadmap. The expert interviews contribute to the demarcation of the roadmap and provide a starting point for the relevant scenarios. The scenarios help to make the map of pathways more robust since it considers uncertainty. A workshop with people from the city logistic industry can contribute to define actions and strategies for the dynamic roadmap.

Using the Dynamic Adaptive Policy Pathway framework provides a good starting point to make a dynamic roadmap. This answers the question *how a dynamic roadmap can be developed?* The framework is only used partially, since the final steps of the framework are not in the scope of this research. Possible future research may use these steps to evaluation this research.

# Methodologies

## Part 2

# 3 STAKEHOLDER PERSPECTIVES

In this chapter the parties involved in city logistics are analysed. The problems related to urban goods transportation activities are majorly attributed to the underlying characteristics such as heterogeneous stakeholders, their conflicting objectives and resulting distributed decision making (Anand et al., 2014). The stakeholder analysis elaborates on objectives and means of the stakeholders. Mapping the current power position, the attitude and the interests of the stakeholders provides insights in the interdependencies. The stakeholders' perspectives are central in the research and will return in every chapter. The five main stakeholders in this research are the local government, shippers, carriers, logistic hubs, and the retailers. The outcomes of this chapter will be used as input for the system analysis which is described in the next chapter.

Figure 9 shows the position of the stakeholder analysis in the dynamic roadmap framework. Together with the system analysis it will describe the current situation of city freight distribution. Both chapters together provide the answer on the third sub-question of this research: *Which elements of city logistics are relevant for mapping pathways?*

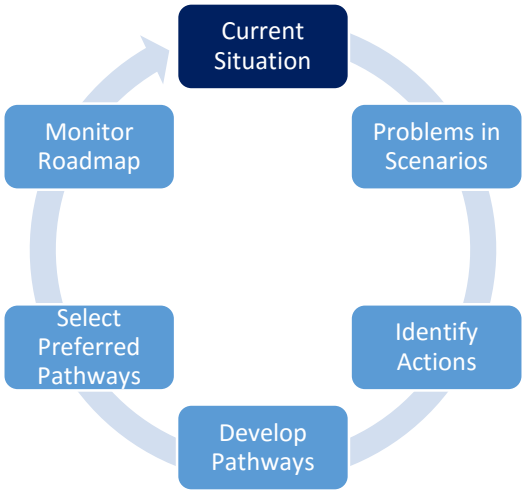



*Figure 9: Stakeholder analysis in the Dynamic Roadmap framework*

## 3.1 Approach of stakeholder identification

In city logistics multiple parties are involved. In this research stakeholders are defined as those parties that have a certain interest in the system and have some ability to influence that system, either directly or indirectly. This chapter deals with the variety of players involved in order to get insight in the interdependencies and power positions. An in-depth stakeholder study contribute to policy analysis by creating ideas for alternative strategies and tactics by mapping options and interests of different stakeholders. It helps to understand common ground and shared fundamental values, so that needs and possibilities for compensation or mitigating measures to satisfy particular stakeholders can be identified (Enserink et al., 2010, p. 80).

In this report the stakeholder analysis follows the basic procedure that is described by Enserink et al. (2010). By using literature lots of information can be found on different stakeholders and their positions in the system. Interviews are an addition on the existing literature to get up-to-date knowledge of the stakeholders' attitude.

## 3.2 Stakeholder identification

This section describes the identification of the involved stakeholders in city logistics. There are several stakeholder groups that are affected by changes in city logistics (De Bruijn & Ten Heuvelhof, 2010; Koppenjan, 1993). For developing pathways for the green logistics it is expected that their cooperation and contribution is necessary to ensure a more supported study. Mapping the stakeholders gives a better understanding of the main players in the system.

Anand et al. (2014) made a classification of the stakeholders. These groups included shippers, carriers, shop owners/retailers, municipalities, and customers. The multi-agent model by Taniguchi & Tamagawa (2005) considers also five agents in the model freight: carriers, shippers, residents, administrators and motorway operators. The motorway operators in the Netherlands is the government, so this stakeholder is not applicable for this research

In this research however, one change is made according to these stakeholders. Since the focus is the corporate freight market, the customers are excluded. This group is replaced by a city logistic hub. The hub can function as a logistics provider in the urban area. Therefore also the illustration they used is slightly adapted. A schematic overview of the parties involved is shown in Figure 10.

In urban logistics other stakeholders can be defined, for example European and national authorities, research institutes, smart cities, and citizen. These stakeholders do have an interest in city logistics, but they have relatively few means to influence decision-making or the system, so the actions of these stakeholders are not included in this research. The stakeholders, including the consumers and residents, are briefly explained individually below

### *Shipper*

The shippers are the suppliers in the city logistics domain and are responsible for supplying the goods to the retailers. Shippers generally send the goods from the warehouses they operate. They can be manufacturers, wholesalers or retailers. Sometimes the shipper has his/her own private fleet for goods delivery. Then the shipper shows great similarities with the carrier. In another case, the carrier is an independent logistics provider who collects goods from different shippers and delivers to retailers (Anand et al., 2014). They contract the services of the freight carriers on behalf of the receivers. So, the shippers are the customers of the carriers (Macharis et al., 2014).

### *Carrier*

The carrier is an independent logistics provider who collects goods from different shippers and delivers to retailers. They work on behalf of the shipper, so the shipper has contracts with the carrier and the retailers. They can also be the forwarders that organize the logistics and subcontract the carriage of the goods (Stathopoulos et al., 2011). The drivers hired by the carriers are also included in this group since they receive some autonomy in routing the delivery before handling the goods. The carriers can be contracted by the shipper for the receiver account or by the receiver, because transport is not included as part of the shipper's operations. Sometimes, they can be contracted by both shippers and receivers, if shippers and receivers agree on the transfer of risk at one place during transport (Macharis et al., 2014).

### *Retailer, shop owner or commercial receiver*

Usually the receiver is a professional, for example a retailer, the owner of a bar, restaurant, hotel or factory, a building contractor or an office manager (Macharis et al., 2014). The retailers are one of the most important stakeholders in the city logistics framework. They have a big influence on the urban freight transportation system. In the end, they decide when to order, how much to order and when they

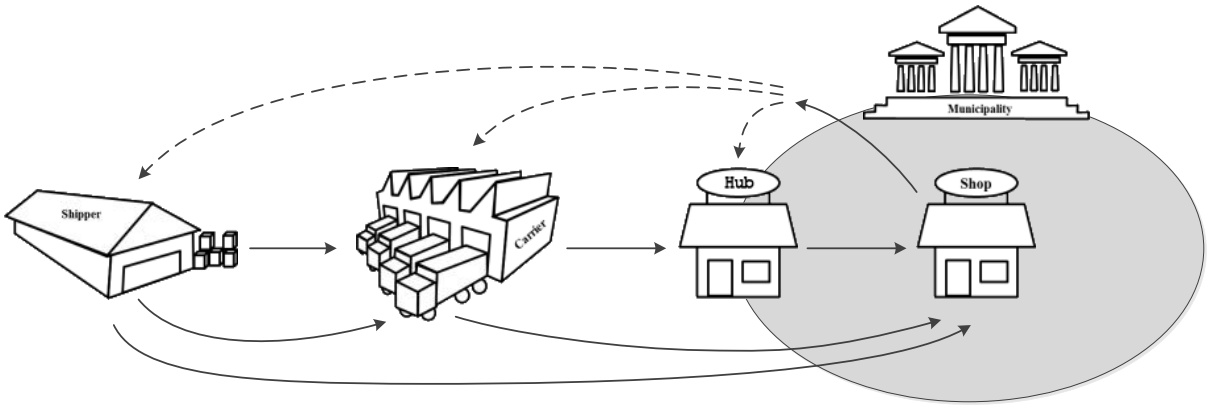



*Figure 10: Schematic overview of stakeholders involved. Adapted from Anand et al. (2014).*

want to have the order delivered (Anand et al., 2014). In this research they partly represent the consumers, since the retailers want to provide a high service level for their customers.

#### *Municipality or local government*

The local government, or the municipality, is the administration in the city that can influence the urban freight activities by implementing various policies, measures, regulation etc. The local authorities are elected by the residents to design and manage the physical environment. Indirectly they represent the interests of the group of stakeholders that include citizens, workers, inhabitants, shoppers, etc. (Dablanc, 2011). The authorities' task is to finance the public infrastructure like roads and railroads, and subsidize some services of public interest. They are also responsible for land planning and regulations (Macharis et al., 2014). The administrator is also responsible for the economic and environmental sustainability of the city and so she has to be sure to implement policies which do not affect business as well as citizen adversely.

#### *City logistic hub*

The city logistic hub is the logistics provider within the borders of urban areas. Consolidate goods and deliver them fast with high service level in city centre. The hubs are responsible for the first- and last mile of the logistics in the city. Services of the city hubs are among others bundling and storage of goods.

#### *Consumers*

The consumers represents the people in the city who want to buy goods from the shops. People are the end-users of the urban freight transport systems and they are also the ones that experience nuisances of transport in the city, such as noise pollution and congestion. However, this stakeholder is not taken into account since the focus is on the commercial freight market. The consumers are (partly) represented by the shopkeepers, since the shopkeepers want to provide a high service level.

#### *Residents*

The residents are the people who live in the city. They are also the ones that experience nuisances of transport in the city, such as noise pollution and congestion, but in contrast to the consumers, they do not buy goods. The residents are not in scope, as is assumed that they are represented by the local government.

The following sections elaborate on the relations between the stakeholders. It shows their interdependencies and power positions.

## 3.3 Relations between stakeholders

Relations between stakeholders have a formal and informal side. Knowledge about both sides is essential to understand stakeholders and their environment. This section represents the formal relations of the stakeholders in city logistics. Mapping the formal relations will contribute to the understanding of the interdependencies of the stakeholders. A '*formal chart*' is used as a means to orient on the mutual relations.

Figure 11 shows a map of relations between stakeholders made by Anand (2015). This figure maps the formal relation of the stakeholders of city logistics in the Netherlands. The formal relations are defined in terms of goods, money, information and emission. The UCC in the illustration corresponds with the city logistic hub.

The formal relations are mapped in Figure 11. In this map the money flow shows indirectly the contractual relations. So, the shop buys goods from the shipper. The shipper pays the carrier to transport the goods to the shops, or the carrier delivers the goods directly to the shop, or he delivers it to the city hub. The hub is paid by the shop to deliver the goods in the shop. In the end, not in scope of this research, the consumer buys the goods from the shop. The municipality does not have any contractual relations with the parties. However, they influence the system by directives and restrictions.

## 3.4 Objectives of stakeholders

This section deals with the objectives of the stakeholders. The previous section shows that the stakeholders have more than one objective and that they have to make trade-offs between them. The objectives between different groups of stakeholders are diverse and can sometimes be conflicting.

Stakeholders try to optimize their activities according to their own interests, independently of their neighbours' interests (Melo & Costa, 2011). An overview of the various objectives gives insight in the attitude of the stakeholders.

### *Shippers*

The shipper is the party that is responsible for the delivery of the goods at the receiver. They aim for satisfying the receiver, a high-level service, some green concerns and high accessibility. The main aim is to keep the cost of logistics as low as possible (Macharis et al., 2014). Sub-goals are secure, punctual and damage-free pick-ups.

### *Carriers*

The main objective of the carriers is a positive return on investment and to generate profit by providing logistic services. Next they aim for quality of transport service by satisfying both shipper and receiver. Visibility, punctuality, and deliveries with no damage are examples. Carriers are also concerned with about worker satisfaction. Some carriers mentioned their commitment towards reducing emissions, noise levels, visual nuisance, and congestion (Macharis et al., 2014).

### *Retailers*

The shops want to be secure of goods. Hence their aims are to be delivered frequently, at low cost and on demand, so stock can be kept to a minimum. Furthermore, they want high service, i.e. real-time information, and deliveries on a preferred time when there are not so many customers. This is because they want to handle the delivery, reduce risk of theft and avoid customer complaints (Macharis et al., 2014). Also the shopkeepers aim for an attractive shopping environment with less trucks. Just-in-time delivery and low stock directly increase the amount of trucks. They have a little green concerns.

### *Local government*

The interests of the local government are not always directly related to urban freight. The municipalities represent numerous users of the city, so multiple perspectives have to be kept in mind. They aim for optimal use of existing infrastructure and low cost measures to optimize the transport network. The trade-off for governance is on the one hand, the urban environment to be nice and attractive for the citizens and they try to improve the quality of life of the citizens. But on the other hand the local government would like to ensure a positive business climate and provide an attractive environment for companies, so accessibility is of great importance (Macharis et al., 2014).

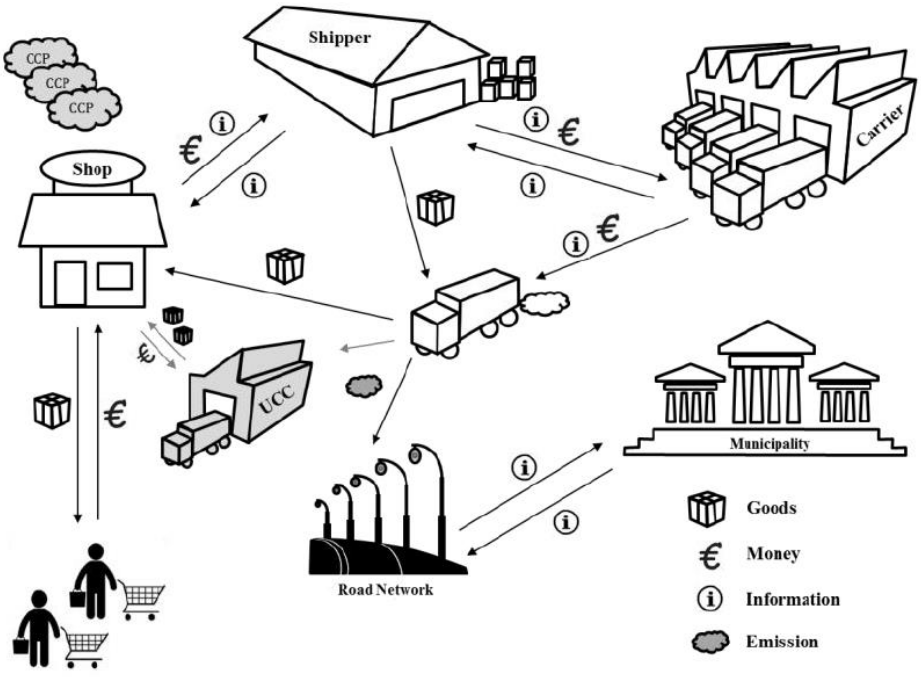



*Figure 11: Relations between stakeholders in city logistics (Anand, 2015, p. 147)*

*City hub*

Like the objectives of the carrier, the main objective of the city hub is a positive return on investment and to generate profit by providing logistic services. The aim for a high service level, providing same-day delivery, punctuality, storage and bundling of goods. The logistic city hub has significant green concerns and seek for towards reducing emissions, noise levels, visual nuisance and congestion.

To summarize, Table 3 provides an overview of the objectives of the stakeholders mentioned above. The stakeholders all seek to meet their objectives. However, sometimes they have to make trade-offs between objectives. To see what the informal relations are of the stakeholders, a power, attitude and interest analysis is done in the next section.

*Table 3: Summary of stakeholders' objectives*

| STAKEHOLDER | OBJECTIVES |
|---|---|
| Shipper | Satisfying the receiver<br>High service level<br>Accessibility<br>Low cost of logistics<br>Profitability |
| Carrier | Positive Return on Investment<br>Profitability<br>Satisfying shipper and retailer<br>Punctuality<br>Workers satisfaction<br>Reduce delivery time |
| Retailer | Profitability<br>Frequently delivery<br>Low cost of logistics<br>High service level<br>Customer's satisfaction<br>Low stock<br>Attractive shopping environment |
| Local Authority | Optimal use of existing infrastructures<br>Low cost measures<br>Urban environment<br>Citizen's Quality of life<br>Positive business climate<br>Accessibility |
| City hub | Positive Return on Investment<br>Profitability<br>High service level<br>Green concerns |

## 3.5 Power, interest and attitude

The next step is the identification of the power and interests of the stakeholders. This is done by mapping the stakeholders on three characteristics, or dimensions. The characteristics that are described considering stakeholders are (Murray-Webster & Simon, 2006):

1. Their **power** or ability to influence in the system. This may be their potential to influence derived from their positional or resource power in the system, or may be their actual influence derived from their credibility as a leader or expert.
2. Their **interest** in the project or programme as measured by the extent to which they will be active or passive.
3. Their **attitude** to the project or programme as measured by the extent to which they will 'back' (support) or 'block' (resist).

Table 4 shows the power, attitude and interest of the stakeholders. This table is derived from studies of Russo and Comi (2010), Taniguchi and Tamagawa (2005), and Slabbekoorn (2014, p. 24 and 40).

Table 4 displays that the stakeholders that are considered in this research all have a high interest in the urban freight logistics. The shippers, retailers and the municipalities have the strongest power position. The retailer can determine how the goods are delivered to him by the shipper. The shipper on his turn can choose the carrier and say how the goods should be transported. And the municipality can set regulation to change the logistics. The carrier and the logistic hub are commissioned by the parties and due have less influence on the system. The attitude of the stakeholders towards change city logistics in order to improve the liveability differs. Retailers want to focus on their core business: selling goods to consumers. Shippers and carriers do not want restrictions and measurements that limit the option for delivering goods to the shops. The hub operators in contrast, they can benefit from restrictions in the centre since they provide high service on a local level. Also the municipality wants that the logistics in their city causes less nuisance and are positive about changes.

*Table 4: Stakeholder role identification*

| GROUP | POWER | INTEREST | ATTITUDE |
|---|---|---|---|
| Shipper | High | Active | Negative |
| Carrier | Low | Active | Negative |
| Retailers | High | Active | Negative |
| Local government | High | Active | Positive |
| Hub Operator | Low | Active | Positive |

But these findings have to be put in perspective a little, especially towards attitude. Not all the shippers, carriers and retailers are negative about changes in logistics. Some shippers are looking for opportunities to change since they also want that the city becomes more accessible. The carriers do also want less hinder of traffic in the city and some of them want to deliver goods with zero emission. And finally the shopkeepers, they want to focus on their business, but also want a pleasant shopping experience for their customers. These double agendas exists because the stakeholders have more than one objective and have to make trade-offs. The next section will describe actors' objectives.

## 3.6 Conclusions of the stakeholder mapping

This section draws the conclusions of the stakeholder analysis. It explains the contribution of the stakeholder analysis for this research is the sub-question: *Which elements of city logistics are relevant for mapping pathways?* This question is answered in the next chapter.

The stakeholders that are concerned in this research are shippers, carriers, retailers, city hubs and municipalities. Customers and residents are not in the scope since the focus is on the corporate freight market. However, indirectly the municipalities represent the interest of the residents and the retailers represent the needs of customers. The municipalities have the most power and interest in changing the city logistics.

# 4 THE CITY LOGISTIC SYSTEM

This chapter is about the conceptualisation of city logistics. The conceptualisation simplifies the sector of city logistics. It follows up the stakeholder analysis (chapter 3) that described the different perspectives and objectives for city logistics. To have a starting point of developing a roadmap, it is recommended to have a basis of the system description. It will help to understand the relations and impacts of elements of urban logistics. This chapter is prior to the scenario analysis (chapter 5), since the external factors are used for designing scenarios. The chapter has the following structure: First, there is a brief introduction to system analysis and its functions. In the second part the theory is applied on the urban logistic system. And finally, the most remarkable conclusions are drawn.

The system analysis helps to understand the scope of the research and the current situation. Figure 12 shows the position of the system description in the dynamic roadmap approach. The system functions as a basis for designing context scenarios (chapter 5). The system analysis is strongly connected with the stakeholder analysis (chapter 3). Together the chapters have to answer to following question: *Which elements of city logistics are relevant for mapping pathways?*

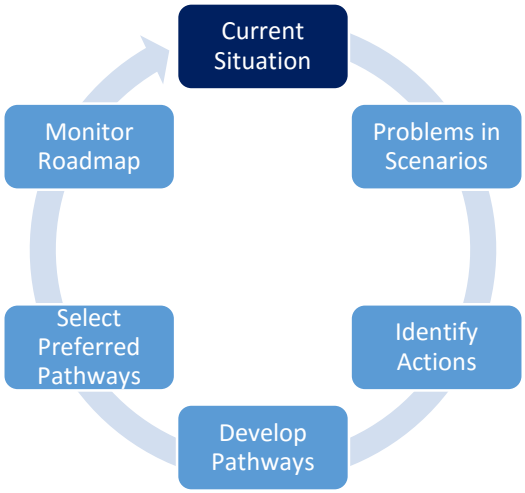



*Figure 12: The system analysis in the Dynamic Roadmap framework*

## 4.1 System analysis approach

This section elaborates on the theoretical approach of a system analysis. This theory is used to simplify the system of city logistics. The approach of analysing the system is an objective tree and a simplified map of the system. The main method for input for this chapter is a literature review, this is illustrated in Figure 13.

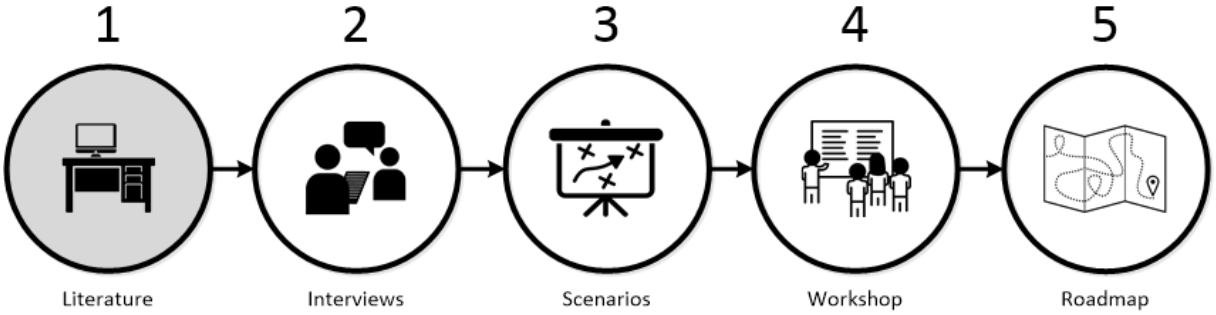



*Figure 13: Method for demarcation of the system analysis*

Urban logistic operations is a complex process in which many actors are involved and have various stakes and interests, also see Chapter 3 on stakeholder analysis. The urban logistics is a dynamic environment, which changes over time. A description of the system helps to map and analyse the system

by defining its boundaries and its structure, the main elements and the correlation among them (Walker, 2000, p. 13). The advantage of these analyses is that it helps to put structure to ill-defined and complex policy fields (Enserink et al., 2010, p. 52).

System analysis helps to make assumptions and expectations explicit, which is useful for designing a map with policy pathways. It provides a basis for communication with clients and other researchers. In order to simplify a complex system, an approach is used that is called a 'System Diagram'. This system diagram illustrates the relations of the different elements in the system. By defining objectives, represented by '*criteria'*, it is possible to show the impacts of changes in the system. Relations between elements in the system can be affected by the stakeholders in the system, by acting differently or by taking measures. These elements are called '*means'*. Changes can be influenced by elements on which actors do not have influence, these are called '*external factors'*. External factors do place important limitations or constraints on the behaviour and the outcome of the system (Checkland, 1985). These elements together form the basis for system diagram. Figure 14 illustrates how a general system diagram looks like. The system consists of three groups of factors on its borders: the means, the external factors, and the criteria. The arrows in the figure imply that the means and external factors influence the criteria in the end.

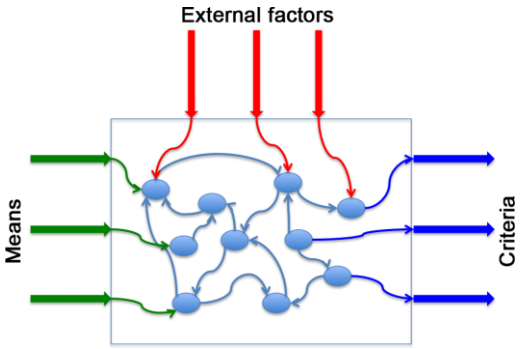



*Figure 14: System diagram, adapted from Bots, Van Twist, and Van Duin (2000)*

## 4.2 The research perspective

The perspective of the research determines the goals and objectives. The perspective of the research is clear, since urban logistics deals with many different stakeholders with different interests. The perspective of this research is from a local authority point of view. This choice is made because the municipality is the stakeholder that can impact the urban logistics most and has the most means.

The Local authority is a heterogeneous stakeholder. The authorities operate in different areas and cities and they do have therefor some different aims. However, there can be made a distinction between the municipalities. In urban logistics, some governments have signed the covenant '*Green Deal Zero Emission Stadslogistiek*' (Green Deal ZES). This covenant shows the intentions of the signers for operating and act sustainable in the first and last mile of urban logistics. The municipalities who have signed this document are willing to change and take action for making logistics in their cities more sustainable. This is a clear match between these stakeholders. The following eight municipalities have signed the Green Deal ZES (Rijksoverheid, 2014): Arnhem, Delft, Groningen, Maastricht, Nijmegen, Rotterdam, Utrecht, and Zutphen.

It is also relevant to see what problems these governments experience with respect to city logistics. Therefor an insight about their objectives and means is useful. A *'means-end diagram'* is a useful tool to structure the objectives and the means of the local government. A means-end diagram is a hierarchical diagram that shows the objectives of the government by presenting the underlying sub-goals and means as well. The means-end diagrams are presented in Appendix A: Means-End Diagram Municipality.

The fundamental goal of municipalities is to improve the attractiveness of the city. An attractive city consists of the following factors: a limited environmental impact, less congestion, safety, and so on. As stated in Chapter 1 the local governments perceive hinder in their centres caused partly by the logistic sector, since they contribute to the congestions and emit greenhouse gasses and particulates. The municipalities that have signed the covenant Green Deal ZES are aiming for a more sustainable logistics in their cities in order to improve the attractiveness of the city. To summarize, criteria concern always trade-offs between more objectives. In transport policy the following trade-offs are distinguished for local governments:

- Economy: accessibility and reliability

- Environment: emissions, particulates and $CO_2$
- Social aspects: transport poverty
- Safety: accidents

The objectives of the stakeholders are the criteria for the system diagram. Means on their turn can help to meet one or more objectives of the local authorities. Identifying these means will help understand how the objectives can be influenced.

## 4.3 Influencing factors of city logistics

The criteria mentioned in the previous section are influenced by other variables in the system. This section deals with variables like means and external factors. The aim of this sections is to identify suitable system boundaries and main factors with the important relations among them. In this analysis the method described by Enserink et al. (2010, p. 57) is applied?. The potential means of the stakeholders have to be identified so that a map can be made with the main causal relations and their influence on the outcome of interest. These steps together provide a sound system description of city logistics. This system analysis supports the scenario analysis that is used for this developing pathways for the roadmaps. The next part elaborates on the system diagram of the city logistic system that is used in this research. It combines objectives and means of the criteria defined in the previous chapter about the stakeholder analysis.

### 4.3.1 Means for influencing city logistics

Now that the objectives for the municipality, which is the problem-owner, are clear, this part elaborates on how the objectives can be met. Means can influence the system so that objectives can be achieved. Also the local governments have means to impact the criteria. Anand et al. (2012, p. 11951) elaborates in his thesis on the measures of the government. He has identified the following measures: enforcement, harmonisation, information providing, permission, pricing, restriction, and subsidy.

The other stakeholders in the city logistics are also able to influence the system. They also have means to meet or hinder the objectives. In the Generic City Logistic Ontology (GenCLOn) the following, clustered measures are identified for the other stakeholders (Anand, 2015, p. 62):

- Delivery scheme; early delivery scheme, fixed time scheme, full load scheme;
- Loading principle;
- Infra component; road component, urban bridge;
- Road traffic mode; motorised mode, non-motorised mode;
- Inventory policy; economic Order Quantity (EOQ), Just in Time (JIT), periodical approach;

In literature can be found many more alternative means to improve city logistics. Naming these actions is not relevant since the essential action are identified during the workshop ‘Roadmap Urban Logistics 2025’. Participants of different parts of the business are asked to name to most urgent means that should return in the roadmaps.

### 4.3.2 External influences

The city logistic system is not only influenced by means of the stakeholders. There are also external factors that impacts the urban freight distribution. The external factors cannot be (significantly) influenced by the stakeholders defined in this research. External factors make the system uncertain and unpredictable. Since these factors are not predictable, they are used to design the scenarios. A detailed substantiation about the external factor in scenarios is provided in the next chapter about scenario development.

In this research only three important external factors are defined that shape the city logistics: market power, demand for goods, and the priority of liveability. None of the five stakeholders of this research can directly influence these factors, though they are important to take into account for city logistics.

### 4.3.3 Other influencing factors

Stakeholders have means to influence the results of the criteria. Mostly the means are not influencing the criteria directly, but indirectly by intermediate factors. The intermediate factors can impact more than one criteria at the same time. The consequences though, is that the factors influence contradictive

objectives. Through the identification of the elements that influence the criteria, it becomes clear how to realize these objectives. The relations between the factors are less relevant for this research since it aims for developing a macro-level conceptual map of pathways. Relations of factors is a complex study and is on a micro-level.

In literature are many examples of the relations of factors in city logistics (Allen et al., 2012; Anand, 2015; Anand et al., 2012; Anderson et al., 2005; Behrends et al., 2008; Browne et al., 2005; Lindholm, 2012b, 2013; Lindholm & Behrends, 2012; Lindholm & Browne, 2013). For example, Anand et al. (2012) names in the ontology indirect factors like vehicle type, emission, fuel consumption, nuisance, congestion, storage of goods, Urban Consolidation Centres, consolidating goods, area protection, local prosperity, and Infrastructure protection. There are many more factors that influence the system, but mapping these is not relevant for the dynamic roadmap.

## 4.4 The city logistic system diagram

This section is about the system diagram of the city logistics that combines the means, external factors, and the criteria. This is done by mapping the relations of factors identified in the system in a so called '*system diagram*'. It shows the causal chains in the system that link means to criteria (Enserink et al., 2010, p. 69). This section displays the macro-level system diagram with only the relevant factors for the aim of this research.

A system diagram illustrates the causal relation between the factors that are relevant to the city distribution of freight. The diagram supports the analysis of understanding the effects of means and/or external factors on other factors, notably the criteria (Montibeller & Belton, 2006). The causal map is

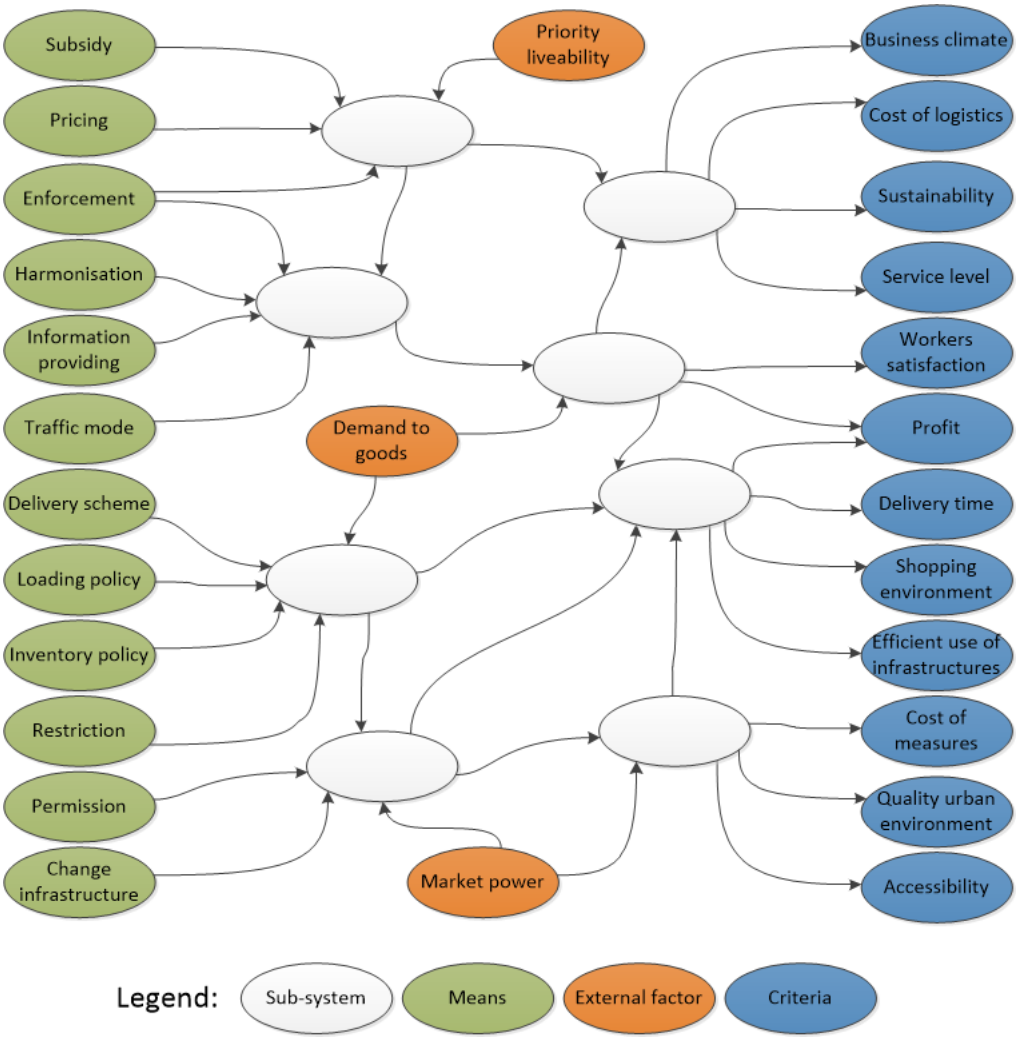



*Figure 15: City logistic system diagram*

composed on a high aggregated level in order to keep it clear for communication. The system diagram is illustrated in Figure 15.

The primary function of this system diagram is to summarize the system demarcation by showing the elements that are relevant for the problem analysis (Enserink et al., 2010, p. 73). The diagram corresponds with the objectives of the stakeholder analyses, the means-end diagram, and the external factors in this chapter. The external factors of the causal relation diagram are the factors that only have outgoing relations with other factors.

The ovals represent the influencing factors that are related to each other. The legend shows the factor type for each colour: green ovals are the means, orange ovals represent the external factors, blue ovals the criteria, and the greys ovals are the undefined sub-systems. The arrows in the diagram represent a relation between the factors. The relation can be positive or negative. A positive relations is if one factor increases, the connected factor increases as well, or if the first factor decreases, the connected factor decreases too. A negative relation is a contradictory link: if factor one increases, factor two will decrease, or the other way around.

The system diagram simplifies a complex system with an illustration of interconnected factors that impact the outcomes of the criteria. This diagram is a simplified representation of the reality: some factors can indirectly have some influence on results, but these are not within the scope of this research.

## 4.5 Conclusions of the city logistic system

This section concludes the findings of the system analysis chapter. The conclusion helps to understand the need of a well-scoped research for making a dynamic action plan. A system diagram of city logistics demarcates the scope and helps to understand the complexity and dynamics of the city logistic system. The sub-question that relates to this chapter and Chapter 3 Stakeholder Analysis is also answered. The sub-question that corresponds to this chapter is: *Which elements of city logistics are relevant for mapping pathways?*

The system can be simplified in three types of factors: criteria, means, and external factors. The criteria show the trade-offs that have to be made. Retailers need goods and should be supplied, but the vehicle movements and emissions should be low. Meeting both objectives is not possible, therefore the trade-offs have to be made. The means that are identified can be used to compare the actions from the workshop. The actions of the workshop are more relevant for the roadmap since the participants are potentially the users of the roadmap. Involving the users of the roadmap is important for the acceptance. The external factors that influence the city logistics are not defined in this chapter. These external factors and dimensions are explained in Chapter 5 about making future context scenarios.

The system analysis contributes to the understanding of the complexity of city logistics. The sub-question can be answered *Which elements of city logistics are relevant for mapping pathways?* A simplification of the system helps to start from the basis to develop the roadmap. Combining the elements of the system with a stakeholder analysis helps to understand which factors should be taken into account. A detailed study of the relation between the system's elements is not relevant for this research. However, for new action strategies it can be interesting to analyse how the elements can impact the criteria.

# 5 DESIGNING THE FUTURES OF CITY LOGISTICS

This chapter is about the design of future context scenarios. This chapter follows after an assessment of the main stakeholders (chapter 3) and the important elements of the system (chapter 4). Stakeholders have mostly a short term vision on their business and do not (yet) concern the problems of the future. Scenarios are a tool to help the stakeholders to anticipate on plausible problems of the coming decade. The scenarios of this chapter are used to generate action strategies (chapter 6) to make the Pathway roadmap more robust (chapter 7). The generation of the context scenarios is done according to the steps of Schwartz (1991). The steps of Schwartz result in four scenarios that are briefly described at the end of the chapter.

The design of scenarios contribute to make a roadmap adaptive since it concerns different possible future. The position of the scenario design in the dynamic roadmap framework is illustrated in Figure 16. The scenario design answers the fourth sub-question: *How can future alternatives help to make the pathway roadmaps more robust?*

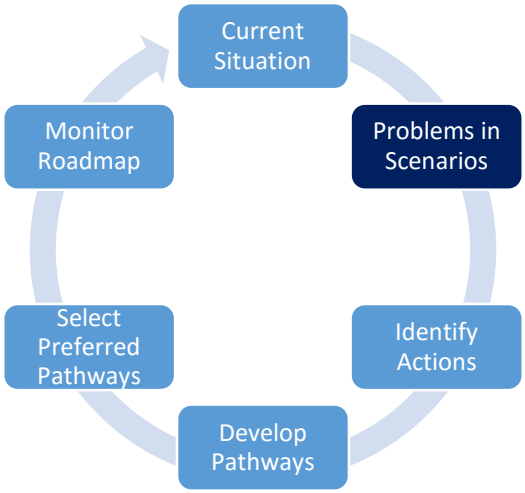



*Figure 16: Scenario design in the Dynamic Roadmap framework*

## 5.1 Approach of the scenario development

This section is about the theory of scenario development and explains the functions of using scenarios as a tool. Also the methods that are used in this research are highlighted. A combination of the system analysis and interviews have resulted in four orthogonal context scenarios about city logistics in 2025.

If people are asked how the future will look like, many different views and descriptions will be told. For these stakeholders it is hard imaging how future will affect the company or the logistic system. Scenarios are developed in order to help people emphasize in plausible futures (Schwartz, 1991). Dealing with scenarios helps also to include risk and uncertainty in strategic decision making (Ilevbare et al., 2010; Wise et al., 2014). In this chapter the generation of the scenarios is explained and substantiated to get support for the future stories.

The development of scenarios is a process of multiple steps. Several steps need to be taken for generating accepted futures, else the futures will not be usable to explore the problems for the stakeholders. In this study the basic principles of Schwartz about scenario development are used. In his book The Art of the Long View: Planning for the Future in an Uncertain World he provides the handles for scenario development. His view on scenarios is that the future is uncertain, but that the use of scenarios can help to prepare for it. Scenarios assemble possible futures in story form to help you make better decisions (Schwartz, 1991). Scenarios are thus not predictions, but they are stories of what could happen in the future.

Schwartz recommends to expand the mind-set and seek data from many sources to build better scenarios. This is done by analysing different future studies (Bell & Paskins, 2013; Bubner et al., 2014;

DHL, 2009, 2012, 2013a, 2013b; Glockner et al., 2014; Jeske et al., 2013; Macaulay et al., 2015; McKenzie, 2013) and by doing interviews with experts (Coremans, 2015; Hendriks, 2015; Ploos van Amstel, 2015b; Quak, 2015; Tjalma, 2015). Creativity is key the design open-minded futures, so therefore it should be developed by using multiple views. In this research this is done by submitting the futures in the interviews with the experts. Then they can give extra feedback and input for each of the scenario. The use of literature and interviews is illustrated in Figure 17.

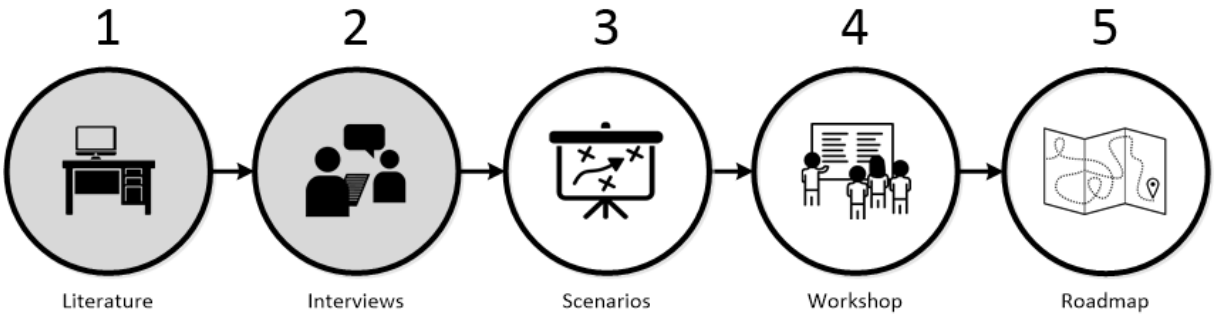



*Figure 17: Methods for scenario development*

## 5.2 Using the system diagram for scenario development

This section describes the input for the design of the context scenarios. This is done by using the system diagram illustrated in Figure 15 in chapter 4 and the feedback of the experts. In this section also the driving forces, external factors and uncertainties are substantiated. This results in a two dimensional matrix that can be used for plotting the context scenarios.

### 5.2.1 Driving forces of urban logistics development

The starting point for generating scenarios is by identifying the driving forces, since these factors are developing slowly over time, but are predictable. For city logistics these driving forces are identified in literature and interviews (McKenzie, 2013, p. 213):

- Climate change (mitigation and adaptation)
- Demographic change (population growth, ageing and urbanisation)
- Environmental Sustainability (reconciling resource consumption and ecosystem health)
- Values, behaviours and lifestyles (changing expectations)
- Technology (development and application)

The first driving force is the climate change. Climate change is an ongoing trend that is affecting many policymakers. The environment is increasingly harmed, mainly because the polluting of emission. The harm of the environment forces companies and authorities to adapt their strategy in order to reduce emissions. Restrictions on pollution become stricter to prevent terrible consequences. Therefor the need to take the environmental concerns into account increases.

The second trend in the list is the changing demographic. The health of people in Europe is getting better. People live longer and become more dependent on external assistance. This is also including that elderly people are impacting the way of distribution of goods will look like in the future.

The third driving force is the environmental sustainability. People are more and more convinced of the seriousness of the ecosystem health. There is an increasing desire for sharing resources in order to get economies of scale. This will impact the logistics because people want the combine their resources since it is more efficient.

The fourth force is that the values, behaviours and lifestyle of people are changing over time. The customer is controlling to a greater extent the services the logistics provider offers. Customers expect high services and on-time and real-time delivery.

The fifth and final driving force is technology development. Innovations will change the logistic business over time. Innovations and new methods make new services and products possible. The distribution of

goods is more efficient and the opportunities of logistics are exponentially growing. However, how technology develops is highly uncertain.

The driving forces are included in the design of the scenarios. They are not named explicitly in the description, but are part of the global process of the stories.

### 5.2.2 External influences of urban logistics

The external influences do also effect the city logistics. In this section the external factors from the system diagram in chapter 4 with some other external influences are considered. The difference between external influences and the driving forces are the uncertainty of them. Driving forces are predictable trends, but the impact for the city logistics of external factors is not predictable. The following external influences are identified for urban logistics and are briefly explained:

- Economic development
- Level of e-commerce
- Level of Urbanisation
- Local vs central facilities
- Active or passive government
- Priority of liveability in urban areas

Economic development, both positive and negative development, will influence the city logistics. In case of economic development people make more money. The demand for goods and services will increase. On the other side, when the economy is under pressure, the demand for goods is declining. Shippers want cheap transport and receivers are not willing to pay for service. The expectations of the customers sets the logistic system. Economic development is indirectly named in the system diagram of chapter 4: it is called *demand for goods*.

The second external factor is the E-commerce. Internet is becoming more important, so also the logistics is encounters the influence. Products used to be bought in stores by the customers, but soon people will buy products online. The shift from shopping in the city to online impacts the logistics. It results in more transhipment movements and fine-grained logistics. Bulk transport is not the standard anymore and new routes should be planned. The level of e-commerce is not named in the system diagram. This is because the focus of the research is on the commercial freight market. This is not the fine-grained distribution of goods to customers.

The third external influencing factor is the level of urbanisation. Nowadays about 75% of the people live in the cities and this number is still increasing. The city is getting denser and a lack of housing may arise. This may lead to a change of the function of the shopping environment. Currently there are a lot of retailers and food stalls in the centre so that the citizen can buy their needs just around the corner. Due to the urbanisation the centre can become less accessible. This may result that people are going to buy goods from internet and avoid the centres. The city centre may lose its function as shopping centre. A change of the function will influence the logistic process in these areas and are therefore significant to take into account. The level of urbanisation impacts the amount of congestion in the system diagram.

The fourth factor in the list is the location of the facilities. Hendriks (2015) proposed that in the future maybe the bars in neighbourhoods can get a logistic hub function. In this situation the last mile will be removed in the logistic process and residents can pick up their goods at local bars. The other effect of more centralised facilities can also happen. In this case hubs are placed on the border of the city and from there the logistics services are provided. The location of this kind of hubs is not taken into account in the system diagram, since the function of this hub is to deliver the goods directly to the consumer. Because the focus is the commercial market, this external factor is outside the demarcation.

The fifth factor is concerning the attitude of the local government in the urban logistic policy. Since policymakers seek for low cost measures, a government can decide to have a passive attitude. The philosophy is to let the market force decide how the logistics operates. In contrary, when the government is interfering, many measurements can be adopted. Subsidy, restrictions and permissions are the means that become relevant then. This external factor is adopted in the system diagram.

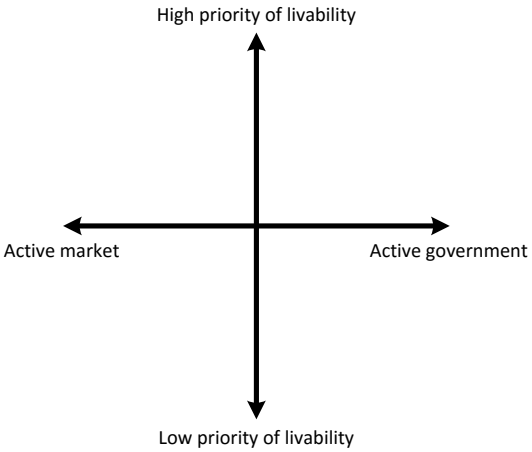



*Figure 18: Matrix of the dimensions*

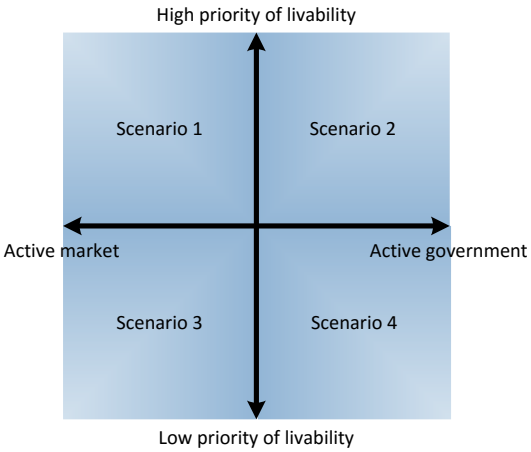



*Figure 19: Position of the scenarios in the matrix*

The sixth and last listed external influence is the social priority of liveability in the city. The priority of liveability is relevant since it determines the boundaries of the nuisance level. A high priority implies that residents, governments and logistics providers aim for a sustainable and liveable city. In this case the liveability and green concerns are important objectives. A low priority implies that other objectives are more necessary than liveability. This factor is also mapped in the system diagram.

### 5.2.3 The uncertainty matrix

This section deals with the choosing the dimensions for designing the scenarios. Scenarios are constructed by first identifying specific sources of uncertainty and using those as the basis for alternative futures, depending on how the uncertainties play out. The dimensions are determined by external factors since it is uncertain how these factors develop over time. The uncertainties of the external factors can be plotted like dimensions for the future. The future context scenarios are created by plotting two external factors.

For the development of the scenarios in this research is chosen to plot the priority of liveability and the attitude of the government. Both liveability and attitude of the local government can develop in two directions. The directions of the two factors can be drawn in a system of axes. On the X-axis the attitude of the government is plotted. On the Y-axis the social priority of liveability in urban areas is plotted. For the attitude the dimension varies from an active market (passive government) to an active government. The vertical axis the liveability runs from low priority to high priority. Plotting these dimensions on the two axes will result a matrix displayed in Figure 18.

The matrix is based on two dimensions of uncertainty. The four cells represent alternatively the four combinations of the poles of the two uncertainties, each of which contains a logic of a plausible future (Bishop et al., 2007). This results in orthogonal, not overlapping, scenarios. This contributes to the understanding of the scenarios because the different setting will be clear. The position of the scenarios in the cells of the matrix are displayed in Figure 19. As show each scenario is located in a different quadrant of the matrix. The position of the scenarios is used to reflect on the system diagram of the previous chapter. The matrix combined with the system diagram function as input for the description of the scenarios later in this chapter.

Scenario 1 is dealing with city logistics in an environment with high priority of liveability and mainly a market that should meet the expectations of high standards in the city. The difference of scenario 2 compared to scenario 1 is that the government is interfering actively by means of adoption of measurements and facilitating platforms. Scenario 3 deals with a society that is not mainly concerned with the liveability in the city. There are other problems to focus on than improving the standards, but if there is an improvement, it is initiated by the market force. The fourth scenario deals also with an environment where standards of living are not the main concern. External events force the government to focus on other issues in society.

The scenarios are used as a tool for emphasizing with possible futures. They are developed with the aim to help people from the logistic business to think about future developments and possible problems. The objective of the scenarios is that stakeholders use it in their design to think how they can make robust logistic system. In this research a logistic case is considered robust if it meets the following criteria:

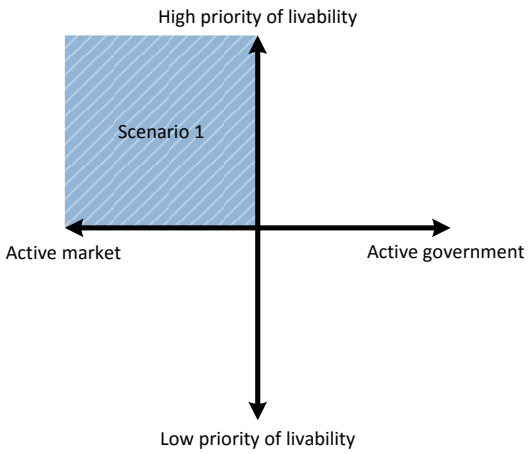
- Have a minimum impact on the liveability (environment, noise, vibrations, congestion, safety and city scape);
- Have a more efficient logistic process, with fully loaded vehicles and sending customers;
- Have a high service for the receiving customer, delivery on-demand, and flexible same-day-delivery.

## 5.3 Description of the context scenarios

The scenarios of the city logistic systems give insight for the stakeholders in the pitfalls they have to overcome. They are able to test whether the robustness of their operations is sufficient to deal with the future. On the following pages the future scenarios are described. The scenarios are based on the feedback of the experts during interviews and the use of the dimensions. There are six key figures added to the scenarios to get a quantitative impression of the changes in the next decade. These figures are vehicle movements, emission of PM10 and NOx, emission of CO2, number of residents, number of retailers, and the number of accidents. The figures are just an estimation and the numbers are assumptions. The real numbers are not studied since the figures only function as an indication.

## Scenario 1: Conscious Entrepreneurship

People keep on moving to the city coming years. This urbanization results in makes cities. A high quality of life in the city is key for the citizen. Both shop owners as consumers can afford to pay for logistic services and are willing to pay for it. There are many initiatives for entrepreneurs and residents to reduce environmental impact, by reducing emissions for example. Local authorities put the market force in the lead for changing and optimizing the logistics. The city centre is the beating heart, where the residents are seeking for leisure time. Therefore the catering and service industry, and the retail sector are highly present in the centre. Entrepreneurs on their turn, they experiment with new technologies for redesigning the transport and logistic process, for example drones and self-driving vehicles. However, due to the urbanisation more and more vehicles are needed in the city. This impacts local problems with particulate matter (PM) and smog. The capacity of the road infrastructure is not sufficient anymore, which results in traffic jams and delays for entering the city.

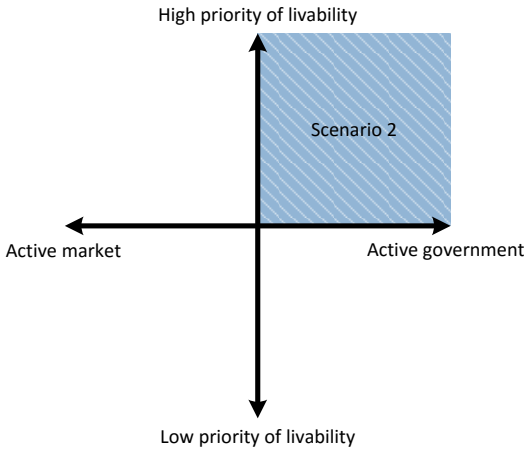



| **Objectives local governments** |
|---|
| Market force is leading |
| Facilitate start-up incubators |
| Accessible city |

| **Criteria** | **Change** |
|---|---|
| Number of vehicle movements | + 20 % |
| Emission op PM10 and NOx | + 5 % |
| Emission of $CO_2$ | + 10 % |
| Number of residents in city | + 20 % |
| Number of retailers | - % |
| Insecurity (# accidents) | + 10 % |

## Scenario 2: Pragmatic Governance

The national and local government have an objective: liveable city centres as soon as possible. Sustainable transport is one of the main goals of the central authority. Municipalities cooperate together and take uniformed measures to force the market to performing sustainable. Zero emission is a broad supported and ultimate aim of the authorities. They use subsidy and restrictions to influence the market. There is budget for research of new technologies in logistics. 'Physical Internet' is getting designed boosted by the government. Central coordination makes it possible to develop a system that reduces transaction cost of transhipment. This gives opportunities for small, local entrepreneurs to enter new service markets. Since the availability of the city centre is limited for heavy traffic, the function is changing. Retailers have smaller stocks and are shaped as 'pop-up stores' and 'experience centres'. The goods are stocked mainly outside the centre, and are supplied in the evening.

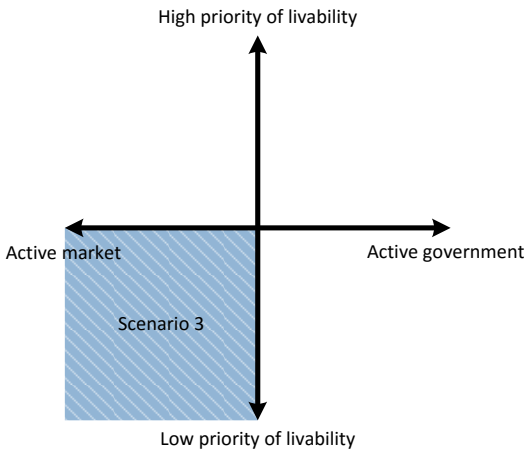



| **Objectives local governments** |
|---|
| Market force is leading |
| Facilitate start-up incubators |
| Accessible city |

| **Criteria** | **Change** |
|---|---|
| Number of vehicle movements | - 10 % |
| Emission op PM10 and NOx | - 10 % |
| Emission of $CO_2$ | - 10 % |
| Number of residents in city | + 20 % |
| Number of retailers | + 20 % |
| Insecurity (# accidents) | - 10 % |

## Scenario 3: Shop Vacancy


Economic stagnation has limited the effectiveness of the government. Her main task is to stimulate the economy and to create jobs for the population. Retailers have to fight to survive financially, since the population has less purchasing power than before. Because of this the number of shop owners in the city centre reduces rapidly. This results is many shop vacancies and unattractive shopping streets. Heavy trucks, with more volume of bulk, drive into the centre to supply stores since fine-grained logistics is not viable. There is a lack of investments in energy efficient vehicles because there is no budget for it, neither from the market, nor the government with subsidies. The air quality declines in urban areas and the regional road are crowded. There is no other option than wait until the economy attracts. Only then new investments can be done and the logistics system can innovate.

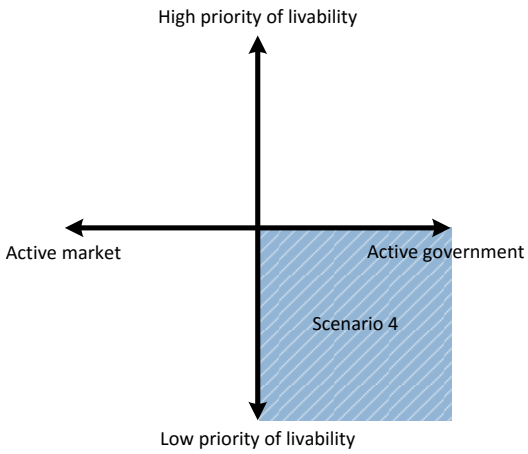



| **Objectives local governments** |
|---|
| Stimulate economy |
| Create jobs |
| Ensure safety |

| **Criteria** | **Change** |
|---|---|
| Number of vehicle movements | - 10 % |
| Emission op PM10 and NOx | + 10 % |
| Emission of $CO_2$ | + 10 % |
| Number of residents in city | + 5 % |
| Number of retailers | - 20 % |
| Insecurity (# accidents) | + 10 % |

## Scenario 4: Resilience of Logistics


Vulnerabilities of important infrastructure are the main priorities of governments. The vulnerable energy network, extreme weather conditions and economic stagnation are the concerns of central authorities. Highways are not prepared for the increase of vehicle movements and traffic accidents can result into traffic nightmares. Only very resilient logistics can severe in these circumstances, since it should be able to supply shops and supermarkets in extreme weather conditions. Especially the bigger companies can anticipate on the change of logistic demand. Liveability of the city is less important than a minimum standard of living for the residents. There is no budget available for subsidies and the companies are prudent with innovations. Fine-grained distribution is irrelevant, so mainly heavier vehicles with more volume is still the standard.




| **Objectives local governments** |
|---|
| Stimulate economy |
| Create jobs |
| Ensure safety |

| **Criteria** | **Change** |
|---|---|
| Number of vehicle movements | - 10 % |
| Emission op PM10 and NOx | + 10 % |
| Emission of $CO_2$ | + 10 % |
| Number of residents in city | + 5 % |
| Number of retailers | - 20 % |
| Insecurity (# accidents) | + 10 % |

## 5.4 Conclusion of the context scenarios

This section gives the conclusions of the scenario analysis. It explains the contribution of the scenario analysis for this research. The most remarkable findings are presented here. There will also be reflected on the sub-question defined about the use of scenarios: *How can future alternatives help to make the pathway roadmaps more robust?*

The scenarios described in this chapter function as a tool to help the stakeholders anticipate on plausible problems and events of the coming decade. The objective of the scenarios is that stakeholders use it in their design to think how they can make robust logistic system. It helps people to emphasize in future context scenarios. The scenarios of the city logistic systems give insight for the stakeholders in the pitfalls they have to overcome. They are able to test whether the robustness of their operations is sufficient to deal with the future.

The process of designing scenarios is difficult to repeat since it is on the one hand a snapshot of a moment in time and is strongly dependent on the perspective of the researcher. The researcher is influenced by the input of the experts. The iterative process of scenario design makes it hard to imitate the context stories. But the high subjective level of the scenario is not a problem since they are not adopted for granted. The stories are only used to generate ideas of actions and measure to make urban logistics more robust.

*How can future alternatives help to make the pathway roadmaps more robust?* As mentioned in this chapter, it is not the objective to design normative scenarios nor to do predictions. Normative scenarios should be accepted by the strategic policymakers and other stakeholders. This concerns a detailed planning and predefined milestones to realise the best valued future. Predictive futures is another type of scenario design. Neither this type is useful for this research since the city logistics strongly depend on the attitude of the stakeholders. For predictive futures one needs to use quantitative models that have to be verified and validated. Since the objective of this research is not to develop these kind of scenarios, only rough sketches of context scenarios are designed. These context scenarios only function as a tool for this research to help people of the business emphasize with plausible logistic complication the next decade. So, the scenarios will help to make a process design more robust since more scripts are taken into account.

# Dynamic Roadmap

## Part 3

# 6 ACTIONS AND MEASUREMENTS

This chapter is about forming tactics and strategies of the stakeholders for the roadmap. These tactics and strategies are based are mainly based on the results of the workshop '*Roadmap Urban Logistics 2025'*. The action and measurements are identified by using the scenarios from chapter 5 as an input for the workshop. This input forms the basis for generating actions during the workshop. The goal of this chapter is making the action strategies explicit, so that can be incorporated in the roadmap (chapter 7). In total thirteen different action strategies were extracted from the input of the workshop.

As mentioned in the introduction, the actions and measurements of the stakeholders that are incorporated in the roadmap are identified in the workshop "Roadmap Urban Logistics 2025". The position of the identification of the actions in the Dynamic Roadmap framework is displayed in Figure 20. The tactics and strategies in this chapter are part of the design of the dynamic roadmap. Together with the next chapter, were the dynamic roadmap design is described, the action strategies contribute to the fifth sub-question: *How does the dynamic roadmap of city logistics in the Netherlands looks like?*

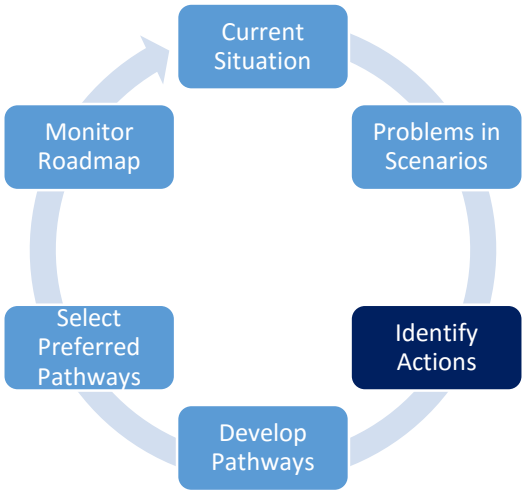



*Figure 20: Action identification in the Dynamic Roadmap framework*

## 6.1 Approach for defining actions

In this first section the approach of generating action strategies for the roadmap will be discussed. To get a useful action plan it is important that the strategies that are incorporated in the roadmap are supported by all the stakeholders. The main input for forming the action strategies are the results of the workshop '*Roadmap Urban Logistics 2025'*. The section about the approach for defining actions elaborates on the set up and the preparation of this workshop. The next section of this chapter discusses the results of this workshop.

The covenant 'Green Deal Zero Emission Stadslogistiek' is signed by different stakeholders of urban logistics (Rijksoverheid, 2014). This covenant represents the willingness of these stakeholders to make the logistics in the first and last mile more sustainable. In order to make the city logistics more sustainable several actions are needed. However neither the actions, nor a strategy is explicitly defined in the covenant. This results in a lack of clarity for the involved stakeholders. In order to define action strategies for the roadmap these stakeholders have to be involved. This is done by inviting these stakeholders for a workshop were actions strategies are defined together.

It is difficult to translate ambitions into actual actions. One of the main reasons is that actions of the multiple parties are interdependent of each other. This means that the choices stakeholders make are dependent of the choices of others, in other words interdependency. Since there are no target values in the covenant, parties cannot held accountable in neglecting the agreement. To get insight in the interdependency of actions, stakeholders should discuss and understand each other's motivations.

Since the interviews with experts do not cover the interaction, another method is needed. The identification of problems and the generation actions is done in a workshop where interaction in included in the design. In this workshop the scenarios of chapter 5 are used to explore strategies. The methods that are used in this chapter are illustrated in Figure 21.

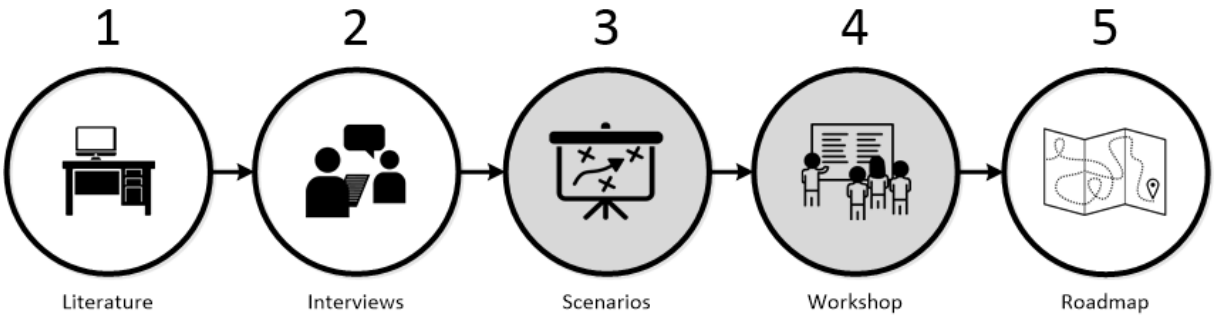



*Figure 21: Methods for generating action strategies*

The next section elaborates briefly on the setup of the workshop, which is essential for the results and conclusions of the workshop.

## 6.2 Design of the workshop

This section is about the setup of the workshop, a brief description is provided of the most important choices that were made. The quality of the output of the workshop is determined by various input variables. This section elaborates on these different elements for the workshop configuration, like the aim of the workshop, venue, participants, facilitators, the program, and the output. A more detailed explanation of the workshop design can be found in Appendix C: Setup of the workshop.

The setup of the workshop is of great importance in order to get the right results and to be able to use these results in forming conclusions. In literature tools are described how to design an interactive and relevant roadmapping workshop. The theory behind facilitating workshops that is used in this research is based on Beer and Packard (2012); Gastil (1993); Kaner et al. (1996).

Wise et al. (2014) have addressed an important shortcoming in roadmapping that happens often: designed roadmaps do not always take responsibility into account. It happens often that tactics in roadmaps are not assigned to a stakeholder, causing an absence of responsibility. To overcome a lack of responsibility in the dynamic roadmap of city logistics the tactics are coupled to involved stakeholders.

The total duration of the workshop was four hours. The name of the workshop is '*Roadmap Urban Logistics 2025'*. The design of the workshop is determined by the goals and the input that is needed for the research. The following goals are defined for the workshop:

- Get insight in the attitude of the stakeholders to urban logistics;
- Get insight in the opportunities and pitfalls of urban logistics in the near future;
- Preparing on the events that may occur that will change urban logistics;
- Creating a provisional roadmap;

In total a mix of ten people from different logistic businesses participated in the workshop. The ten participants are from different stakeholder groups. The following stakeholders attended the workshop: carriers, retailers, municipalities and logistic hubs. These ten participants were subdivided in three groups, each dealing with a different scenario from chapter 5. Because the *Resilience of Logistics* scenario is a bit more radical than the other scenarios, this scenario was not used during the workshop. The scenarios were used as a starting point for the design of the roadmap. Hereby the developments described in the scenarios were taken into account in order to deal with risk and uncertainties over time.

The workshop consists of four rounds in which the participants need to seek for strategies in a specific scenario. The first round is set up to discover potential problems in the defined scenarios. The second round is designed to think about solutions and actions to cope with the risk and uncertainty of the scenarios in the first round. In the third round the actions that were found in round two are put on a

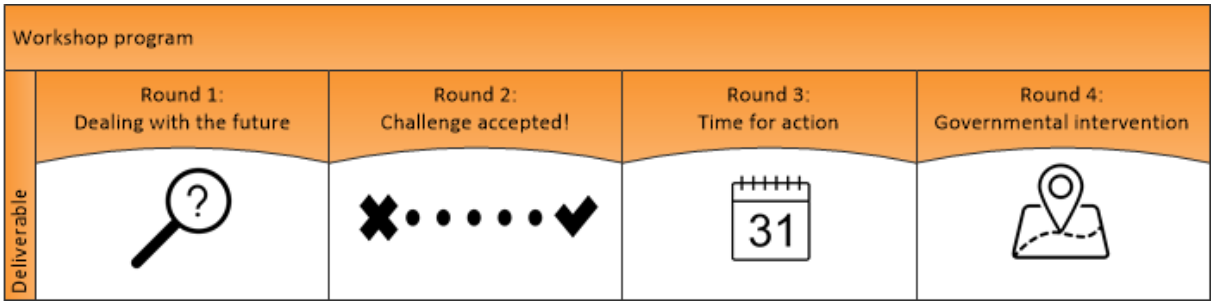



*Figure 22: Program of the workshop 'Roadmap Urban Logistics 2025'*

timeline by the participants to discover a possible sequence of actions. In the final round the participants define some extra actions of authorities to supervise and coordinate the strategic process. The rounds are illustrated in Figure 22.

To assure that the results of the workshop are interpret in the right way, the results that are generated by participants have to be standardized. This will help to compare results between the scenarios and gives a uniform output. In the workshop this is done by using sticky notes as a central tool in presenting the findings during the workshop. Each of the five different stakeholder groups has a unique coloured sticky note. The colours help with the interpretation of the results, since it makes it easier to link actions to the stakeholders. In Figure 23 the links between the different stakeholders and the different colours of the Sticky notes is presented.

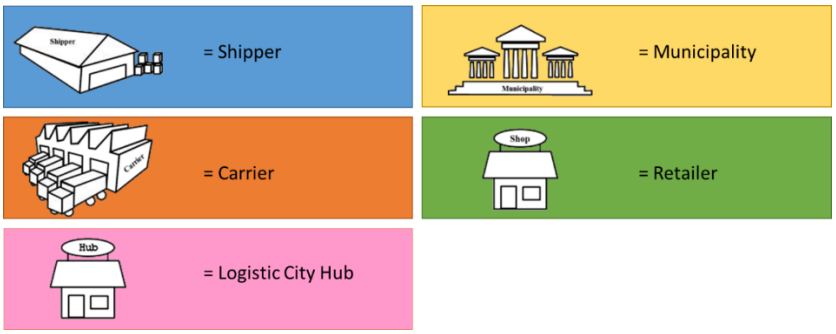



*Figure 23: Stakeholders and their corresponding sticky notes colour*

For roadmapping purposes it is important to assign the actions to a date and to put them in a sequence. This will also show actions that are successive. In order to get a standardized format in the way the sequence is presented, the participants are asked to stick them on a time line. On this time line the approximate date of the elections of the local authorities are presented. The elections are added to the timeline because the experts of the interviews experienced it is a key element in strategic planning (Ploos van Amstel, 2015b; Quak, 2015). An example of the time line is showed in Figure 24. By using these two standardized outputs it makes it easier to interpret, discuss and understand the results. Also for the research it is an advantage because the result can be compared more easily.

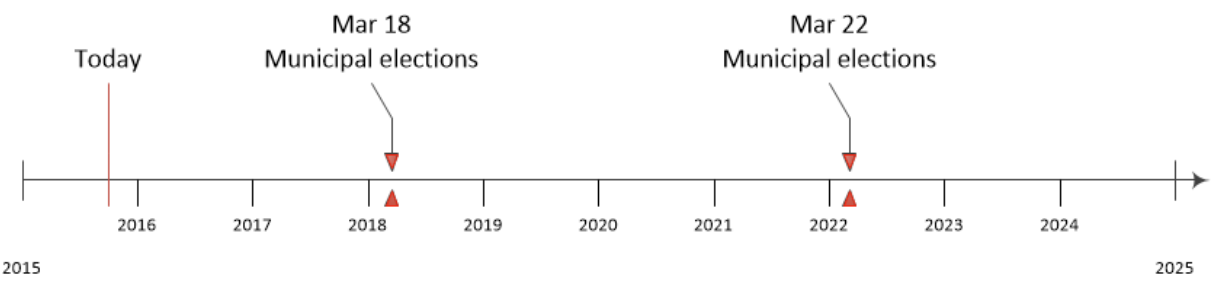



*Figure 24: Timeline used in the workshop*

## 6.3 Results of the workshop

This section presents the results of the workshop '*Roadmap Urban Logistics 2025*'. The results are explained briefly in this chapter, an in-depth description can be found in Appendix E: Results of the workshop 'Roadmap Urban Logistics 2025'. This section follows the results of the rounds of the workshop (Figure 9). First the identified problems are presented. The second part elaborates more on the conceived actions. In the last part the results are analysed and interpreted for the use of forming possible pathways for the roadmaps.

### 6.3.1 Round 1: Identified Problems

The first round of the workshop was named '*Dealing with the future'*. The participants were asked to project themselves to be in a context scenario in order to identify potential problems and weaknesses in the logistic system. The identified problems were noted on the coloured sticky notes. This helped to name the problems briefly instead of writing long stories. Due to the short description of the problems, the problems of the different scenarios could be compared more easily. Similar problems, defined by different groups of stakeholders, imply vulnerabilities that are likely to occur. The coloured notes make it clear which stakeholder the problem experience. Figure 25 provides an impression of the outcomes of the first brainstorm session about the problem identification. Each scenario has its own deliverable. The sticky notes are grouped for each of the five stakeholders.

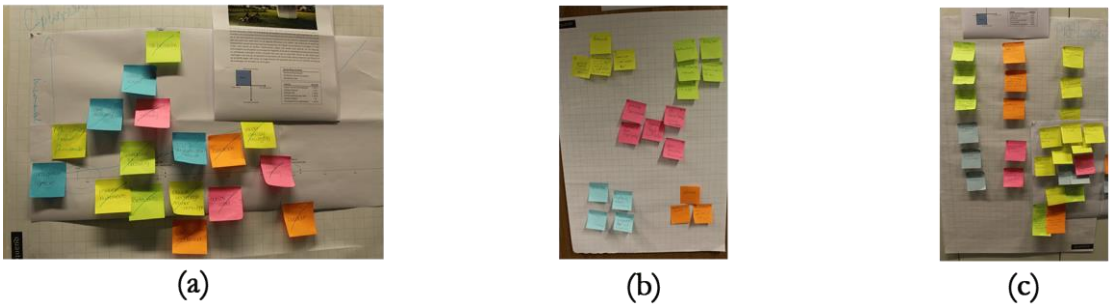



*Figure 25: Deliverables of the problem identification (a) Conscious Entrepreneurship, (b) Pragmatic Governance, and (c) Shop Vacancy.*

Table 5 provides an overview of the number of identified problems per scenario and per stakeholder. The number of problems is more or less the same between the scenarios. This can be explained since the participants should seek for 2 or 3 problems per stakeholder. The number of problems per stakeholder is comparable. This can also be attributed to the instruction to identify 2-3 problems per stakeholder.

Table 5 presents only the amount of identified problems. The details of these problems that are identified in the workshop are listed in Table 6. In this table the problems are listed for each of the three scenarios. Including these problems in the preliminary phase of roadmapping will ensure a risk-aware roadmap. Generally the problems from the workshop are in line with the literature about city logistics. Examples of the identified problems in the workshop are that a lack of action results in more nuisance of logistic operations and the bad cooperation. The problems provide insights in the uncertainties of the logistic sector so the problem identification helps to include uncertainty in the dynamic roadmap. To deal with the risks and uncertainties, the participants of the workshop were asked to brainstorm about action strategies to cope with the problems.

*Table 5: Total number of problems per stakeholder*

| STAKEHOLDER | CONSCIOUS ENTREPRENEURSHIP | PRAGMATIC GOVERNANCE | SHOP VACANCY | TOTAL |
|---|---|---|---|---|
| Shipper | 3 | 3 | 3 | **9** |
| Carrier | 2 | 3 | 3 | **8** |
| Retailer | 3 | 4 | 3 | **10** |
| City Hub | 3 | 4 | 2 | **9** |
| Municipality | 3 | 5 | 3 | **11** |
| **TOTAL** | **14** | **19** | **14** | **47** |

*Table 6: Identified problems per scenario*

| STAKEHOLDER | CONSCIOUS ENTREPRENEURSHIP | PRAGMATIC GOVERNANCE | SHOP VACANCY |
|---|---|---|---|
| Shipper | Thick flows to hub<br>Small flows into city<br>Contact consumer | Bounded regulation<br>Multiple freight chains<br>City dependency | Low demand of products<br>Bundling needs agreements<br>Bad image |
| Carrier | More transhipments<br>Nuisance | Measurements requires investments<br>Some win, other loose<br>Bad cooperation | Low hit rate of deliveries<br>Infrastructural problems<br>Congestion |
| Retailer | Stock determination<br>Vacancy<br>Physical shops | Customer approach<br>Practical organisation<br>Delayed stockings<br>New role entrepreneurs | Less customers in centre<br>Limited stocks<br>Vandalism |
| City Hub | Load factor<br>No alignment<br>No business case | Controlled competition<br>Restricted due to policy<br>Dependent on short term subsidy<br>No business case | Lack of bargaining power<br>No revenues |
| Municipality | Safety<br>Emissions<br>Congestion | Uniform regulations<br>No cooperation with other municipalities<br>Insufficient knowledge<br>Pushing instead of pulling<br>Elections | Unattractive centre<br>Nuisance due to heavy vehicles<br>Bad air quality |

### 6.3.2 Round 2: Generating action strategies

The second round of the workshop dealt with the generation of strategies to overcome the identified problems of the first round. The second round is named '*Challenge Accepted!*' since the vulnerabilities of the urban freight logistics should be solved. Again this is done with the coloured sticky notes that corresponds to the different stakeholder that are presented in Figure 23. The participants were allowed to come up with as much as possible potential solutions as they could think off.

In each scenario about twenty solutions were generated by the participants. Some of the actions in the different scenarios are more or less the same. These actions are consolidated to identify similarities. Table 7 shows the number of actions per scenario and the number of action per stakeholders. Remarkable of Table 7 is that the number of actions of the municipality is significantly higher compared to the other stakeholders. This is because an extra round took place during the workshop where participants of other groups could reflect on the deliverables of others from a governmental perspective. This step was done in the fourth round '*governmental intervention'*. The table only provides an overview of the output of the workshop.

The identified actions of the stakeholders to deal with uncertainty are presented in Table 8. The actions are clustered per scenario and per stakeholder. Table 7 and Table 8 show that the number of actions identified for shippers, retailers and carriers is limited. This can attributed to the outnumbering of these stakeholder types in the workshop. Also the interest for more green logistics of these groups is less than for the city hubs and municipalities.

*Table 7: Total number of actions per stakeholder*

| STAKEHOLDER | CONSCIOUS ENTREPRENEURSHIP | PRAGMATIC GOVERNANCE | SHOP VACANCY | TOTAL |
|---|---|---|---|---|
| Shipper | 3 | 1 | 3 | **7** |
| Carrier | 4 | 1 | 3 | **8** |
| Retailer | 2 | 7 | 3 | **12** |
| City Hub | 3 | 4 | 2 | **9** |
| Municipality | 9 | 6 | 12 | **27** |
| **TOTAL** | **21** | **19** | **23** | **63** |

### 6.3.3 Round 3: Sequence of actions

In the third round "Time for action" the participants were asked to determine which actions should follow up on other actions, in other words what the sequences of the determined actions should be. The ordering of actions is done by sticking the notes on the timeline of Figure 24: Timeline used in the workshop. The allocation of time made the participant think about the sequence of actions. They were ask to think which actions should follow upon other actions. What can be concluded from the results is that in the years 2023, 2024, and 2025 no actions are expected from the stakeholders. In other words,

*Table 8: Identified solution per scenario*

| STAKEHOLDER | CONSCIOUS ENTREPRENEURSHIP | PRAGMATIC GOVERNANCE | SHOP VACANCY |
|---|---|---|---|
| Shipper | Bundling<br>Local stocks | Force uniform policy | Cooperation with non-competitive parties<br>Green logistics in tendering<br>Omni-channel |
| Carrier | Local-to-local<br>Same day delivery<br>24/7 distribution<br>Consumer determines | Change mind-set | Cooperation with city hub<br>Live trace and communication<br>Avoid rush hours |
| Retailer | ICT solution<br>Shopping experience | Cooperation between retailers<br>Green logistics in terms<br>Omni-channel<br>Retailer associations<br>Green logistics as requirement<br>Shopping concept<br>Home deliveries | No stockings<br>Omni-channel |
| City Hub | Value adding<br>White label<br>Sharing economy | White label<br>Alliances with shippers and carriers<br>Cooperation in the logistic chain<br>Logistics planning tool | Own responsibilities<br>Media attention |
| Municipality | Less transhipments<br>New technologies<br>Moderate policy<br>Convince residents<br>Announce city lock down<br>Inform customers<br>Balance between online/offline<br>Limit city access<br>Parking free zones | Start subsidies<br>Make retailers conscious<br>Facilitate disruptive innovations<br>Start G30 city logistics platform<br>Cooperate with other parties<br>Long term policy with poles | Create space for hubs<br>Facilitate retailers' cooperation<br>Lower m2 price<br>Improve city's attractiveness<br>Subsidize low emission vehicles<br>Announce policy change<br>Load and unloading zones<br>Improve infrastructure<br>Oblige retailers to work with hubs<br>Stricter emission restrictions<br>Repel heavy vehicles<br>Privileges for clean vehicles |

the results shows that the transformation of the city logistics should not take place within a scope of ten years, but within 8 years: 2015-2022.

Another interesting result from the workshop is that the city logistic hubs do not have to act the first years according to the workshop participants. This is remarkable since the initiators of change in city logistics are mainly city logistic hubs. These results from the workshop might be explained by the fact that the hub operators do not have a strong power position (chapter 2) and therefore are not able to lead the city logistic transition.

Figure 26 provides an impression of the final results of the preliminary roadmaps of the workshop. The colour of the sticky notes corresponds to a pre-defined stakeholder. Table 10, Table 9 and Table 11 display the attributed date to the tactics. Scenarios Pragmatic Governance and Shop Vacancy (b and c) show that almost all actions are assigned to the beginning of the timeline. This can be interpreted that all the action strategies defined have to take place before 2021 according to these deliverables. Indirectly the message is that strategic planners in the city logistics have to speed up the process of change to make the urban area more liveable. The ex post discussion about the roadmap of the


*Figure 26: Results of the workshop 'Roadmap Urban Logistics 2025'. (a) Conscious Entrepreneurship, (b) Pragmatic Governance, and (c) Shop Vacancy.*

Conscious Entrepreneurship case (a) concluded that strategic planners should act decisively as well. So, regardless the scenario, the 'risk- aware roadmap' should be ambitious in meeting the targets.

In all the three scenarios the government is the action holder in most cases. This implies that whatever the scenario is, the government should act pro-active. The government is in most cases in the lead for speeding up the process of improving liveability in urban areas, even regardless the assumption of an active market.

*Table 10: Tactics and their attributed due date of the Concious Entrepreneurchip scenario*

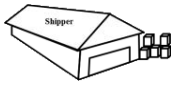
| **CONCIOUS ENTREPRENEURCHIP** | | |
|---|---|---|
|  | Shipper | 2019 Local stocks<br>2020 Bundling<br>2022 Bundling |
|  | Carrier | 2015 Consumer determines<br>2016 Same day delivery<br>2017 Local-to-local<br>2019 24/7 distribution |
|  | Retailer | 2017 ICT solution<br>2017 Shopping experience |
|  | City Hub | 2017 Sharing economy<br>2020 White label<br>2022 Value adding |
|  | Municipality | 2015 Moderate policy<br>2015 Inform customers<br>2016 Announce city lock down<br>2016 Parking free zones<br>2018 Balance between online/offline<br>2019 New technologies<br>2019 Convince residents<br>2021 Less transhipments<br>2021 Limit city access |

*Table 9: Tactics and their attributed due date of the Pragmatic Governance scenario*

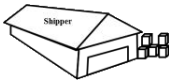
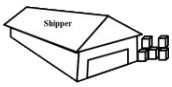
| **PRAGMATIC GOVERNANCE** | | |
|---|---|---|
|  | Shipper | 2015 Force uniform policy |
|  | Carrier | 2018 Change mind-set |
|  | Retailer | 2015 Cooperation between retailers<br>2015 Omni-channel<br>2015 Retailer associations<br>2015 Home deliveries<br>2016 Shopping concept<br>2017 Green logistics in terms<br>2019 Green logistics as requirement |
|  | City Hub | 2017 Cooperation in the logistic chain<br>2017 Logistics planning tool<br>2018 Alliances with shippers and carriers<br>2019 White label |
|  | Municipality | 2016 Start subsidies<br>2016 Make retailers conscious<br>2016 Start G30 city logistics platform<br>2016 Cooperate with other parties<br>2016 Long term policy with poles<br>2017 Facilitate disruptive innovations |

*Table 11: Tactics and their attributed due date of the Shop Vacancy scenario*

| **SHOP VACANCY** | | | |
|---|---|---|---|
|  | Shipper | 2015<br>2015<br>2018 | Green logistics in tendering<br>Omni-channel<br>Cooperation with non-competitive parties |
|  | Carrier | 2016<br>2016<br>2018 | Live trace and communication<br>Avoid rush hours<br>Cooperation with city hub |
|  | Retailer | 2015<br>2015<br>2016 | Omni-channel<br>Omni-channel<br>No stockings |
|  | City Hub | 2017<br>2019 | Media attention<br>Own responsibilities |
|  | Municipality | 2015<br>2015<br>2015<br>2016<br>2016<br>2016<br>2017<br>2019<br>2019<br>2020<br>2020<br>2020 | Facilitate retailers' cooperation<br>Subsidize low emission vehicles<br>Privileges for clean vehicles<br>Create space for hubs<br>Announce policy change<br>Improve infrastructure<br>Improve city's attractiveness<br>Load and unloading zones<br>Repel heavy vehicles<br>Lower m2 price<br>Oblige retailers to work with hubs<br>Stricter emission restrictions |

The action strategies that are named differ a little between the scenarios. However, the actions do relate to each other, so a consolidation step is done to make the scenarios more consistent. In total the workshop yields from 63 unique actions to 12 consolidated, aggregated action strategies. The unique actions are allocated a date to be carried out. Relying on the motivation of the allocated date, the aggregated actions also have a suggested date of execution. Both the aggregated action as well the due date return in the dynamic roadmap of city logistics.

*Table 12: Number of aggregate tactics per stakeholder*

| AGGREGATE ACTION | SHIPPER | CARRIER | RETAILER | CITY HUB | MUNICIPALITY | TOTAL |
|---|---|---|---|---|---|---|
| Bundling | 2 | 1 | 2 | 5 | 2 | **12** |
| Cooperation | 1 | 1 | | 2 | 1 | **5** |
| Governmental policy | 1 | | | | 6 | **7** |
| ICT solution | | | 1 | 1 | | **2** |
| Inform | | 1 | 1 | 1 | 5 | **8** |
| Infrastructure | | | | | 2 | **2** |
| Local stocks | 1 | 2 | | | 1 | **4** |
| Omni-channel | 1 | | 3 | | | **4** |
| Platform | 1 | | | | 3 | **4** |
| Restrictions | | | 1 | | 6 | **7** |
| Shopping concept | | | 3 | | | **3** |
| Others | | 3 | 1 | | 1 | **5** |
| **Total** | **7** | **8** | **12** | **9** | **27** | **63** |

## 6.4 From tactics to strategies

This section focuses on the coherence of the tactics or actions in order to translate the tactics that are a result from the workshop, into strategies. The strategies are an aggregated factor of the tactics. The composed strategies are used in the dynamic roadmap of chapter 7. The 63 tactics named in the workshop resulted in 14 strategies for the roadmap.

To get a clear understanding of the difference between tactics and strategies the definition of Olsen (2011) is used. Strategy is what the stakeholders are trying to accomplish. It is about the trade-offs of the objectives. Since every stakeholder has limited resources and operate in a competitive landscape, the trade-offs make more sense. Trade-offs lead to tactics because can accomplish a goal of the trade-off. The difference between tactics and strategies is that strategy acts as a guide to a set of tactics that various stakeholders will undertake. The tactics that have to serve the same objective are bundled to obtain the overlying strategy. This is done in the following paragraphs.

### 6.4.1 Clustering of tactics into aggregated tactics

The output returned from the workshop varies for each scenario since each sub-group was working independently. The clustering of actions and tactics gives a better overview of the next steps for city logistics. This section is about clustering the input of the workshop, with the aim for constructing the dynamic roadmap.

The process of clustering actions starts with seeking to an aggregate factor, or an underlying plan. Since three groups worked independently on a scenario case, different actions are conceived. Some of the actions in the other scenarios strongly relate to each other. Merging the comparable tactics reduce the number of identified tactics. The consolidation of the tactics is named ‘aggregate actions’. In ‘Appendix E.2 Identified tactics in the workshop’ is presented how each tactic is assigned to an aggregated factor. The aggregation is the interpretation of the researcher, but the aggregated factors are verified by the people from the city logistic business. The validation of the translation is done by four participants of the workshop of different sub-groups and by three external parties of outnumbered stakeholder groups: a retailer, a shipper and a carrier. This is done to increase the contribution of the outnumbered stakeholder groups.

The twelve approved aggregated tactics are displayed in Table 12. It provides an overview of the number of aggregated tactics that are coupled to the stakeholders. Some of the aggregated tactics appear more than once per stakeholder. This can be explained in two ways: the strategies are named in different scenarios, or two or more tactics of the same stakeholders are classified to the same aggregated tactic.

Table 12 has some remarkable results. The first notable figure is that the municipality has 6 tactics that are part of the ‘governmental policy’ strategy. This can be explained since this strategy is strongly connected with the governmental stakeholder. This raises the question why the shipper has a tactic that is a governmental strategy. The corresponding tactic is that shippers can seek for a uniform policy according to restrictions of the city centre. Also the restriction strategy should be realized mainly by the local authorities’ tactics. In this case the retailer has also a tactic that contributes to the ‘restriction’ strategy. The corresponding tactic is that the retailers should make clean distribution as an obligatory condition for transport. The following section deals with the responsible stakeholders for the contribution of the strategies.

### 6.4.2 Responsible stakeholders of the aggregated tactics

Two tactics of the workshop involve all the five stakeholders: a city logistics platform and setting zero emission zones. This can be interpreted as measures that impact the whole logistic sector. The carriers have most of their actions in common with shippers and hub operators. This can be explained since carriers are logistics operators and therefor formally related to shippers and hubs. The formal relation is illustrated in Figure 11 in chapter 3. The analysis of the responsibilities shows also that the municipality often operates alone. In reality this is not the case since parties can interfere decision making, but the municipality is responsible for realizing the restrictions. The final finding is that city hubs are the only party that cannot take action by itself. The logistic city hub has to collaborate with other stakeholders to change the city logistics.

### 6.4.3 From aggregated tactics to pathway strategies

The aggregated tactics are a little too general to fit in a dynamic roadmap since the sell-by date of the aggregated tactics are about endless. Cooperation for example, can be done on every level on every aspect, what makes the sell-by date of this tactic about endless. Therefore the aggregated factors are transformed into pathway strategies that have a sell-by date for the roadmaps. The tactics defined earlier relate directly to a strategy but are not for roadmapping purposes. The transformation to strategies is presented in Table 13.

*Table 13: Transition from aggregate action to pathway strategy*

| AGGREGATE ACTION | | STRATEGY |
|---|---|---|
| Bundling | → | Bundling |
| | → | Avoid nuisance in operations |
| Cooperation | → | Retailer associations |
| Governmental policy | → | Low traffic areas |
| | → | Subsidy new technologies |
| ICT solution | → | ICT planning tool |
| | → | Physical Internet |
| Inform | → | Inform residents |
| Infrastructure | → | (Un)loading zones |
| Local stocks | → | Create city hub zones |
| Omni-channel | → | Omni-channel |
| Platform | → | Platform of G30 |
| Restrictions | → | Zero Emission Zones |

Table 13 shows that three aggregated actions are split up in two pathway strategies. This is the case with cooperation, governmental policy, and ICT solutions. The tactic *'others'* in not taken into account of the strategies since the variety of actions is too broad. In total thirteen strategies are defined. From now on, only these pathway strategies for roadmapping are considered. The strategies can be explained as follows.

- Bundling freight is the consolidation of goods in order to increase the truck load
- Avoiding nuisance in operations includes tactics like early morning deliveries and avoiding rush hours deliveries.
- Retailer associations are collaborations between retailers in the same shopping district or street. Cooperation can lead to alignment of logistic services.
- Low traffic areas are zones were the access for vehicles is partly restricted
- Subsidy for new technologies is compensation from governments to invest in research and development and to stimulate the purchase of responsible resources.
- The ICT planning tool is a tool that is developed by the logistics providers. This should contribute to an improvement of logistic planning amongst the different parties. It will result in a reduction of transhipment movements.
- Physical Internet is the concept of a network of logistic services where senders are not entrusted with concerns about which carrier is delivering the goods.
- Informing residents makes the residents aware of the impact of high level services of logistics
- Load and unloading zones are assigned by the municipalities in order to concentrate the nuisance of loading and unloading
- Creating city hub zones is about Logistic Decoupling Points. These are areas for the logistic hubs on the borders of the city.
- Omni-channel shopping is the possibility to buy goods via various channels like in a shop, online are at home delivery.
- The platform of G30 is about a platform with the 30 largest municipalities in the Netherlands. The aim is to create a platform for them to discuss logistic issues, so that uniform measurements can be adopted in different cities.
- Zero Emission Zones are areas in which a no pollution policy exist for logistics.

All of these strategies can contribute to improve the urban living environment. But also the strategies are assigned to the stakeholders to prevent an absence of responsibility (Wise et al., 2014). The assignment follows from the input of the workshop. The results of these assigned strategies can be found in Table 14. The table makes the initiators of the strategies explicit in order to make a party responsible for the realisation of the strategy. Assigning the responsibility will improve the likeliness that the dynamic roadmap is respected by strategic planners.

In Table 14 the initiators of the strategies are presented. The strategies corresponds to the thirteen strategies of Table 13. It is self-evident that the initiator also contributes to the implementation of the strategy. The municipality is as showed mostly the initiator. This is because the local authorities have the means to change the regulations or to set requirements.

## 6.5 Conclusions of actions and strategies

In this section the conclusions of the actions and strategies are drawn. The aim of this paragraph is to summarize the main findings of this chapter. Among others it reflects on the interpretations and assumption made in this chapter. This section is subdivided in two parts: first the conclusions are drawn related to the workshop and second the interpretation of the results are concluded. In this section a part of the fifth sub-question: How does the dynamic roadmap of city logistics in the Netherlands looks like? is answered.

Some of the actions they can do individually without intervention of other stakeholders, these action do not require coordination. However, most of the actions have a high interdependency of other stakeholders. In order to implement the action, alignment between these stakeholders is needed. Table 25 and Table 14 shows that the actions and strategies are dependent of other stakeholders. Table 14 presents also the initiator of the actions are assigned. Assigning the responsibility will improve the likeliness that the dynamic roadmap is respected.

The thirteen strategies transformed from the aggregated tactics (Table 13) are useful for the design of the dynamic roadmap. The strategies are well distributed over the stakeholders, with different initiators of the strategy. This improves the interest of the stakeholders, so that the roadmap is more likely to be respected.

This chapter about the action contributes to the fifth sub-question: *How does the dynamic roadmap of city logistics in the Netherlands looks like?* The findings of this chapter are the base for the dynamic

*Table 14: Initiators of the strategies*

| **STRATEGY** | **INITIATOR** | **CONTRIBUTORS** | | | | |
|---|---|---|---|---|---|---|
| | | **C** | **H** | **R** | **S** | **M** |
| Avoid nuisance in operations | Carrier, City hub | X | X | | | |
| Bundling | City Hub | | X | X | X | |
| Create city hub zones | Municipality | | | | | X |
| ICT planning tool | City Hub | | X | | | |
| Inform residents | Municipality | | | | | X |
| Low traffic areas | Municipality | | | X | | X |
| Omni-channel | Shipper | | | | X | |
| Physical Internet | Carrier, city hub | X | X | | | |
| Platform of G30 | Municipality | | | | | X |
| Shop associations | Retailer | | | X | | |
| Shopping concept | Retailer | | | X | | |
| Subsidy new technologies | Municipality | | | | | X |
| (Un)loading zones | Municipality | | | | | X |
| Zero Emission Zones | Municipality | X | X | X | X | X |

C = Carrier, H = City Hub, R = Retailer, S = Shipper, and M = Municipality

roadmap. The thirteen strategies are used as backbone of the graphical roadmap. How the graphical representation of the roadmap looks like is covered in the next chapter. The chapter Dynamic Roadmap Design substantiates the roadmap. In the roadmap the strategies defined in this chapter return. This chapter supports the policymakers to coordinate the process of execution the process described in the roadmap.

# 7 PATHWAY ROADMAP DESIGN

This is the chapter about the final product of the research: the pathway roadmap of city logistics. This chapter converges the findings of the previous chapters. The stakeholder analysis (chapter 3) and the system diagram (chapter 4) form the starting point of the roadmap. The actions and strategies (chapter 6) are used for the pathways. The impact on the liveability targets of the local government are plotted in a roadmap. A graphical representation of the actions in time supports the findings of the research. The actions are clustered to the amount of cost (effort or monetary cost) to realize them. Over time, higher investments can be done, but the starting point are the quick wins.

The graphical representation of the roadmap helps the policymakers to communicate decisions. The pathway roadmap deals with pathways and the perspectives of stakeholders. The position in the framework is presented in Figure 27. Together with the action strategies of chapter 6, the pathway roadmap design answers the fifth sub-question: *How does the pathway roadmap of city logistics in the Netherlands looks like?*

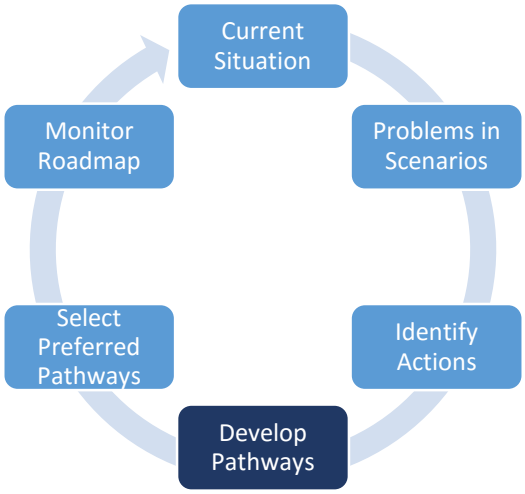



*Figure 27: Pathway roadmap design in the Dynamic Roadmap framework*

## 7.1 The graphical representation of the pathway roadmap

This section recaps in short how the roadmap should look like. The roadmap template is used to capture, structure and share knowledge about the area of interest, i.e. city logistics. The roadmap designed for city logistics is for strategic appraisal purposes. It provides a tool for identifying and assessing strategic issues, leading to agreement with strategic planners on appropriate actions (Phaal et al., 2004a). Roadmaps are mostly represented in a layered structure of solution strategies together with a dimension of time (Lee et al., 2015). Roadmaps can also be used for illustrating the sequence of actions in time (Phaal et al., 2004b; Phaal et al., 2009; Robinson & Propp, 2008).

The roadmap should be supported by appropriate documentation (Phaal et al., 2004b, p. 23). A rule of thumb of designing a roadmap is that it shows explicitly the time dimension, which is important both for ensuring that developments are synchronized effectively and for reflecting the dynamic, changing natures of the environments.

## 7.2 Pathway strategies for roadmapping

The goal of this section is to elaborate on the endurance of the pathway strategies, since that determines the tipping point of the strategies in the roadmap. It explains the argumentation of the length, using the theory of TRAIL. The clustered tactics named in the previous chapter were assigned a time the action would last. It turns out that some actions are not lasting long, but are relative easy and affordable to implement, others or more time consuming and more expensive.

### 7.2.1 Sell-by date of the pathway strategies

Several researchers consider transport measurements as layered structures (Bockstael-Blok, 2001; Bovy et al., 1994; Evers et al., 1994). The layers correspond to the time investments in infrastructures should last, i.e. the sell-by date. The layers are slightly adapt for the usage of the roadmap. The four layers are an *activity layer*, a *mobility layer*, a *transport means layer*, and finally an *infrastructure layer*. Table 15 shows the time an investment ought to last. The lifetime of the investments are used as starting point to determine how long a measurement will last before further action is needed. Generally, the life time correlates with the investment cost. This gives the consideration to take small steps or a big investment at once. The sell-by date corresponds to the aim of the Green Deal ZES. If targets are not

*Table 15: Lifetime of investment type, retrieved from Bovy et al. (1994); Evers et al. (1994)*

| LAYER | SELL-BY DATE (YEARS) |
|---|---|
| Activity layer | 1-2 |
| Mobility layer | 2-5 |
| Transport means layer | 5-8 |
| Infrastructure layer | 20-30 |

met anymore, extra measures are needed. The sell-by date of the strategies are presented in Table 16, Most of the strategies have a sell-by date period of two to five years. Some strategies can take place at the same time, some are better to follow upon the preliminary action.

The strategies that have a short lifetime (are in the activity layer) are informing residents, setup a platform with the biggest municipalities, and retailer associations. The cost in terms of people, effort and money is relatively low compared to the other strategies. The mobility layer needs some higher cost. Strategies that suit this layer are nuisance in operations, bundling, low traffic areas, and omni-channel shopping. In city logistics the transport layer is about investments that influence the transport mode, this layer include city hubs , ICT planning tool, Physical Internet, subsidy for new technology, and load/unloading zones. The layer with the highest cost is the infrastructure layer, the layer needs high investments. The only strategy in the layer in the Zero Emission Zone strategy. This strategy requires a change in infrastructure since the area around the city have to be adapted due to its new function: parking facilities and commuting.

### 7.2.2 Contribution of pathway strategies to liveability

Some strategies require more resources than other strategies. However, not all of the strategies do contribute the same level of liveability improvement. Therefore the strategies are ranked on the improvement of liveability in the city. The ranking of the pathway strategies is also presented in Table 16 in the last column. The ranking is the initial contribution of the strategy to a better urban environment. The ranking runs from one to four: one is a significant improvement of green logistics and four implies little impact.

The distribution of freight in the city can change due to stakeholder's actions, but it is not guaranteed that all the actions improve the liveability. Informing residents, omni-channel shopping and Physical Internet will not ensure more green logistics. In fact, omni-channel shopping for example, may result in even more logistic movements. The risk of Physical Internet is that it becomes more difficult to enforce green logistics. Informing residents neither makes the difference compared to the current policy, it will only generate awareness. Therefore these three strategies are ranked with number four. Subsidy of new technologies and Zero Emission Zones, in contrary, do improve the liveability in urban area significantly. Both strategies result in less vehicle movements and less emission in the city centre. Low traffic areas will reduce the number of vehicles in the city between time frames, this will improve the urban environment. Also bundling and a planning tool will improve the liveability, because these strategies result in a decrease of vehicle movements. Unloading zones have impact on the nuisance of trucks in the centre. These four strategies are ranked with a two. The other four strategies, city hub zones, a platform of municipalities, retailer associations and avoiding nuisance, are ranked with a three. Creating city hubs enables the possibility to bundle freight, but it does not directly improve liveability. A platform of the 30 most important municipalities will result in a better alignment between cities, but it wound reduce the number of vehicle movements. Associations for retailers can help to start the process of cooperation in the shopping district to reduce the vehicle movements in the centre. And avoiding

*Table 16: Lifetime and ranking of the pathway strategies*

| STRATEGY | LAYER | SELL-BY DATE (YEARS) | RANK (1-4) |
|---|---|---|---|
| Avoid nuisance in operations | Mobility | 2-5 | 3 |
| Bundling | Mobility | 2-5 | 2 |
| Create city hub zones | Transport | 5-8 | 3 |
| ICT planning tool | Transport | 5-8 | 2 |
| Inform residents | Activity | 1-2 | 4 |
| Low traffic areas | Mobility | 2-5 | 2 |
| Omni-channel | Mobility | 2-5 | 4 |
| Physical Internet | Transport | 5-8 | 4 |
| Platform of G30 | Activity | 1-2 | 3 |
| Retailer associations | Activity | 1-2 | 3 |
| Subsidy new technologies | Transport | 5-8 | 1 |
| (Un)loading zones | Transport | 5-8 | 2 |
| Zero Emission Zones | Infrastructure | 20-30 | 1 |

nuisance improves the liveability in terms of comfort, but it will move the problem to other moments of the day.

The ranking of the strategies is also used in the map of pathways for city logistics. It helps to understand how pathway strategies impacts the liveability. The ranking also gives insight in the priority of implementing measures. The next section provides a map of the pathway strategies.

## 7.3 Basic map of pathways strategies

This section maps the basic pathway strategies of city logistics. The section elaborates on the pathway strategies that results from the workshop of this research. The aim of mapping the pathway strategies is to provide a tool for communication between strategic planners.

The map of pathways has the purpose to help stakeholders anticipate on what to do or not to do in the coming years, depending on actions of others. Different than in the Dynamic Adaptive Policy Pathways approach is that stakeholders are able to act quite independently, so coordination and alignment between them is needed. Besides, in contrast to the Rhine Delta case, the City Logistics deal with a vaguer target: the definition of liveability contains more criteria. It is more difficult to make the aim liveability quantitative, therefore a qualitative approach is chosen here. The graphical representation of the DAPP in Figure 6 in Chapter 2 on page 13 is used as basis for the map of strategy pathways. However, the following changes are made:

- The actions are strategies and are not all interconnected in this case;
- The strategies do not have their own colour each, but the colour corresponds to their rankings;
- The map contains follow-up strategies: strategies that are likely to succeed each other.

These adaptions have resulted in a map with thirteen pathway strategies mentioned in Chapter 6. The map of the different strategies and their impact on the liveability is represented in Figure 28. The map shows on the first sight strong similarities to the DAPP map in Figure 6.

### 7.3.1 Reading instructions of the pathways map

This section is about the interpretation of the map with pathways of Figure 28. First the structure of the roadmap is elaborated and second the more detailed elements of the map are explained.

The pathway roadmap has two axis. The horizontal axis represents the time in years, which runs from 2015 to 2025. The vertical axis shows the strategic measures that the stakeholders have. A consistent Y-axis makes it possible to compare the different Roadmaps under different circumstances with each other. The action are roughly sorted in governmental actions versus market stakeholder actions. In this map from top to the '*current policy'* are the strategic measures of the governments, and from the '*current policy'* to the bottom of the map are the actions of the other stakeholders. The actions are also sorted to the cost of resources of the strategic pathways. In this map the measures at the edges are the most resources consuming measures. The more to the inside of the map, the easier the measures are in terms of cost, time or effort. The advantage of clustering the action strategies to the cost of resources

results in a pathway map that expands to the outside of the illustration, corresponding to an Uncertainty Trumpet of Rosenhead (1989).

This paragraph explains each element of the map with pathways for city logistics. The colourful lines represents the identified strategies of the stakeholders. The colour of the line reflects the contribution of the strategy to the liveability in the city. A green colour corresponds to a sustainable development of city logistics, ranked with number 1. Yellow corresponds to rank 2 strategies, orange to rank 3 and the red lines correspond to non-improving strategies, ranked with a 4. The transparent lines in the figure are plausible moments a strategy can start, however, it is not recommended to do so yet. In other words, the strategies can be chosen, but that is not convenient since it may exclude other strategies. Another element in the map is the length of the lines. The length of the line corresponds to the sell-by date of the strategy. It shows how long the strategy is effective to meet the liveability targets of the Green Deal ZES. The lines end with a vertical black stripe. This stripe indicates the point that strategy does not meet the targets anymore. This is called the '*Tipping Point'* of the strategy. The strategies contain white dots, which represents a '*Transfer Station*' to another strategy. Connecting the strategies via transfer stations result in a metro looking map of pathways. The last element in the map is the grey arrow. The arrow indicates a logical subsequent strategy after a strategy. Indirectly it represents a recommended preliminary strategy as requirement for a strategy. These are the elements of the map. The following part elaborates on the content of the city logistic pathways map.

### 7.3.2 Interpretation of the map of pathways

This part of the section deals with the content of the map of pathways in Figure 28. First the market strategies are elaborated, then the governmental strategies.

Retailers can start cooperation directly, without any interference of other parties, see also Table 25. If the retailers start to cooperate, some improvement of the urban environment can be realized. This can be done via agreements between retailers concerning waste, loading times, and so on. Also avoiding nuisance in operations can take place without many interference. Carriers and retailers can agree upon delivery moments, avoiding shopping hours for example. Both strategies are orange coloured.

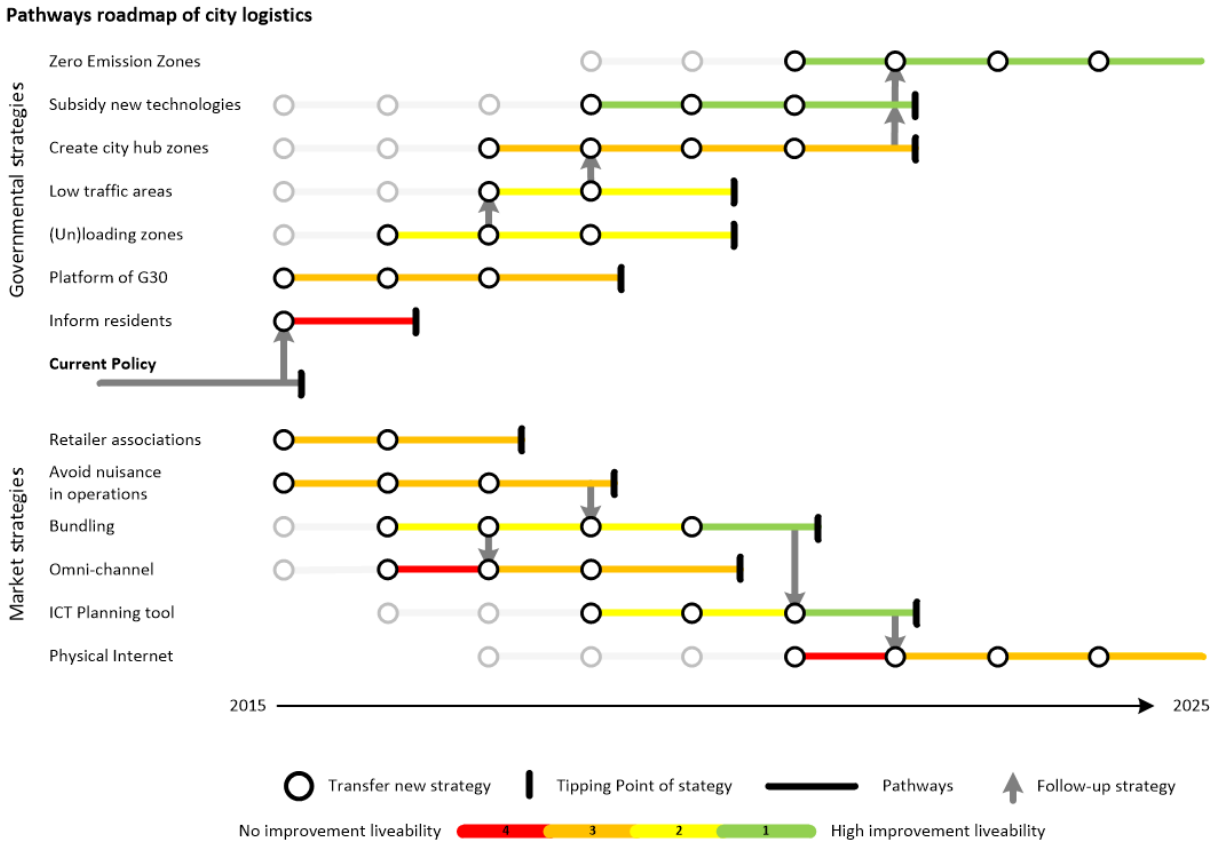



*Figure 28: Strategic Pathways Map of City Logistcs*

Market parties can also start autonomously with bundling and omni-channel shopping. Both actions need alignment between market parties. Bundling of freight reduces the vehicle movements in the city, so it is a substantial improvement for the liveability. That freight is being bundled does not imply that the goods are distributed with for example electric vehicles. The bundling strategy turns green at the point that commercial parties collectively start to bundle freight in order to avoid nuisance. This increases the impact on the urban environment significantly. Omni-channel shopping might impact the liveability in a negative way, possible more vehicle movements are needed to provide goods to the consumers. The omni-channel line is therefore red. It is also more likely to happen that first goods are bundled before retailers start with omni-channel shopping concepts. In combination with bundling it will slightly improve the urban environment and the colour is now orange.

The final two strategies concern planning alignment. A general ICT planning tool can be developed by transporting parties. The planning tool can help to increase the load factor of trucks, which results in less vehicle movements. The colour of the planning tool strategy is yellow, corresponding to its initial rank 3 in Table 16. The rank changes after the planning tool is combined with the bundling strategy, it turns green. The Physical Internet strategy is named at the bottom of the map, implying that it cost the most effort to realize. The risk of Physical Internet is that is hard to monitor and control the transporting parties of the freight. There is even a higher risk that Physical Internet leads to an increase of vehicle movements and a decrease of the load factor. The colour of the line is thus red. If there is a general planning tool, it may result in a little improvement of the vehicle movements and the strategy turn orange after a while.

From now on the governmental strategies are elaborated. As the map illustrates, the first step is informing residents. Informing the residents is done by the local authorities, aiming to make residents aware of the urgency of a liveable city. This strategy is coloured red, since informing people does not affect the liveability in the city directly. Local authorities can also start with a dedicated platform for transport to align policy with other municipalities. The G30 can help the city logistics with make uniform transport policy in different municipalities, which is beneficial for carriers. The platform strategy is ranked 3 and has therefor the orange colour (Table 16).

Governments can also opt to concentrate hinder of logistics by setting loading and unloading zones. Following on that measure the government can appoint low traffic zones in the centre. Shoppers do not experience hinder of the vehicles due both strategies, so the lines are yellow. The government can also set up zones for realizing city hubs. Only the hub does not influence the liveability in the city, but it lowers the market threshold to start using the city hubs. Creating zones for city hubs is therefore coloured orange.

Subsidy is a strong means of the municipality, however it is confined. Subsidy is an expensive measurement, but it will result in more sustainable resources for city distribution. Providing subsidy for innovative technologies does improve the liveability in urban area, so it is a green line. After a couple of years of subsidy, the government can start by locking the centre of the city for conventional vehicles. Zones that only allow zero emission vehicles will push the market to invest in green vehicles. No emission in the centre is good for the urban environmental pollution and does contribute to the liveability of the city centre. The measure of Zero Emission Zones is also coloured green.

The map of pathways provides strategic planners a useful tool to understand and to communicate the best pathways for city logistics. Planners can see directly which means do contribute to the environment and what pathway can be chosen to enable a strategy. But this map does not illustrate the power of the local government. The next section elaborate on the governmental intervention.

## 7.4 Intervention map of pathways strategies

In the previous section a basic map is presented in which is illustrated how the objectives for a more liveable city can be achieved. The local government is able to influence and interfere in the process of change of the distribution of urban freight. The municipality has mitigating, hedging and seizing actions to shape the logistics system in urban areas. The strategies of the government can help to improve the basic map and to make it more robust. Mitigating actions are means to reduce the likely adverse effects of strategies, hedging actions spread or reduce the uncertain adverse effects of a plan, and seizing actions seize likely available opportunities (Haasnoot et al., 2013; Kwakkel et al., 2010).

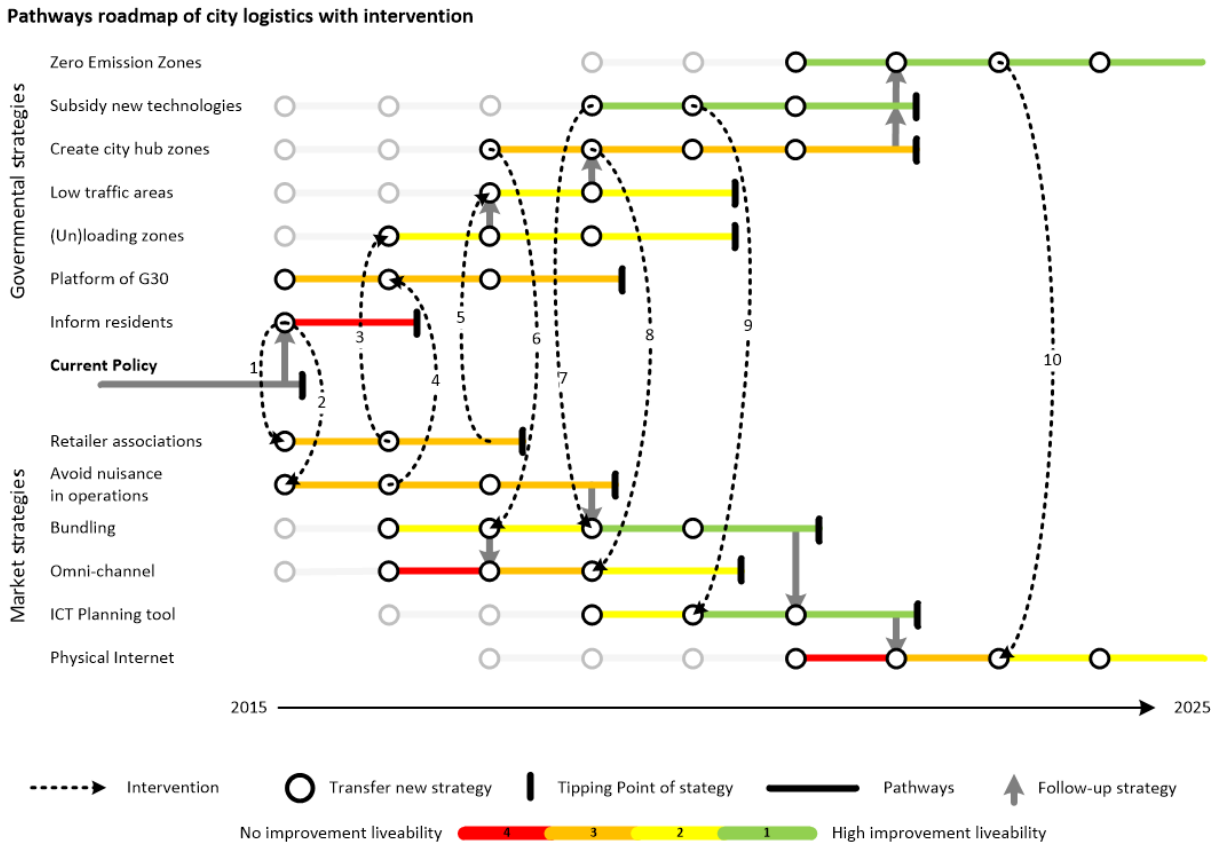



*Figure 29: Strategic Pathways Map with intevention of City Logistcs*

Including these type of actions of the government will make the pathways map more robust. The impact of the strategies of the government are displayed in Figure 29. In this illustration the black dotted arrows represent the mitigating, hedging and seizing power of the municipalities.

Informing the residents is a measure of the municipality that does not contribute to liveability itself, but it is a seizing intervention of the government. Aware residents makes also the retailers more aware, so they will start forming coalition with other shop owners to think about improvements (1). The awareness does also influence carriers and shippers to change their operations and seek for nuisance avoiding processes (2). Both strategies can be accelerated by informing the residents.

If there are retailer associations, governments can profit of the window of opportunity to involve retailers in the load and unloading policy (3). The logistics operators that aim for a reduction of nuisance can participate in decision making of the municipality platform about making policy uniform to reduce nuisance (4). If retailers are united in an association, a co-decision process can be started about assigning low traffic areas. This will help improving the shopping environment (5).

Governments are able to create city hubs for first and last mile logistic purposes. Facilitating city hubs have effect on bundling of freight since it lowers the threshold to do so. In this sense it is a seizing action of the government (6). The function of a city hub is not only bundling, but can also serve as a stock facility or a consumer distribution point. These functions will reduce the number of freight vehicles in the centre since shops needs no longer to be supplied anymore. This is an omni-channel means too and contributes thus to more liveability, so in this case the city hub zone is a mitigating action (8).

Subsidies stimulates logistic parties to invest in green and non-nuisance vehicles. The subsidy strategy has a seizing effect as well and will speed up the contribution of hubs to liveability (7). Subsidy does function as a hedging strategy since it makes it more likely that the ICT planning tool also support green logistics freelancers. The subsidy results in more green vehicles that can be deployed for logistic purposes. Green logistics providers may benefit of an ICT planning tool (9).

*Table 17: Classification of strategies of the municipality*

| NR | TYPE | NR | TYPE |
|---|---|---|---|
| 1 | Seizing strategy | 6 | Seizing strategy |
| 2 | Seizing strategy | 7 | Seizing strategy |
| 3 | Window of opportunity | 8 | Mitigating strategy |
| 4 | Window of opportunity | 9 | Hedging strategy |
| 5 | Window of opportunity | 10 | Hedging strategy |

As mentioned in the basic pathways map, the Physical Internet is an uncertain concept. The planning tool will help to improve the load factor of vehicles, but may result in more and smaller vehicles. Regulating and monitoring the logistics providers is more difficult since private individuals can distribute goods. To prevent that the urban area suffers from Physical Internet, the government is able to make their city a zero emission zone. This strategy can be seen as a hedging strategy because it deals with uncertain vulnerabilities (10).

The strategies of the government that can influence the system are represented by the black arrows. The type of the strategies is summarized in Table 17. All these strategies have consequences for the attitude of stakeholders towards change in city logistics. Figure 29 illustrates that the government can steer the development of the logistics. To make this map more robust than the responsive strategies of the municipality, the context of the scenarios of Chapter 5 can be added. This is done in the following section.

## 7.5 Incorporation of the scenarios in the pathway roadmap

This section seeks for a robust map of pathways that is useable under different societal conditions. In chapter 5 is dealt with four scenarios that investigate the potential future perspectives on city logistics, using two dimensions: market vs governmental initiative and priority of liveability in the city. Both

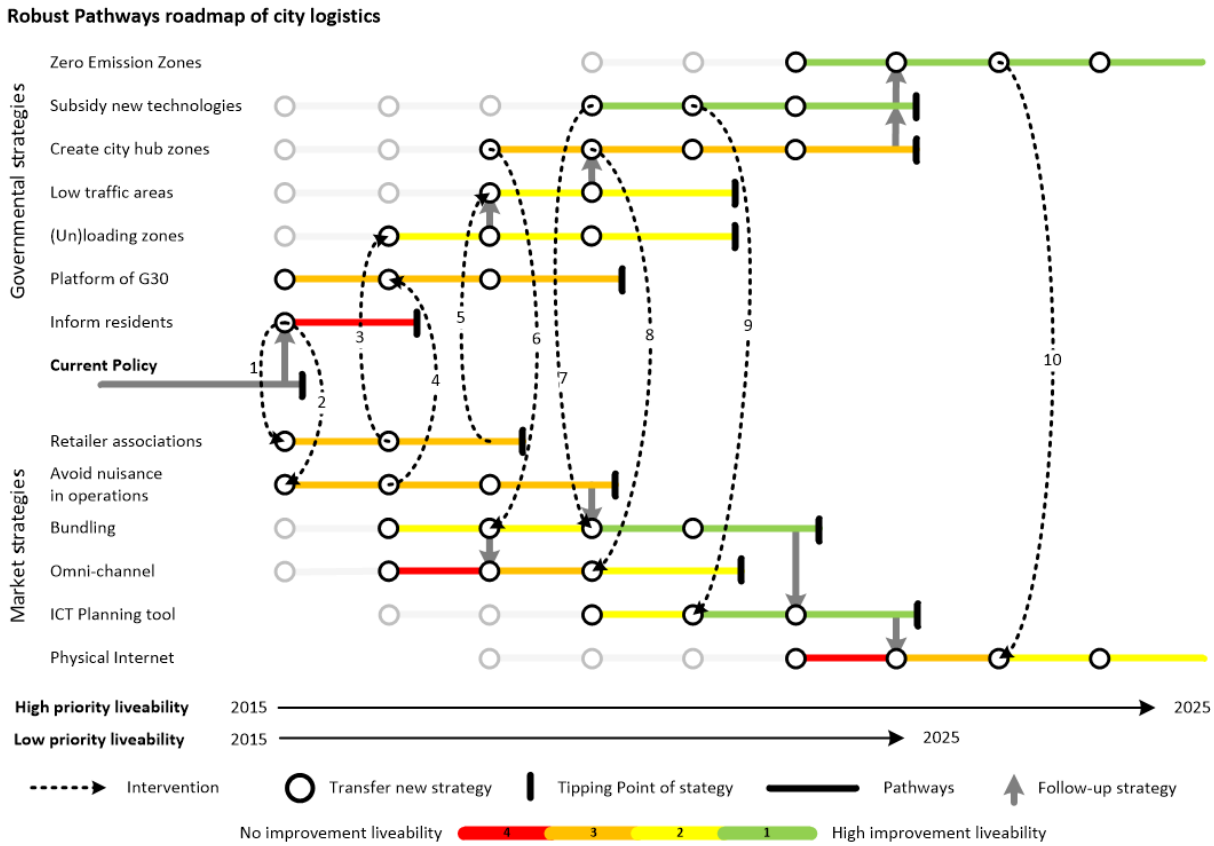



*Figure 30: Robust Strategic Pathways Map of City Logistcs*

dimensions determine the attitude of the stakeholders in different environments. Including the potential dimensions in the roadmap of pathways will provide a map that covers all scenarios.

The inclusion of the priority level of liveability results in the map displayed in Figure 30. The addition of an extra timeline refers to the adequate actions of the stakeholders. The priority of a liveable city centre determines how fast actions will be followed up. If the priority is low, then measures will last longer due to the lower ambitions. The other dimension, market or government lead, helps to determine the pathway strategy. The more the commercial parties are in the lead, the sooner the market strategies will be realized. The government only has to interfere if market strategies neglect the ambitions of the Green Deal ZES. But if the municipality is in the lead, then the seizing strategies can be used to stimulate market parties. The map of Figure 30 is applicable in the four scenarios defined in chapter 5.

## 7.6 Conclusion of dynamic roadmapping

This section is about the conclusions that can be drawn from the Map of Pathway Strategies. The aim is the see how this roadmap can contribute to transform the intentions of the Green Deal ZES into actions. First a brief reflection is provided about the pathways map and second the conclusion answers also the fifth sub-question: *How does the pathway roadmap of city logistics in the Netherlands looks like?* This is done together with the conclusions of the previous chapter about the actions and measurements.

The pathway roadmap contains the required elements the deal with different environments. Either a governmental lead or a market lead, in both circumstances the roadmap can be respected. The two time dimensions for the level of priority of the urban environment make the roadmap more robust. The priority of liveability can change over time due to elections for example. Even though there are different perspectives and priorities, this pathway roadmap can be used.

The strategies in the roadmap are originated from the workshop from Chapter 6. These strategies are only a few of the possible strategies since there are more strategies that are not identified during the workshop or considered in the roadmap. Further research and if time pass by, new strategies and technologies may be discovered that will also contribute to the liveability in the city. Monitoring, evaluating and updating the pathway roadmap will make it a useful tool to communicate for the strategic policymakers.

The end product of making a these roadmaps is to support strategical planners, but this is not the main benefit. Many of the advantages of roadmapping are derived from the roadmapping process, rather than the roadmap itself. The process that brings people together of different responsibilities, sharing information and perspectives, is useful itself (Phaal et al., 2004b, p. 23).

The main benefit of the first map of pathway strategies that is developed is probably the communication that is related with the process, and a shared approach for thinking about strategic planning in the sector. Several iterations may be required before the full benefits of the approach are achieved. Therefore the map should be updated coming years. Reflecting with more and different people of the business can help to create support for the pathways. Then an integrated map of pathway strategies has the potential to drive the strategic planning process.

Now we can answer the sub-question: *How does the pathway roadmap of city logistics for the Netherlands looks like?* The Pathway roadmap structures the pathways by separating governmental actions and the market actions. The colours help to provide a clear insight in how strategies can contribute of threat the targets of the Green Deal ZES. The brief documentation in helps to understand and read the map, so that the map can be a useful communication tool. The map can be improved and expanded coming months to increase the usability. The roadmap will help strategic planners to select a preferred pathway. Recommendation about the action that should be taken are drawn in the next chapter about the conclusion and recommendations.

# 8 CONCLUSIONS AND RECOMMENDATIONS OF THE PATHWAY ROADMAP

This is the chapter about the conclusions and recommendations of the research. In this chapter the findings of all the previous chapters come together. It summarizes the conclusions of the previous chapters and an overall conclusions is drawn. This chapter consists of three sections. It starts with drawing the conclusions, then some recommendations are done, and finally, a reflection of the research is provided.

The conclusion and recommendations help strategic planners to understand the pathway roadmap of city logistics. Strategic planners can use the map to select their preferred pathway. Because this is the first pathway roadmap, the map should be evaluated over time. The evaluating is the feedback loop of the dynamic roadmap approach. The conclusion and recommendation are the final steps in the dynamic roadmap approach and this is illustrated in Figure 31. The conclusions and recommendations answer the final sub-question: What are the strengths and weaknesses of the pathway roadmap? And finally the main research question can be answered: How can the good intentions of the stakeholders of city logistics in the Netherlands be converted to a robust roadmap for the next decade, aiming for an improvement of urban logistics?

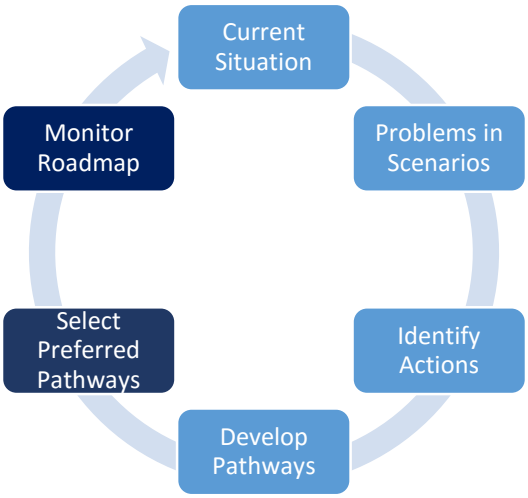



*Figure 31: Conclusion and recommendations in the Dynamic Roadmap framework*

## 8.1 Conclusion of the pathway roadmap

This section is about the conclusions over the research to the roadmap of city logistics. The conclusions drawn are more or less a summary of the findings in the previous chapters of the report. First the new findings are presented and second the section recaps to the research objectives and the related research questions.

### 8.1.1 Main findings of the research

The local governments in the Netherlands experience a problem. The distribution of freight in the cities is an important driver of the economy, but it has negative impacts on the liveability of their cities, which affects the attractiveness of a municipality. However, changing the city logistics is not straightforward. Shippers, carriers, city hubs, retailers, consumers and residents all have different objectives and other concerns. Shippers for example, want to meet the expectations of the consumers. The consumers want same-day delivery, deliveries on Sundays, just-in-time, sustainable and affordable services. The challenge is to increase the logistic operations with less vehicle movements and to decrease emissions.

Despite the Green Deal Zero Emission Stadslogistiek, people from different parts of the business avoid taking appropriate action. The conclusions of the interviews with experts consist essentially of the gap

between intentions and appropriate actions. This problem is confirmed by the participants of the workshop.

Mapping the stakeholders helps to get insight in the attitude and perspectives of the involved players in city logistics. The conflicting stakes and interests lead to difficulties to improve the logistics in urban areas. The developed pathway roadmap can help strategic planners to make decisions in order to follow a preferred pathway. Including context scenario during the roadmapping process helps to make a roadmap robust, since scenarios deal with risk and uncertainties.

This research presents the first roadmap for city logistics. The main benefit of the first roadmap is the communication that is related with the roadmapping process, and a shared approach of thinking about strategic planning in the sector. Several iterations may be required before the full benefits of the approach are achieved. Therefore the map should be updated continuously. Reflecting on more and different people of the business can help to create support for the pathways. Only then has an integrated map of pathway strategies the potential to drive the strategic planning process.

Relating the strategies in the roadmap to the cost and effort to realize them, helps to clarify the easy steps and quick wins. Starting with the easy achievable actions will have the effect that the process of change in the city logistic sector begins. In the meanwhile the more complex strategies can be prepared and new innovations can be included in the map by the strategic planners. The complex strategies have a significant impact on the goals of a liveable city. Ambitious strategies will make the Dutch cities attractive again.

### 8.1.2 Recap on the research objective and questions

The objective is to deliver a robust roadmap for the coming decade in order to break through the cautious attitude of the stakeholders. The roadmap should support strategic planners of city logistics to activate stakeholders, regardless of circumstances. To meet this objective the following research question was formulated to seek for such pathway roadmap.

---

*How can the good intentions of the stakeholders of city logistics in the Netherlands be converted to a robust roadmap for the next decade, aiming for an improvement of urban logistics?*

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In order to give a well-substantiated answer to this research question, six sub-questions are defined. Over the different chapters, these sub-questions were answered. The conclusions of these sub-questions are described below. For a more detailed justification of the questions, the corresponding chapter can be read. Below, the sub-questions are listed again.

1. What is the underlying problem of the lack of actions for improving the city logistics?
2. How can a dynamic roadmap be developed?
3. Which elements of city logistics are relevant for mapping pathways?
4. How can future alternatives help to make the pathway roadmaps more robust?
5. How does the pathway roadmap of city logistics in the Netherlands looks like?
6. What are the strengths and weaknesses of the pathway roadmap?

*1. What is the underlying problem of the lack of actions for improving the city logistics?*

Interviews with experts expose the main problem in city logistics in the Netherlands. In the Netherlands there is a gap between the intentions of making Dutch cities more liveable (stated in the Green Deal ZES) and the actual actions. In the Green Deal only the ambitions are recorded, and not the process to achieve this. Due to a lack of targets in the covenant Green Deal ZES, stakeholders cannot be judged on their behaviour. Since the process is missing, stakeholders experience little responsibility to take action.

*2. How can a dynamic roadmap be developed?*

The aim of this question is to explore the opportunities of designing a pathway roadmap that suits for urban logistics in the Netherlands. Ambitions and means are already identified for city logistics, but the

alignment and responsibilities of stakeholders are not clear. An approach based on the Dynamic Adaptive Policy Pathway is chosen to provide a robust map of pathway strategies. The approach in this research is a cycle consisting of 6 clear steps: set current situation, identify problems, generating ideas for new actions, develop robust pathways, select a preferred pathway and monitoring the progress to improve the city logistics. Going through these six steps will result in a roadmap that deals with risk and uncertainty.

*3. Which elements of city logistics are relevant for mapping pathways?*

The stakeholders that are concerned in this research are shippers, carriers, retailers, city hubs and municipalities. Customers and residents are not in the scope since the focus is on the corporate freight market. However, indirectly the municipalities represent the interest of the residents and the retailers represent the needs of customers. The municipalities have the most power and interest in changing the city logistics. Two important elements that have impact on city logistics but are barely to influence by the stakeholders are the societal priority of liveability and the attitude towards change of the stakeholders. A detailed study of the relation between the system's elements is not relevant for this research. However, for new action strategies it can be interesting to analyse how the elements can impact the criteria.

*4. How can future alternatives help to make the pathway roadmaps more robust?*

The use context scenarios until 2025 helps to make the pathway roadmap robust. In the Netherlands, mainly prognoses are done on the logistic challenges in the future. However, it turns out that context scenarios can function as a tool to help strategic planners emphasize with plausible logistic complications in the future. Already anticipating on potential setbacks and including scenarios in the pathway roadmap makes the map widely applicable.

*5. What does the pathway roadmap of city logistics in the Netherlands look like?*

The problems and actions identified in the workshop are translated into tactics and strategies that can be used in the pathway roadmap. Involving people from the business in developing pathways contribute to the acceptance of the roadmap. Also the different perspectives of the involved people is of added value since it provides new insights for the roadmap. The pathway roadmap design includes a graphical representation that can be used for strategic planners in communication and for selecting preferred pathways. The pathway roadmap for city logistics is illustrated in Figure 30. In the pathway roadmap the impacts of the strategies on the liveability is displayed. Also the interfering actions of the local government are shown. This enables strategic planners to interfere in the process if needed. The main goal of these roadmaps is to support strategical planners, but this is not the only benefit. Many of the advantages of roadmapping are derived from the roadmapping process, rather than the roadmap itself. The process that brings people together of different responsibilities, sharing information and perspectives, is useful by itself.

*6. What are the strengths and weaknesses of the pathway roadmap?*

The goal of making these roadmaps is to support strategical planners, but this is not the only benefit. Many of the advantages of roadmapping are derived from the roadmapping process, rather than the roadmap itself. The process that brings people together of different responsibilities, sharing information and perspectives, is useful by itself. The pathway roadmap in this research is just the first roadmap. This pathway roadmap only displays a few strategies to improve the liveability. In order to include more strategies and to increase the acceptance of the pathway map, more stakeholders can be involved in the roadmapping process.

*How can the good intentions of the stakeholders of city logistics in the Netherlands be converted to a robust roadmap for the next decade, aiming for an improvement of urban logistics?*

The six sub-questions are answered and explained briefly. The conclusions of each chapter lead to the answer of the main research question. Developing a pathway roadmap is a good preliminary step for converting ambitions of the Green Deal ZES into achievable strategies. The strategic planners of the city logistic sector in the Netherlands can use the pathway roadmap for communication purposes and for decision-making concerning which pathway the strategy should follow.

There is a lack of authority in changing the city logistics. The policy pathway roadmap shows that municipalities are able to influence the process and can take measures to stimulate or trigger market

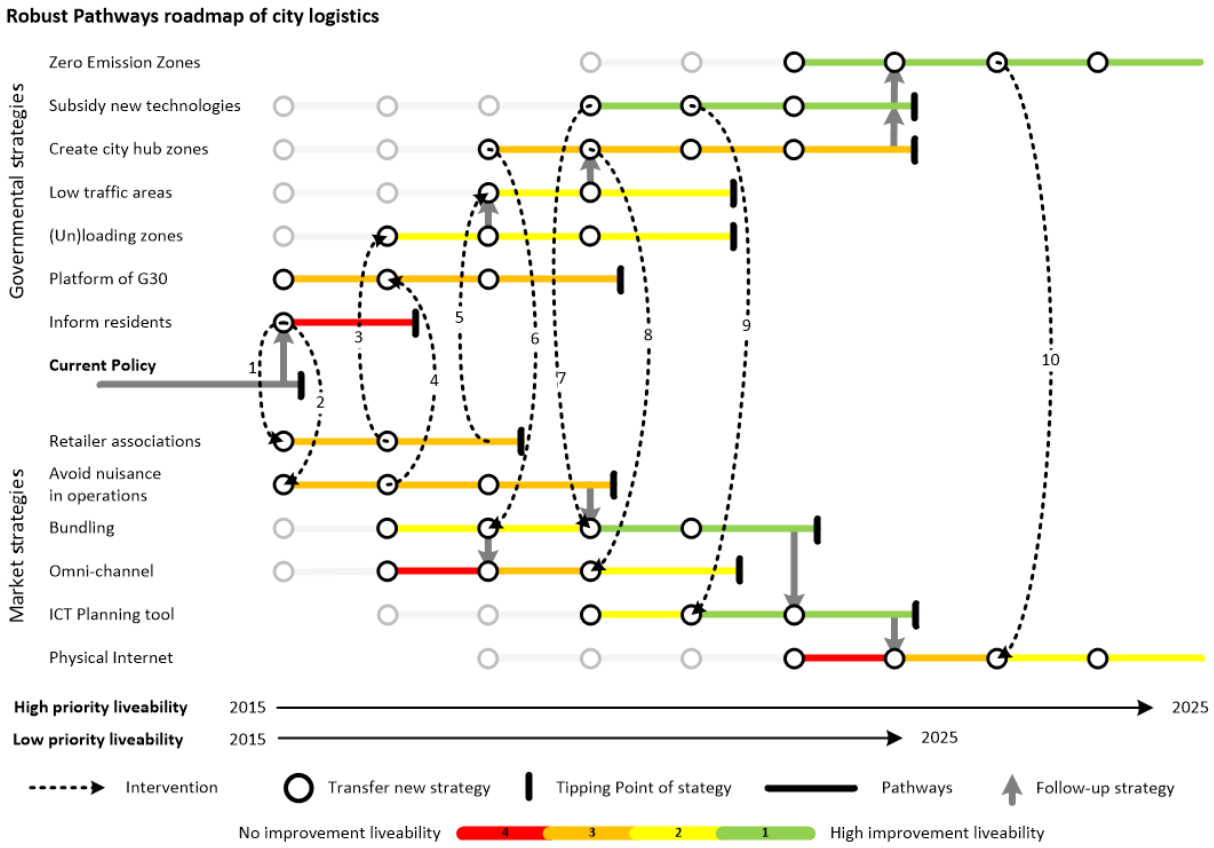



*Figure 30: Robust Strategic Pathways Map of City Logistcs*

parties to take action. The government should cooperate with the commercial parties in developing new technologies, setting rules and restrictions and start to make the consumer conscious about the impact of logistics on the urban living environment. The market parties on their turn can start with cooperation in the logistic chain. Aligning processes can reduce the negative impacts on the liveability. The market parties should also implement new initiatives that lead to more liveability.

### *The research objective*

The research question is answered. This part reflects whether the research contributed to the research objective. This is the research objective:

> *"The goal of this research is to provide stakeholders a pathway roadmap for city logistics in the Netherlands using future scenarios. With this roadmap the stakeholders can anticipate on what to do or not to do in the coming years, depending on actions of other stakeholders"*

The stakeholders can use the pathway roadmap for developing a strategy for the coming years. Especially strategic planners benefit from the pathway roadmap since it can be used as a tool for communication and determining the strategy. The process of the development of this pathway roadmap brings people together with different responsibilities, requires them to share information and perspectives, which is useful in itself.

The roadmap contains the four context scenarios 'Conscious Entrepreneurship', 'Pragmatic Governance', 'Shop Vacancy' and 'Resilience of Logistics'. Therefore the pathway roadmap is able to provide strategies for different future scenarios. This makes the roadmap robust and allows planners to choose their own preferred pathway. From this, it is concluded that the research objective is met. However, to validate the usefulness of the pathway roadmap, the map should be evaluated and reflected by using the roadmap in about three years, since the impact of the cooperating strategies can be

measured. Monitoring and improving this first roadmap can make this dynamic roadmap more useful for strategic planners.

## 8.2 Recommendations

This section is about the recommendations resulting from this research. The section is subdivided in two sections: first the recommended actions for the city logistic sector are presented and the second part discusses the scientific relevance and recommendations for further research.

### 8.2.1 Recommendation for the city logistic sector

*Start with the quick wins*

The pathway roadmap helps to discover the easy achievable strategies and the quick wins. A quick win for the municipality is informing the residents to make them aware of the adverse consequences of freight distribution. Quick wins for market parties is to start with avoiding nuisance in operations and for retailers to unite in associations. The retailer associations can start on a small scale by aligning the needs of a shopping street in terms of delivery moments and combining waste collection.

*Start with a city logistic platform for municipalities*

Alignment of rules and regulations makes it clear for logistics operators what the ambitions and expectations are in the Netherlands. Uniform rules help in efficient planning. Successful innovations and results of living labs in other cities can be adopted in other cities. Cooperation between cities will not only make a city more attractive, but also the Netherlands as a whole.

*Support disruptive innovations*

The market strategies and initiatives should be supported by the government. Disruptive innovations in the logistic business should be supported and facilitate by the government. Although some initiatives like ‘Physical Internet’ and ‘Drones delivery’ may cause negative effects, these developments have to be encouraged. Municipalities can anticipate on these kind of innovations and intervene with appropriate hedging and mitigating actions.

*Push through bundling of goods*

Bundling of goods seems to be a proper change of the current business, combined with city hubs it can reduce the number of vehicle movements in the centre. This strategy is relatively easy to achieve with limited resources. It is also a widely supported strategy by the stakeholders. Retailer associations and shippers can start cooperation with local hubs. The government can facilitate by assigning areas for such hubs and assist in the cooperation between city hub providers and the other logistics providers.

*Seek for zero emission zones*

The ultimate goal of the Green Deal ZES is to achieve zero emission zones in cities. In order to achieve zero emission, the following actions have to take first: create awareness among the consumers, develop and support new technologies, and assist with rules and regulations. It seems that most stakeholders comply with the ambitions of the municipalities and central government. It turns out that the most retarding factor of change in the city logistic sector is the ambition level. If governments are more ambitious, it appears that market parties also become more ambitious.

*Improve the pathway roadmap for city logistics*

The final recommendation is to improve the pathway roadmap. It is the first roadmap that is developed for city logistics, but it is likely to have the potential to be a useful tool for strategic planning and communication. This preliminary roadmap can be improved by involving more parties. Several iterations are needed before the full benefits of the approach are achieved. One neutral authority should be responsible for the improvement of the pathway roadmap. This authority can also ensure that the pathway roadmap is respected and complied. This authority can be the top sector transport policy (in Dutch: Topsector Logisitiek). They can also use the pathway roadmap for allocating budgets for research and innovative initiatives.

### 8.2.2 Scientific relevance and further research

*Design dedicated stakeholder’s action in a roadmap*

The development of the pathway roadmap shows the interdependencies of the stakeholders and the power of the government to interfere in the process. However, the pathway map does not explicitly show

the involved stakeholders nor an action or strategy. Nonetheless it is interesting to have an overview of the responsibilities of the stakeholders in the map. Strategic planners can reminded the responsible stakeholders that targets are not met and can take steps against them. Designing pathways specific for one stakeholder can give new insights and can also be helpful for strategic planners. Take actions of each stakeholder to pieces can help to clarify to the stakeholder in question which expectations there exist. It makes clear when a stakeholder are considered to take action

*Inclusion of uncertainty and triggers*

The pathway roadmap is developed by using scenarios to make the map robust. The scenarios are only elaborated briefly in this roadmap. A substantiated plan for including futures in the pathway mapping can provide a framework that can be generalised. A new framework, possibly based on the Dynamic Adaptive Policy Pathways, gives strategic planners of other sectors the chance to map strategic pathways for their purposes. The pathway roadmap did not deal with signposts and triggers. Signposts specify information that should be tracked and monitored in order to determine whether the plan is meeting the targets for success. In addition, critical values of signpost variables (triggers) beyond which additional actions are needed to be implemented should be specified.

*Reflect on roadmap by using a system diagram*

A detailed system analysis, for example of Anand et al. (2014) in the city logistic case, can help to investigate whether new strategies meet the targets. Besides, such ontology determines the impact of strategies on other targets. Trade-offs between stakeholders' objectives can be taken into account by the users of the pathway roadmap. A detailed system analysis can help to validate a pathway roadmap and can display trade-offs.

*Applicability of pathway roadmapping on a large scale*

This research shows the potential of roadmapping on a local scale. Pathway roadmaps can be used for comparable policy issues. The value for large scale policy problems however, is not proven. More research needs to done in order to assess whether pathway roadmapping is applicable on European or even global scale.

## 8.3 Limitations

All research studies deal with limitations and need to be put in perspective. This section deals with the limitations of the pathway roadmap for city logistics in the Netherlands. The following limitations can be addressed:

1. The scenarios used in the workshop to deal with uncertainty in the roadmap are developed in prior of the workshop. Developing the context scenarios in the workshop will result in a more accepted scenario description and reflects multiple perspectives.
2. The problems and actions are generated by a select group of participants. More participants that help design the pathways of a sector will increase the acceptance of the final pathway roadmap. Also, all types of stakeholders should be included.
3. The roadmapping workshop did not deal with some key variables for the pathway roadmap. The sell-by dates are not handled and did not cover the contribution of action to a liveable environment.
4. This research deals with five main stakeholders: shippers, carriers, retailers, city hubs and municipalities. Consumers and residents are not considered explicitly since the consumers are represented by the retailers and the residents are represented by the municipalities. Including these two stakeholder groups will provide new insight of these two stakeholder groups since the can influence the sector as well. Also a group of 'senders' can be considered.
5. The validation of the roadmap is not done after the workshop. A big part of the pathway design is done by the interpretation of the researcher. It means that the pathways are designed from the researcher's perspective and are therefore potentially biased. The validation can be improved by involving the strategic planners in the design process of the pathway roadmap.
6. The pathway roadmap is the first robust roadmap for city logistics in the Netherlands. Since it is a preliminary roadmap it may contain some teething troubles. Also, more strategies and actions can be included.

Despite of the limitations of this research, the first pathway roadmap can be useful for strategic planners. The process of making this roadmap is brought together people of different responsibilities, sharing information and perspectives. The city logistic pathway roadmap can function as a good starting point for selecting the preferred pathway for strategic planners.

## 8.4 Generalizability

The generalizability deals with the potential to use pathway roadmaps in other sectors. The advantages for other businesses are elaborated and nuances are provided.

Dynamic roadmapping, and in this case pathway roadmaps, have lots of potential for other businesses. The main contribution of developing roadmaps is the roadmapping process, rather than a pathway roadmap itself. Next to studies about ontologies and stakeholder analysis, a pathway roadmap can help to frame the problem field. Almost in all the policy top sectors in the Netherlands can benefit from pathway roadmapping. Challenging policy issues that concern many stakeholders and affect lots of people can use pathway maps, for example for implementing smart cities, the energy transition, and the water management. In these policy issues context scenarios are key to deal with future challenges. The pathway mapping can help to coordinate and interfere in the change management process.

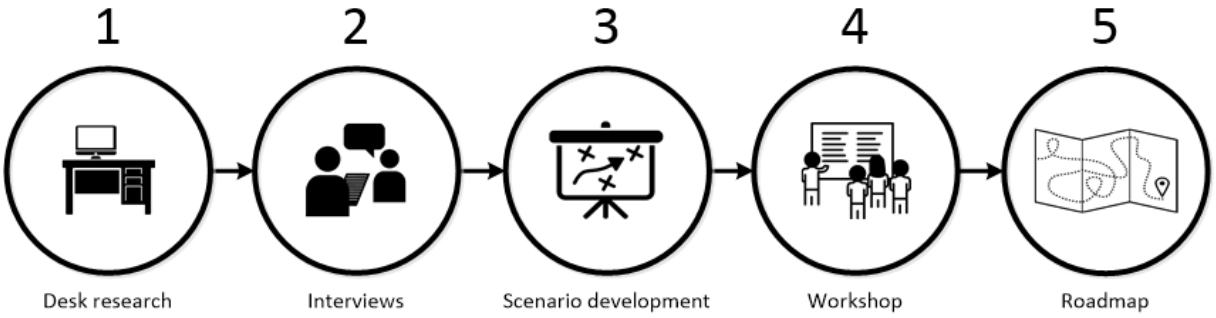
This research has shown the potential of roadmapping on a local scale, but it also shows potential to be used on a large scale. More research needs to done in order to assess whether it is applicable on European or even global scale.

# 9 REFLECTION

This extra chapter reflects on the quality and process of this research. Evaluating the process steps helps to expose improvements for comparable researches. First the process of the research is evaluated, and secondly the scientific embedment is evaluated.

## 9.1 Reflection on the process

The first part of the reflection is done by evaluating the methodologies that are chosen for this research. Each of the methodologies is evaluated and checked on its contribution for developing dynamic roadmaps. The five different methodologies are displayed again in Figure 8.

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The literature review is done in an early stage. It is used to describe the background information of city logistics and provides insights for the stakeholder and system analysis. New studies to improve the logistics in urban areas appear regularly. The new studies can be used to develop new tactics and strategies that can be processed in the iterative process of the pathway roadmap.

The interview are done with eminent professionals of urban logistics. Involving these eminent persons will make the roadmap more supported and relevant since authorities approved the strategic planning. The role of the interviewed experts may be more significant if they would be involved in the processing of the adaptation pathways.

The quality of the development of scenarios is limited. The eminent persons provided feedback on the novice scenarios, but due to the iterative process, the usefulness of the input is moderate. Scenarios should be developed in a workshop setting. Then all the stakeholders involved can give input on the scenarios, so that the scenarios have a higher acceptance.

The workshop can be improved in multiple ways. First more participants from different parts of the business should participate to get more different perspectives. Now the workshop had a lack of representatives of governments, suppliers and retailers. Second, the duration of the workshop should have been longer. More time for a workshop makes it possible to deal with scenarios and the strategies can be elaborated more. Also the time for the can be extended. More time might have resulted to more interesting insights.

Finally, the strategies in the pathway roadmap are roughly bundled from the researcher's perspective. A more critical review and assessment, by involving more stakeholders, may lead to other actions. Due to a lack of time and money this preliminary roadmap is not reviewed by other parties. An extra review assessment will increase the validation and acceptance of the pathway roadmap.

## 9.2 Scientific Reflection

In the development of the roadmap, the uncertainty and risk are not explicitly taken into account. Although Ilevbare et al. (2014) recommended to embed risk management procedures during roadmapping. They call this 'risk-aware roadmapping'.

The pathway roadmap of city logistics lacks of good validation. Since many phases of the development of the roadmap are based on assumptions and researcher's perspectives, the deliverable is biased. To increase the validation, people of the business should be involved more often. A higher involvement will improve the likeliness that the roadmap is being respected. Also a validation of the sub-deliverables of the research can help to get a better founded dynamic roadmap. Involving experts in the system diagram design, a workshop session for designing context scenarios, and a workshop concerning the development of the adaption pathways will improve the validation.

The Dynamic Adaptive Policy Pathway framework is used for this research. The steps in that framework elaborate in detail on the type of actions and their impacts. This is a quantitative approach, so it can be monitored and measured. The pathway roadmap is harder to monitor since it is not based on quantitative data. The so called signpost are harder to define. Informed consent of the strategic planners and the business may overcome the lack of numerical data.

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# Appendices

# APPENDIX A: MEANS-END DIAGRAM MUNICIPALITY

This appendix elaborates on the means and ends of the municipality concerning city logistics. The findings are illustrated in a means-end diagram. This diagram shows the trade-offs a municipality should make to meet their objectives. Figure 33 illustrates the objectives of the local governments. Figure 32 elaborates some more on the objectives concerning the logistic efficiency.

Generally, the diagrams can be read as follows: the higher the goal is presented, the more fundamental the goal is. By asking the following question the diagram is made. The question 'why?' should be asked to find the fundamental motivation of doing something. The question 'how?' defines the means of enabling the goals. In the orange boxes are defined the units of the means. The specification is done because it shows how to increase or decrease the means (Enserink et al., 2010).

The main interest of the local government is to make the city more attractive. This is done by reducing the environmental impact, reducing congestion, improving townscape, ensuring economic activities, and improving safety. These sub-goals corresponds to the objectives formulated in chapter 3: optimal use of existing infrastructures (improve logistics), low cost measures (limit taxes), improve urban environment, citizen's quality of life (multiple sub-goals), positive business climate (ensure economic


*Figure 33: Objective tree local government*

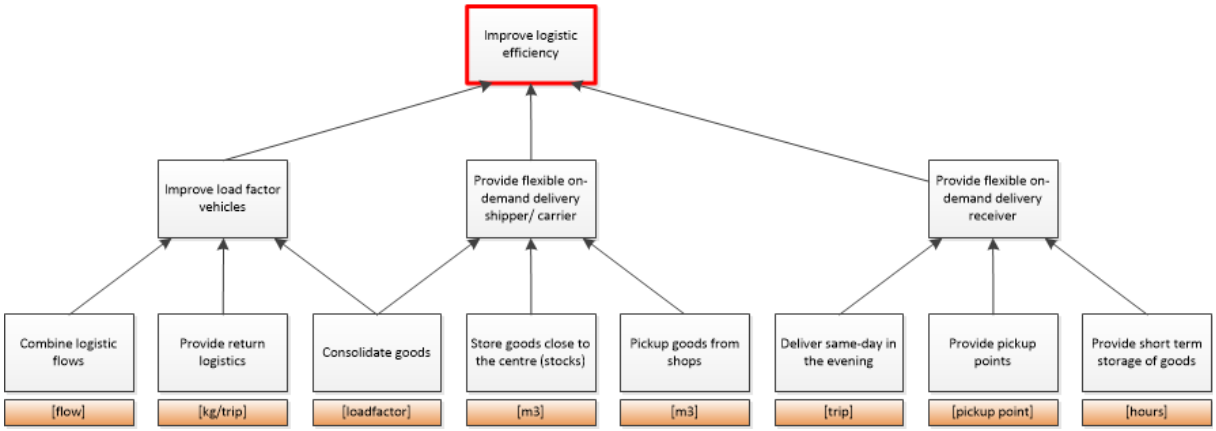


*Figure 32: Objective tree local government, concerning logistic efficiency*

activities), and accessibility (improve logistics). Since the research is about logistics in the city centre, the means-end diagram is elaborated more on the aim of improving logistic efficiency. The red lined rectangles are corresponding in both illustrations.

The means-end diagram in Figure 32 concerns the objectives to improve city logistics. The sub-goals that are displayed can be seen as measures to improve the logistics. These improvements together contributes to the main objective of an attractive city.

These two means-end diagrams of the municipalities gives understanding to the trade-offs in urban logistics. The fundamental goal of municipalities is to improve the attractiveness of the city. Asking the question what an attractive city is, it results in a limit environmental impact, less congestion and so on. As stated in Chapter 1 the local governments perceive hinder in their centres caused partly by the logistic sector, since they contribute to the congestions and emit greenhouse gasses and particulates. The municipalities that have signed the covenant Green Deal ZES are aiming for a more sustainable logistics in their cities in order to improve the attractiveness of the city. To summarize, criteria concern always trade-offs between more objectives. In transport policy the following trade-offs are distinguished for local governments:

- Economy: accessibility and reliability
- Environment: emissions, particulates and $CO_2$
- Social aspects: transport poverty
- Safety: accidents

The objectives of the stakeholders are the criteria for the system diagram. Means on their turn can help to meet one or more objectives of the local authorities. Identifying these means will help understand how the objectives can be influenced.

# APPENDIX B: MINUTES OF THE INTERVIEWS (DUTCH)

This appendix contains the minutes of the interviews. The interviews were held in a preliminary stage of the research in order to design scenarios and to analyse the problem. The minutes of the interviews contain the perception of the researcher of the conversation. In Table 18 is made an overview of the experts that were interviewed. The order of the minutes corresponds to the order of the table. The minutes are in Dutch since the interviews were done in Dutch.

*Table 18: Overview of interviewed experts*

| NAME | COMPANY | STAKEHOLDER TYPE | INTERVIEW DATE |
|---|---|---|---|
| Bram Coremans | Municipality of Delft | Researcher | 18-08-2015 |
| Birgit Hendriks | Binnenstadservice | Logistic City Hub | 28-05-2015 |
| Walther Ploos van Amstel | Amsterdam University of Applied Sciences | Researcher | 11-08-2015 |
| Hans Quak | TNO | Researcher | 14-08-2015 |
| Peter Tjalma | TransMission | Carrier | 10-08-2015 |

## B.1 Interview Bram Coremans, Advisor of Municipality of Delft

18 August 2015

Minder en duurzamer. Stadslogistiek noemen we zo omdat logistiek twee richtingen op is. Voor ons als gemeente is het t hele reilen en zeilen in de binnenstad. We bekijken dat alleen in de binnenstad en niet buitengebieden. Je hebt personen en goederenvervoer. Niet alleen B-B, maar ook B-C.

Minder, schoon en dan duurzaam. Concreter: minder, schoner en daar waar het t beste kan. De meeste winst zit daar waar er geen voertuig in de stad zit. Verminderen is de sterkste aanpak, verschonen is een zwakker middel, omdat het aantal voertuigen niet afneemt. Strategie: weren van verkeer. Doelstelling van bestuur gemeente Delft: minder, schoner en duurzamer. Coalitieakkoord heet Delft Verdient het. Daar staat de doelstelling voor de logistiek in de stad.

PostNL heeft een database gekregen van 50 bedrijven die hebben aangegeven mee te willen werken met efficiëntere distributie. Maar als het puntje bij paaltje komt, staan deze bedrijven niet te springen. Streven was door via marktwerking de distributie te veranderen. Nu de markt het niet oppakt, moet de gemeente maatregelen nemen om het vervoer aan te passen. Op dit moment niet voldoende natuurlijke prikkels om te veranderen.

Eerst huidige besluiten beoordelen, daarin staan al veel maatregelen. Kijken wat voor consequenties hebben deze op de huidige vervoersbewegingen. Als er overal duidelijke borden staan, dan kan je gaan handhaven. Daarna bestaande regels aanvullen of volledig maken. Tussen nu en een half jaar zullen we een besluit nemen over nieuwe regels. Gemeenten hebben twee middelen: regels en ontheffingen. Reguleren mag nooit leiden tot frustratie, er moet altijd een transitie periode zijn. Ontheffingen zijn tijdelijk, dan heeft men toegang. Deze zijn tweeledig:

- Toegang
- Afspraken maken, alleen wanneer transitie dan wordt deze gegeven.

Dit zou een maatwerk model kunnen worden. Er zijn volop oplossingen, maar men is vastgeroest in routines.

## B.2 Interview Walther Ploos van Amstel, Lector City Logistics at Amsterdam University of Applied Sciences

11 August 2015

Wat zijn volgens u de scoringscriteria voor de stadslogistiek?

Hoe kom ik aan criteria: kijken naar initiatieven waarom ze niet lukken. 5 redenen:

1. Er wordt gekeken naar de verkeerde stromen: winkels, gaat al efficiënt. Vooral fashion (60%), wordt al gedaan door vier vervoerders, meerdere zendingen een stad in.
2. Klant wordt er niet beter op
3. Het mag niet duurder worden. 10% van een pakketje kan nog, meer niet anders vallen webshops in elkaar. In bouwverkeer kan ook niet duurder worden, bouwlogistiek 20-25% van je huis, wordt bouwen heel duur.
4. Er is geen solide business model
5. Lokale wethouders en ambtenaren zijn wispelturig. Flooting depot gaat over ca 15 jaar, politieke termijnen slechts 4 jaar. Denk aan laadinfrastructuur voor EV's, ook langer termijn.

Aandeel vrachtwagens neemt af, maar het aandeel vans neemt toe.

Winkelstraten zijn gemengd met horeca. Gros van de busjes komen om de horeca te bevoorraden. Onderzoek Haarlemmerbuurt. Nieuwedijk gaat om 12.00 uur open en sluit om vijf uur, dus maar 5 uur open. Huurprijs van de straten is het laagste in heel Europa in vergelijking met andere hoofdsteden, we scoren matig op het investeringsklimaat, omdat verhuurders minder geld kunnen vragen.

Misverstand: iedereen denkt dat we de hele dag in de file staan, dat valt allemaal mee. Ruimte is verkeerd verdeeld in Amsterdam. Fietsers hebben veel ruimte, maar de fietsersbond is machtig. Verkeer is afgesloten voor nieuwmarkt en negen straatjes. Maakt straten en pleinen geweldig aantrekkelijk, ook een voorbeeld in Maastricht. Waarde van een huis wordt ook grotendeels bepaald door de luchtkwaliteit in de straat, dus belangrijk voor zowel gemeenten als bewoners.

Stedelijke distributie moet goedkoper worden, ieder concept dat je ontwikkelt moet goedkoper. Dit is mogelijk, voorbeeld met Canon over papier en toiletpapier. Voorraad dicht bij de stad. Gemiddelde zending de stad in

Gros van de vervoersbewegingen is eigen vervoer, 80%. Eigen vervoer rijdt maar 40 kilometer. Groothandel is al een soort hub. Er gaat veel van buiten de stad naar binnen, ca 30%. Ook 30% binnen de stad, broodjes zaak die een levering doet.

Klant staat aan het stuur van de logistieke keten, die bepaalt hoe het proces er uit ziet. Hoog service-level. Distributie aangepast aan de markt: seniorenzorg bijvoorbeeld. Ook de aflevering moet bezig, 40% van de eerste aflevering komt niet aan, andere klantbehoeften. Service-level is just in time en heel betrouwbaar.

Er kan gedifferentieerd worden in service niveau, afhankelijk hoeveel een klant wilt betalen.

Klant wil een vaste lever afspraak, het maakt geen verschil tussen 4 uur en 2 dagen, je moet dynamisch plannen. Webwinkels kunnen niet bepalen wanneer ze aan de deur staan, de klant die bepaalt dat. Ook Horeca wil precieze afspraken wanneer fusten worden geleverd. Tijdsvensters zijn hierin belangrijk.

Klanten die een duur product kopen, bijvoorbeeld CoolBlue of Nike, dan willen ze een hoog servicelevel, dan is er marge voor transport.

Shopping 2020 rapport, over marktdifferentiatie. 4 soorten klanten: Gepassioneerde klant (Apple, Nike), de gemak klanten (Bol.com) en relatie- en keuze klanten (Bijenkorf), koopjes jagers waar je niet veel service aan wil verlenen.

Aannemer heeft andere eisen dan ouderenthuis en ijscozaak.

Keten moet van kop tot staart kloppen: dus zowel de first-mile als de last-mile meenemen. Alle concepten worden bedacht vanaf de rond van de stad. Er komt een ontkoppeling van slow mobility, platoons LZV AH.nl, op rustige momenten wanneer het hun uitkomt. Daarna met kleine busje de stad in. Stedelijke Ontkoppel Punten. Iemand rijdt naar het ontkoppelpunt, iemand bemant het ontkoppelpunt en iemand verzorgt de last-mile.

Ondernemers snappen niet van hoeveel ze moeten betalen voor bezorging. Ze betalen de shipper voor de goederen, die regelt ook het transport.

OV-chipkaart voor transport. Nu zijn er hele hoge transactiekosten voor het transport, je kan niet even een pakje afgeven bij een SDC. Dan moeten er facturen worden aangemaakt en worden verwerkt. Hoge coördinatielast. Techniek is dusdanig dat je met een tankkaart binnenkort moet kunnen betalen. Schaalgrote is ook niet heel hoog, 50.000-100.000 zendingen per jaar.

Nieuwe initiatieven die succesvol zijn, focussen vooral op minimale transactiekosten. Denk aan Booking.com en UberCargo. Ook slimme trucjes als een sms 3 minuten van tevoren zorgen voor een sneller proces. Verdienmodellen vaak niet goed doordacht.

Overheid wordt lokaal gekozen, dus lokale regelgeving. Venstertijden zijn flauwe kul, nog geen 1/100 adressen heeft venstertijden. Er moet centrale coördinatie komen voor bijvoorbeeld wegonderbrekingen, met open data kan er een hoop transport efficiënter geregeld worden. Al die verschillende steden hebben een eigen verkeersinformatie systeem.

Horecaondernemers balen van vrachtwagens die voor hun terras staan met ronkende motoren om de koeltruck koud te houden. Dit gaat ten koste van de klandizie. Autovrije pleinen komen ten goede aan de waardering.

Luchtkwaliteit is niet echt een issue, fijnstof is geen gemiddeld probleem, maar een lokaal tijdelijk probleem. Met metingen kunnen verkeersinformatiesystemen verkeer omleiden van bepaalde straten. Met pleisters te werk gaan.

CO2 wordt wel belangrijk, wel 35% van de uitstoot vindt plaats in de stad. Belangrijker nog is het geluid.

Er zijn geen grenswaarden, geen harde problemen. Maar door meten kan het lokaal opgelost worden.

Ondernemers hebben steeds meer macht. Ondernemersverenigingen kunnen verplichten mee te betalen aan kerstverlichting. Fiscus int hiervoor geld. Dus besturen van ondernemersverenigingen kunnen maatregelen nemen en die opleggen aan de verplichte leden van de winkelstraat.

Overheden zijn aan zet! Als ze willen ingrijpen dan moeten ze milieuzones instellen. Maar vrachtverkeer wordt steeds schoner, bijna niemand rijdt meer met lager dan EURO5.

Doorstroming is ook een probleem. Dit kan worden opgelost worden door handhaving. Er wordt niet gehandhaafd, dus iedereen kan hun gang gaan. Bouwverkeer krijgen vergunning per 3 maanden, dus die laten hun voertuigen ook in de weg staan, kan ook in een garage.

Laad en losplekken moeten virtueel worden gemaakt, dit doen ze al bij de Doelenstraat. Met lampjes wordt er aangegeven waar je kan laden en lossen. Hierdoor kan je ook privileges geven, bijvoorbeeld vrachtwagens die niet zuinig zijn geen plek toe te wijzen. Winkelstraten beleven hun hoogtijden op vrijdag zaterdag en zondag, dus dan voornamelijk maandag-woensdag laad-en losdagen. Venstertijden zijn hier een goed middel om mee te sturen. In weekenden dus maximaal tot 9.00 uur bevoorraden.

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*“Ik heb geen medelijden met een logistiek dienstverlener zolang ze met gemiddeld 1,8 zendingen de stad in rijden”. – Walther Ploos van Amstel, 2015*

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Feedback op de criteria:

- Kosten van transport: van de hele keten. Van V&D magazijn tot aan de winkel. Winkels en horeca zijn nooit de baas, altijd de verladers!
- Betrouwbaarheid is het belangrijkste!
- Luchtkwaliteit herdefiniëren naar CO2. In de stad heb je meer fijnstof van rokers dan van verkeer.
- Aantal vervoersbewegingen → ruimte in de stad. Minder ruimte voor vervoer in de stad.
- Service level
- Transactiekosten
- Juridische aspect: aansprakelijkheid: verzendingen kwijtraken. Enige die iets kan verzekeren is de eigenaar van de vervoerder. Dus als producten worden overgedragen, dan vervalt de aansprakelijkheid. Eigenlijk een randvoorwaarde, verzekeraars zeggen dat het niet mag.
- Kosten van transport moet gerelativeerd worden, margerijke producten maakt de kosten van transport niet uit.

Parkeergeld: hoe hoger het parkeergeld, hoe beter een stad wordt gewaardeerd. Belangrijk middel, maar stad niet op slot zetten.

Wiersma over cost leadership: operational excellence (80%), customer ultumacy, product leadership.

## B.3 Interview Hans Quak, Researcher at TNO

14 August 2015

Een systeem is er niet voor niets, het systeem ga je niet zomaar veranderen. Je hebt triggers nodig om een systeem te veranderen, triggers geven een bepaalde urgentie aan. Het is geen politieke vraag maar een transitievraag. De scenario's worden gebruikt voor backcasting. Hoe zijn die scenario's gemaakt? Deze zijn gegenereerd met behulp van externe variabelen die zijn geplot als dimensies.

Wat lastig is van het mobiliseren van partijen is dat een overslagpunt veel verandering vraagt van veel partijen. Belangrijk om voor jezelf helder te hebben bij maatregelen en beleid is wie de eigenaar is. Logistiek an sich is niet het probleem. Bij probleem-denken moet je onderscheid maken tussen vervelend en overlast. Een voorbeeld van urgentie: in Engeland zijn er rechtszaken tegen de gemeente over de slechte luchtkwaliteit, als ze strafbaar worden geacht, dan is er echte urgentie. Nu is het omdat Europa dat wilt, maar ook daar heerst geen echte urgentie.

Maatregelen noem ik bewust zero emissie, want er zijn meer alternatieven dan elektrisch rijden. Er zijn meerdere oplossingsrichtingen: physical internet, zelfrijdende voertuigen. Dat is allemaal echt logistiek.

Criteria die ik nu in het rapport heb staan:

- Kosten transport, deels ja
- Luchtkwaliteit, ja, vermindert in meerdere maten. Luchtkwaliteit is niet alleen CO2.
    - Fijnstof is een probleem, want het is direct schadelijk voor de volksgezondheid, bijvoorbeeld op de longen. Is deels lokaal op te lossen, per straat afhankelijk. NOx en fijnstof (roet). Grafieken euronorm, richten zich op lokale invloed. Dat je zegt dat dit probleem deels verdwijnt, in beperkt terecht. Is een probleem van steden. NSL is een monitor.
    - CO2 is een globaal probleem, gaat de lucht in en wordt problematisch voor klimaat. CO2 doelstelling is ook meer een ambitie. Steden willen iets hier aan doen, maar is nu niet urgent voor de stad.

  Erik Rechtenschort kan hier ook veel over vertellen. Luchtkwaliteit is een beetje een luxe probleem. De corridors waar veel verkeer zit hebben er last van.
- Noise, helemaal mee eens, maar zal geen trigger zijn om het systeem aan te passen. Is een keuze om in de stad te wonen. Moeilijk hard te maken dat het schadelijk is. Je hebt ook de keuze om in een dorp te wonen.
- Transaction costs. Deze vind ik wel een aardige. Druk op de kwaliteit van leven in de stad wordt groter, dus er is minder ruimte beschikbaar voor verkeer. Anders dan 20 jaar geleden. Er komt meer ruimte voor mensen om te recreëren, gaat impact hebben op de logistiek. Is echt een ruimtelijk issue. Eerder autoluwer dan autovriendelijker.
- Servicelevel, dit en kosten is redelijk hetzelfde. Naar mijn idee zijn sommige stukken erg duur in Nederland. In de zorg mag transport best wat duurder zijn. Per segment afhankelijk wat men over heeft voor service en transport. Er zitten wat restrictie waarbinnen transport kosten moeten zitten.
- Betrouwbaarheid, is aan het veranderen. Eerst stond de verlader aan het roer, nu de ontvanger aan het roer.
- Kosten voor verandering, niet eens per se in euro's, maar meer in moeite. Bij de leveranciers zijn helemaal geen bewuste keuzes voor welke dag ze leveren, dat komt door onze logistieke bril. Als ontvanger weet je steeds beter waar je aan toe bent.
- Aansprakelijkheid, deels een excuus waarom mensen niet willen bewegen. PostNL heeft ook onderaannemers.

Je hebt nu vooral je focus op negatieve triggers, kijk ook eens naar de positieve. Je kan bijvoorbeeld ook kijken naar gemak, bijvoorbeeld ICT oplossingen als Uber en dergelijke. Als de faciliteiten veranderen, kan dit ook een beweging in het systeem veroorzaken.

Wat zijn de eerstvolgende oplossingsstrategieën? Voordat je aan oplossingen gaat denken, eerst terug naar de basis en kijken naar welke problemen je op wilt lossen. Het grootste probleem is de luchtkwaliteit

en overlast van groot verkeer. Daarnaast is veiligheid voor Europa een belangrijke trigger. Als je het systeem wilt aanpassen, dan is de gemeente degene die actie moet ondernemen.

Voor gemeenten is er veel te winnen, betere kwaliteit binnenstad, hogere huis en winkelprijzen, economisch aantrekkelijk. Huizenprijs enigszins te maken met luchtkwaliteit, maar het heeft meer te maken met de overlast. Hele vuile pleinen met veel verkeer, kunnen populairder zijn dan pleinen met grasvelden. Leefbaarheid blijft zeker belangrijk.

Ik ben terughoudend in oplossingen en optimisme in stadslogistiek omdat ik jou niet te veel wil sturen in je onderzoek. Ik heb al veel onderzoeken gezien met mooie oplossingen, maar nog niet naar hoe het systeem daadwerkelijk veranderd wordt. Daarnaast heb ik geen antwoord op de vraag hoe je actoren kan activeren, anders had ik dat al wel gedaan.

Contrast tussen de mensen die je geïnterviewd hebt voor validatie, versus de mensen die je gaat uitnodigen voor de workshop, is in mijn ogen goed. Dan kan je juist heel goed die nieuwe inzichten toetsen.

Wat is jouw achtergrond? Waarin heb jij je ingelezen? Marijn Slabbekoorn voor de verschillende actoren perspectieven, Stefan … over consolidatie centra en Egbert Gruisberg over stedelijke ontkoppelpunten over ecoterm, aansprakelijkheid, waarom kan dat wel in de haven? Maria Lindholm voor doel middelen-schema. Het is goed om mensen voor je workshop uit te nodigen die niet te veel gekleurd zijn met stadslogistiek. Opgestuurde flyer kan helpen bij actoren perspectief.

Over de scenario's:

Elementen die in meerdere scenario's terug komen, moet extra rekening mee worden gehouden omdat de waarschijnlijkheid groter is. E-commerce kan je misschien vervangen door physical internet of technologische ontwikkelingen. Physical internet heb je echt op pakketniveau informatie, op de kleinste schaal.

1. Dynamic Local Delivery: Best een mooi scenario, ga je er bij zetten hoe je hiertoe bent gekomen? Stadsgebied verandert, de ruimte wordt groter. Niet alleen winkelgebied, maar de hele stad autoluw. Dit is echt een ruimte scenario. Gestandaardiseerde informatiestromen op bepaalde niveaus. Hoge waarschijnlijkheid
2. No margins, no investments: Lage kosten voor retail in het centrum. Zeeman, Aldi, etc. vooral bulk profiteert hiervan. Rationeel scenario, sturend op kosten Lijkt me niet dat er congestie is, door de leegstand zal een binnenstad minder aantrekkelijk zijn. De leegstand kan gebruikt worden als stedelijke hubs voor winkeliers. Extra voorraad. Winkelruimte wordt goedkoper. Minder beleveren, nachtleveringen
3. The sky is the limit: Deel economie, kan je daar wat mee in logistieke dienstverlening. Betekent dat je makkelijker iets bij de buren af kan laten geven. Uber-achtige praktijken mogelijk. Hub zou hier iets kunnen zijn. Pakketboxen van PostNL. Meer vanuit een maatschappelijke trigger. De burgers willen duurzaam handelen en doen. Contrast ruimte perspectief (1) versus deeleconomie perspectief (3). Scenario lijkt misschien wel net veel op scenario 1. Richt de ene zich op de consument en de ander op de overheid?
4. Resiliance: Trend van meer extreme situaties. Die extremen gaan nu je systeem bepalen, maar daar kan je nooit rekening mee houden. De stagnatie en beperkte ruimte van investeren is interessant. Er moet veel geld naar infrastructuren: elektra, wegen, dijken, etc. Ook al vaak extremen, maar je gaat niet je systeem er op aan passen.

Gevaar is dat iedereen naar scenario 3 wilt gaan. Anderzijds is scenario 2 ook niet zo gek. Vergrijzing is misschien interessant om mee te nemen: wat als de babyboom generatie met pensioen is? Die hebben tijd, geld en zijn bekend in digitale omgevingen. Wat is de rol van de overheid, sturend of faciliterend? Stedelijke economieën worden steeds groter, nu worden burgemeesters steeds belangrijker.

## B.4 Interview Peter Tjalma, Managing Director TransMission

10 August 2015

Wat zijn volgens u de scoringscriteria voor de stadslogistiek?

Er zit een enorm waardeoordeel in de criteria van stadslogistiek. Stadslogistiek is alleen interessant voor consumenten als het goedkoper wordt, anders heeft het geen bestaansrecht. Serviceniveau moet op hetzelfde level zijn als voordat de stadslogistiek geïmplementeerd wordt. Wat zijn de drivers en obstakels om te veranderen? Het doorzetten van beleid is buitengewoon moeilijk.

TransMission heeft vooral gekeken naar de mislukkingen van de afgelopen eeuw, bijvoorbeeld cargotram Amsterdam, City Box, Stads Distributie Centrum, etc. Gemeenten zijn feitelijk probleemeigenaar van de stadslogistiek, maar ze pakken niet door. Er zijn voldoende beleidsplannen en nota's over stadslogistiek en enthousiaste reacties, maar niemand neemt daadwerkelijk actie.

Ondanks proof-of-concept met duurzame alternatieven happen winkeliers niet toe, omdat gemeenten hen geen strobreed in de weg legt, dus waarom zouden zijn hun processen aanpassen als het oude nog steeds werkt. Momenteel is er meer bewustzijn over het leefmilieu en omgevingsimpact, maar als we blijven polderen, dan zal dit weinig verandering te weeg brengen in het realiseren van efficiënte binnenstad logistiek. Overleggen polderen zich dood.

CargoHopper opereert kosten neutraal: met het bestaande netwerk en klanten van TransMission is er een berekening gemaakt van de kosten van de CargoHopper als voertuig. Dit komt neutraal uit, weliswaar met subsidie vanuit de gemeente Amsterdam voor de aanschaf van de voertuigen. Dus geen subsidie voor de operatie!

Ondernemers vinden het een leuk 'concept', maar het is geen concept meer. Toch willen ondernemers niet overschakelen van leverancier, omdat bestaande transport aan de vereisten voldoet.

Het buitenland zijn hele goede voorbeelden te vinden waar maatregelen zijn genomen in de stadslogistiek. De vraag is echter of er wel een probleem is in Nederland met betrekking tot stadslogistiek. Binnen 10 minuten sta je van de snelweg in hartje centrum in Amsterdam.

Er zijn barstend veel beleidsnotities, maar er zijn geen rapporten waarin hard wordt gemaakt wat de grenswaarden zijn voor geluidsoverlast en milieugrenzen. Nooit een analyse gemaakt van deze grenzen waar deze analyses goed zijn gedaan en waar deze waardes worden gemeten. Dit moet eerst duidelijk gekwantificeerd worden! Het moet meer concreet, eerst grenswaarden!

Allereerst definiëren welk probleem je wilt oplossen, dan pas gaan praten of de binnenstad dichtgegooid moet worden. Probleem van het polderen is dat er op alle niveaus verkiezingen zijn, waardoor beleidsmakers ook veranderen per periode. Probleembelevers zijn vaak niet de beleidsmakers. De truc is om als probleembelevers bij probleemoplossers de noodzaak in te laten zien.

Voorbeeld over Florance. Tussen 07.30 en 08.30 komen er allemaal busjes de winkels beleveren. Daarna geen conventionele voertuigen meer in de binnenstad, want die zijn daarna niet meer toegestaan, alleen elektrische voertuigen toegestaan. De stad is volledig klaar voor de dag. Aan de rand bordjes met een verbod en dat het nageleefd wordt. De gemeente bepaalt dus wat er op hun stukje grond gebeurt, dan past de markt zich aan.

Gemeente moeten als ze een probleem willen oplossen hun probleem op hun grondgebied definiëren, dan de markt de ruimte geven om in 8-10 jaar de ruimte geven om zich aan te passen, daarna regelt de markt dit. Voorbeelden van Venetie (daar heeft Bartolie een boot) en Capri (zo stel dat t alleen kan met elektrische voertuigen).Ondernemers hebben in Italie niets in te brengen in het beleid maken van distributie in de binnenstad, ondernemers hebben zich te schikken naar de wet en regelgeving. Dus als er kaders zijn, dan past de markt zich vanzelf aan. Maar eerst een heldere probleemformulering!

London zie je ook veel activiteit gedurende de nacht, dan wordt de hele stad bevoorraad.' Het is allemaal een kwestie van vraag en aanbod. Parkeren in de binnenstad heel duur maken, dan is er nog steeds de mogelijkheid om daar te parkeren, maar je moet er iets voor over hebben. Marginale vraag en

aanbod. Dit zorgt voor een afname van verkeer in het centrum. Je moet een prijs hangen aan het parkeren in de binnenstad. Gewoon een kwestie van vraag en aanbod.

Kernpunt van een overheid is dat ze niet mogen discrimineren, maatregelen moeten voor iedereen gelijk zijn. Er zijn uitzonderingen in de vorm van pilots, zoals de tijdelijke samenwerking tussen de gemeente Delft en PostNL.

Je kan ook kiezen, als je de stad in wilt, dan kan je ook kenteken fotograferen, allemaal gedigitaliseerd. Zelfs campings in Spanje hebben dit met kentekenherkenning. Als zij dat kunnen, dan kan Nederland dat ook. Argument is de Privicywetgeving, maar de K… registreert deze gegevens al jaren en gooit een groot gedeelte van die gegevens weg. Sterker nog, als gemeente moet je toch willen weten wie er op jouw grondgebied zijn?! Het oude tolhuisje komt terug. Neem een voorbeeld aan Londen, het meest eenvoudige model.

In Amsterdam is het ook duur om te parkeren, maar de garages in Amsterdam staan net niet helemaal vol. Daarnaast de grootste vervoersbewegingen zijn de fiets en de voetganger. Als fietser kan je de fiets nergens meer parkeren.

Is het fout dat er in Amsterdam de goederen beleverd worden met conventionele voertuigen? Is daar wel eens een analyse naar gedaan wat er maximaal de stad in mag? Wat zijn de grenswaarden? Minder als beleidsdoelstelling kan ik niet mee, het moet gekwantificeerd worden, anders lijk ik wel Wilders.

Worden de grenswaarden modelmatig bepaald of gemeten? Voorbeeld Utrecht: gemeente wilde betere luchtkwaliteit, gebaseerd op modelmatige berekeningen, maar niet op basis van metingen. Begin eens met meten, dan kan je kijken hoe je de overschreden grenswaarden weer binnen de normen te krijgen.

Voorbeeld over de meest vervuilende straat in Nederland in Den Haag, lag vooral aan de stadsbussen en niet personenauto's of vrachtverkeer. Meten geeft nieuwe inzichten. Problemen-analyse is essentieel voor de oplossing. Afwachtende gemeente is niet per se de kwetsbaarheid van het systeem. Als er geen probleem is, dan hoeven ze niet door te pakken, maar als er wel een probleem is, stel normen en laat zien wat het probleem is. Verdienmodel gemeenten in Zweden: autoluwe stede door middel van OZB en de bezuinigingen op het onderhoud van de wegen.

Men is teveel bezig met wensdenken. Door standaardisatie wordt het probleem uitgesteld. Bijvoorbeeld venstertijden zorgen voor een beperkte flexibiliteit. Als zowel Delft, Den Haag als Leiden willen worden bevoorraad tussen 9.00-11.00, dan wordt de belevering krap om met een vrachtwagen door te rijden.

Een ander probleem is dat iedere wethouder een eigen portefeuille heeft. Hierdoor zijn er verschillende belangen binnen de gemeente, maar geen overkoepelende belangen. Wordt erg tegenstrijdig en werkt het polderen in de hand.

Wanneer er geen kaders worden gesteld door lokale autoriteiten, dan zullen winkeliers en ontvangers hun processen niet aanpassen. Over lokale of centraal geregelde logistieke distributiecentra: veel hubs, ook op kleine schaal niet houdbaar. Zie voorbeeld met banken die in iedere plaats banken willen hebben, was niet houdbaar.

Welke elementen in de scenario's moet je overal in terug zien te vinden? Denk aan de afschrijving van de voertuigen, hierdoor krijg je een enorme verschoning van het wagenpark. Nu is het niet meer mogelijk om slechtere dan EURO 5 voertuigen te kopen, tegenwoordig al EURO 6.

Daarnaast wel of niet thuis beleveren, ik geloof in een omni-channel belevering. Consumenten kunnen enorm wispelturig zijn, de ene keer willen we het thuisbezorgd krijgen, de andere keer willen we naar de stad om goederen te kopen. Als bedrijf moet je over aanwezig zijn. Supply chain is niet sturend in dit geheel, maar ondersteunend. Presence is not the control, denk aan outletstores.

Of klanten bereid zijn voor service te betalen, dat hangt van het individu af, niet macro-economisch. Je hebt shopping assistenten.

Low emission vehicles gaan vanzelf komen in de logistiek, dus die gaan veranderen. Dit probleem ebt langzaam weg. "EURO 6 voertuigen door de stad laten rijden, reinigt de lucht (gekscherend).

Ik geloof niet in alleen stagnatie of vooruitgang, is een fluctueerde lijn. Het gaat op en neer, nu in een periode dat er heel veel mensen op de wereld hebben het heel goed.

Ik zeg niet dat elektrische voertuigen de oplossing is, het gaat alleen om de problemen die gemeenten definiëren op te lossen. Dus alle motoren die zero emission zijn, kunnen potentieel een oplossing zijn.

Aanschaffen van zero-emission voertuigen kunnen niet gefinancierd blijven door gemeenten. Subsidie is leuk, maar met succes wordt het te duur. De gemeente heeft de volgende toolbox: wetgeving en uitzonderingen, belasting en subsidies, boetes en vrijheidsbeneming. Dus met wetgeving is het goedkoopste, laat de markt het oplossen.

Aantal vervoerbewegingen: verschil tussen verkeer en vervoer. Verkeer zijn de voertuigen die bewegen. Vervoersbeweging bestaat uit goederen en personen. Meest geschikte verkeersbeweging voor dat vervoer? Kijken naar de soort supply chain waar je over praat. Voedsel, food-services, bouw en afval zijn de grootste stromen. Daar moet je vooral op concentreren. Aantal vervoersbewegingen is een voortvloeisel van andere factoren, bijvoorbeeld beladingsgraad, congestie charge, soort vervoer.

ADR vervoer is interessant, dat is echt een specialisme. Daar zijn de afgelopen 20 jaar veel regelgeving en wetten ingesteld. Dit heeft er voor gezorgd dat veel vervoerders afhaakte omdat ze de wetgeving niet begrepen. Dit geeft kansen aan specialisme. Toegenomen regelgeving.

Stadslogistiek is ook een specialisme. Voordelen te halen als er een fee komt om de binnenstad in te rijden. Voor 1 pakket de binnenstad inrijden zou enorm duur zijn, dan wordt het interessant om voor 20 euro fee je pakket via een specialist de binnenstad in te laten rijden met meerdere pakketten.

Over Uber: wat C-C betreft, daar heeft Uber kansen, heel kleinschalig. Maar voor B-C denk ik niet dat ze het gaan redden, want als vervoerder wil je richtlijnen voor je chauffeurs hebben voor het afleveren. Daarnaast heb je te maken met grotere bulk, en wil je met uniformen werken. Allemaal geparametriseerd.

# APPENDIX C: SETUP OF THE WORKSHOP

This appendix is about the setup of the workshop. There are many input variables that determines the quality of the output of the workshop. This appendix elaborates on the different elements for the workshop configuration, like the aim of the workshop, venue, participants, facilitators, the program, and the output. This configuration explains the choices about the workshop.

The setup of the workshop is of great importance in order to get the right results and to use the conclusions. In literature tools are described how to design an interactive and relevant workshop. The interaction between the parties provides informed consent about difficulties that has to be overcome. The total duration of the workshop is four hours in an afternoon. The duration of a half day is to limit the time that the professionals should set aside. The workshop took place on the 22nd of September 2015. The name of the workshop is '*Roadmap Urban Logistics 2025'*. The following paragraphs explain the principles of the workshop.

## C.1 Aim of the workshop

The design of the workshop is about the goals and what the results should be like. The following goals are defined for the workshop:

- Get insight in the attitude of the stakeholders to urban logistics;
- Get insight in the opportunities and pitfalls of urban logistics in the near future;
- Preparing on the events that may occur that will change urban logistics;
- Creating a provisional roadmap;
- Networking with colleagues of city logistics.

In order to meet the goals stakeholders have to share experiences and perceptions with respect to the consequences for the daily logistics. Since the four scenarios of chapter 5 are a tool to emphasize with the future, the scenarios are used a starting point for the subgroups. Interaction between stakeholders of the business is the main added value, at least three people per scenario are needed. Totally a minimum of twelve participants is needed to deal with four scenarios.

## C.2 Venue

The venue is also decisive for the quality of the workshop. Not only the goal and the content is determinative for the results of the workshop, an inspiring setting contributes too. A good venue ensures inspiration and focus for the participants. A neutral location enables a lower threshold to participate for people. The venue needs some basic facilities to help the process of the workshop like a projector for PowerPoints and flip overs for example. In order to increase the likelihood that invited stakeholders can participate in the workshop, an accessible location suits best. The venue should meet the following criteria:

- Neutral;
- Inspiring room;
- Capacity for about 20 people;
- Accessible;
- (Almost) free of rent;
- Possibility for making subgroups;
- Having a projector.

Schiphol Area Development Centre (SADC) is a venue that meets all these criteria. This venue is located at the Schiphol Business Park close to Amsterdam. The venue provides room for about 25 people and is neutral for all the stakeholders.

## C.3 Participants

The participants are the source of the ideas for strategies. Ensuring highly motivated participants in the target audience is likely the most important step in the preparation of a workshop. Consent of a diverse

*Table 19: Participants of the workshop*

| NAME | COMPANY | FUNCTION | TYPE |
|---|---|---|---|
| Rico van Aggele | Peter Appel Transport | Business Development Manager | Carrier |
| Guy Angel | HAN University of Applied Sciences | Student | Research |
| Bas van Bree | Dinalog | Program Manager | Research |
| Joeri Jongeneel | Municipality of Rotterdam | Program Manager | Municipality |
| Henny Jordaan | HAN University of Applied Sciences | Project Manager | Retailer Fashion |
| Peter Kole | Green City Distribution | Director | City hub |
| Anne-Marie Nelck | Transport Logistiek Nederland | Secretary Policy and Submarkets | Carrier |
| Kam Jzi Wong | Stadslogistiek Delft | Project Manager | City hub |
| Anouk Knap | TMO Fashion Business School | Student | Student |
| Daimy Bok | TMO Fashion Business School | Student | Student |

group of stakeholders is important for a roadmap for city logistic business, because the wide range of stakes and interests can be included. The goal of this workshop to get insight in the perspectives of the parties that are involved in the operations of urban logistics.

There are several stakeholder groups that are affected by changes in city logistics. For developing pathways for the new logistics it is expected that their cooperation and contribution is necessary to ensure a more supported research. Seeking for getting a diverse set of perspectives into the room will make a richer and more educational experience (Kaner et al., 1996). Anand et al. (2014) made a classification of the stakeholders, these are also mentioned in chapter 3. These groups include shippers, carriers, retailers, municipalities and logistic hubs. Below, there is an illustration of the city logistic field the interactions between the five different stakeholder groups. Figure 10 shows again the illustration of the schematic overview of the stakeholders

The aim for this workshop was to work with a group of 12-20 participants from different companies and municipalities, with different stakes and interests. These participants would have been divided in four sub-groups, corresponding to the number of scenarios. However, due to a little late announcement of the workshop only ten stakeholders applied for the workshop. Therefore only three scenarios were elaborated in the workshop. Table 21 shows the list of the participants of the workshop. It presents the stakeholder's function and company, and classifies the stakeholder type.

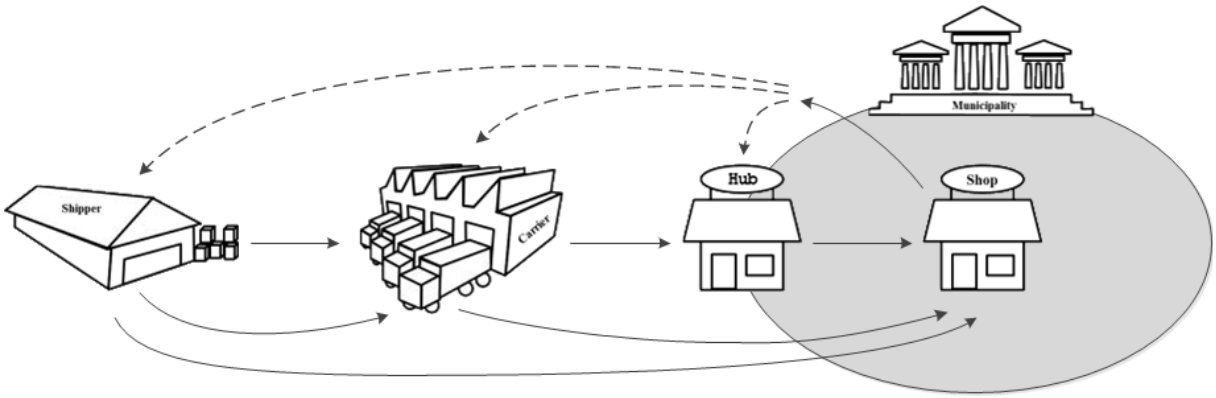


*Figure 10: Schematic overview of stakeholders involved. Adapted from Anand et al. (2014).*

## C.4 Facilitators

Next to the participants the facilitators play are key role in the workshop. Having effective, energizing facilitators are key for running a successful workshop. For small groups, 15-20 participants, two or three facilitators are sufficient. (Creative Commons Corporation, 2015). The facilitators are responsible for the time management, preparing and covering all the material and group exercises, and making sure everyone participates and is involved during the workshop. Though, they are not responsible for logistical considerations. For this workshop two facilitators were in charge: one with experience in the process and facilitating workshops and the other with knowledge and expertise in city logistics. Mr.

Enserink (Delft University of Technology) was responsible for the process and Mr. Rademakers (Amsterdam University of Applied Sciences) was responsible for the in-depth discussions.

The facilitators are briefed two weeks in advance of the workshop, since the facilitator has to have a clear idea what the aim and results of the workshop should be. In agreement with the facilitator the rounds are elaborated in detail and the cohesion amongst them is clarified. The facilitator can strategically redirect the discussions during the sessions so that the output can be maximized.

The role of the researcher is mainly as host of the day. The passive, neutral role is chosen because the researcher should not intervene the process during the workshop in order to get neutral, independent results. The neutral role was thus chosen on purpose in order to avoid influencing the results, so that these are less biased. Next to be the one who was the initiator and the corresponding person for the workshop, he is responsible for logistical considerations and the observation during discussions.

## C.5 The program

The program of the day consists of methodologies to enable useful results of the workshop. The question that is asked here is how the information needed can be extracted from the participants in the workshop. To get the correct output in the workshop, the program have to contain the properly elements. The final output tells something about robust actions in time, so the following questions are asked:

- Why do we want to make a roadmap for urban logistics?
- What kind of actions are needed for the roadmap?
- When should these actions take place in time and in what sequence?
- Who can intervene in these actions?

The answers on these questions gives insight in relevant stages for the workshop. The first question is about the utility of designing a roadmap. This is done in the first round: ‘Dealing with the future’. Using the four scenarios provides the participants insight in problems that might occur in the future and what troubles it will cause for the logistics. Defining the changes stakeholders should undertake needing to overcome the troubles in a scenario, is a requirement before people are going to think in actions and opportunities. Why should you undertake action if it is not needed. Setting the problem for the stakeholders provides insights and the starting point for the actions and solutions.

The second question deals with the actions to overcome the problems defined in the first round. This is round 2: ‘Time for action’. Participants are asked to write down briefly what actions can contribute to the logistic efficiency of the stakeholders. Given the context of the description of one of the four scenarios, different actions will be generated. These actions are the input for the next round.

The third round the actions defined in the previous round should be linked to a year. This round is then able to show the sequence and time needed for an action to take place. The participants have to think about a logical order of the actions of the stakeholders. Since there are already many solutions in literature to make city logistics more sustainable, the order of out rolling it is the new contribution.

Finally, the actions are assigned to the years over the coming decade. Since the local authorities are the most powerful stakeholders with the many means, this round is designed the see it from a governmental perspective. The use of this extra perception is that governments can facilitate, or even force, stakeholders to undertake actions. Involvement of the government may open extra opportunities and alignment over the stakeholders.

Afterwards, when the four rounds are finished, the creators presents the findings to the other participants. Discussions following the presentation contributes to the support of the group and is a validation of the work. Besides, it is an extra chance to involve more perspectives and opinions of the other stakeholders. Only when there is an informed consent with the stakeholders, a roadmap can be a guideline in the coming years.

To speed up the process and improve the outcomes of the rounds, the workshop is introduced at the start. Now people know what is expected from them and what the output should be like. In return of the use of the venue, SADC has some time to introduce a project they are working on. This project is called ‘Westas’, and is an illustration of a project where logistics is being optimized by cooperation of some

stakeholders. However, for this study it is not relevant. All together the program is displayed in Table 20.

*Table 20: Program of the workshop 'Roadmap Urban Logistics 2025'*

| TIME | WHAT | WHO |
|---|---|---|
| 13.15 | Introduction 'WestAs' | SADC |
| 13.30 | Introduction workshop | Facilitators |
| 14.00 | Round 1: Dealing with the future | Participants |
| 14.30 | Round 2: Challenge accepted! | Participants |
| 15.15 | Pause | All |
| 15.30 | Round 3: Time for action | Participants |
| 15.50 | Round 4: Governmental intervention | Participants |
| 16.15 | Presentations | Participants |
| 16.30 | Conclusions and summary | Facilitator |
| 16.45 | Networking | All |

## C.6 Output format

In order to preserve that the results of the workshop are interpret well, the participants have to come up with standardized results. This will help to compare results between the scenarios and gives a uniform output.

In this workshop Sticky notes are a central tool in presenting the findings during the workshop. Since we deal with five different stakeholder groups, five different coloured Sticky notes are provided. Now the participants can present problems and solutions for each stakeholder on a corresponding Sticky note. For the processing of the results it makes it easy to link actions to actors. In the image below, the stakeholders are linked to the colours of the Sticky notes.

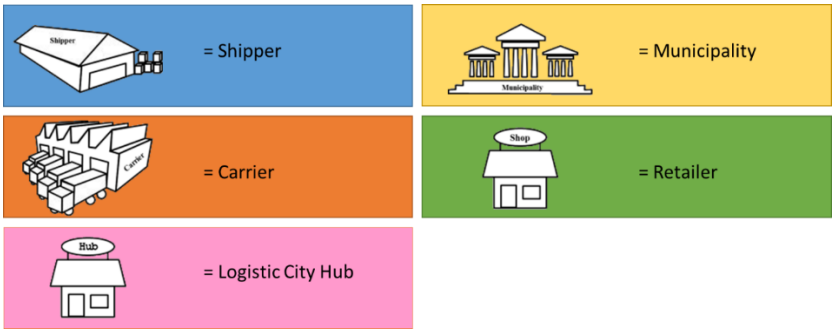


*Figure 23: Stakeholders and their corresponding sticky notes colour*

An important step of the workshop is to put the actions in time, because it shows then the sequence of the actions. In order to get a standardized format in the way the sequence is presented, the participants is asked to stick them on a time line. On this time line the approximate date of the elections of the local authorities are presented. This is because of the responses of the interviews that have been done in prior. A snapshot of the time line is showed in Figure 24.

By using these two tools for the output, it makes it easier to discuss and understand the results. Also for the research it is an advantage because the result can be compared more easily.

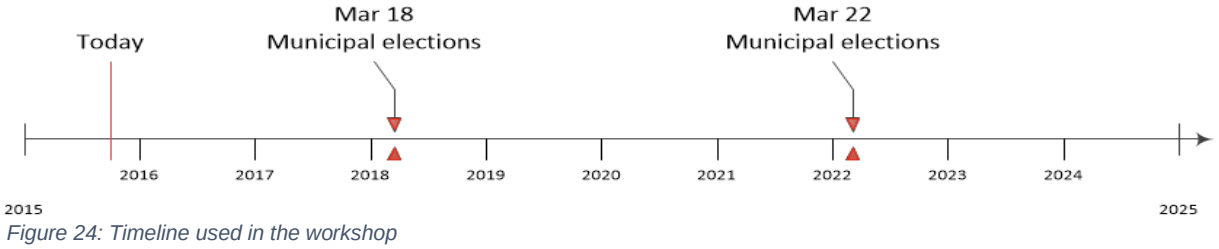


*Figure 24: Timeline used in the workshop*

# APPENDIX D: MINUTES OF THE WORKSHOP 'ROADMAP URBAN LOGISTICS 2025'

22/09/2015

This appendix contains the minutes of the conclusion of the workshop 'Roadmap Urban Logistics 2025'. This workshop took place on the 22nd of September on Schiphol Business Park. The people that were attending this workshop in showed in Table 21. The minutes are in Dutch since the workshop was held

*Table 21: Participants of the workshop*

| NAME | COMPANY | FUNCTION | TYPE |
|---|---|---|---|
| Rico van Aggele | Peter Appel Transport | Business Development Manager | Carrier |
| Guy Angel | HAN University of Applied Sciences | Student | Research |
| Bas van Bree | Dinalog | Program Manager | Research |
| Joeri Jongeneel | Municipality of Rotterdam | Program Manager | Municipality |
| Henny Jordaan | HAN University of Applied Sciences | Project Manager | Retailer Fashion |
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| Daimy Bok | TMO Fashion Business School | Student | Student |

The minutes are only about the final round of the workshop, the conclusions. Each scenario is presented by one of its contributors. They explain the main problems and the measurements for the city logistics. After each presentation there was the opportunity to ask some question and a small discussion.

## D.1 Scenario 1: Conscious Entrepreneurs

Presented by Henny Jordaan, Hogeschool Arnhem Nijmegen

### D.1.1 De problemen

We zien dat we heel succesvol worden in de toekomst: veel bewoners in de stad en er komen ook veel bezoekers. In dit scenario lopen we tegen de volgende problemen aan. Bij de Retail is het nog veel ieder voor zich, nog een beetje BRIC taferelen. Het omni-channel verhaal gaat langzaam vorm krijgen. Omni-channel gaat voorraden op verschillende plekken leggen. Dat kan bij een distributiecentrum zijn, dat kan in een winkel zijn, maar ook lokaal in een hub. Van daaruit same-day-delivery. Door op verschillende plekken voorraad aan te leggen krijg je te maken met dunnere vervoersstromen. Dat wil zeggen dunnere stromen in de stad, maar dikkere stromen naar de stad toe.

Logistiek dienstverleners moeten/kunnen naar een scenario van 24/7 met dagrand distributie. Om 5 uur 's nachts langs een hub gaan om pallets af te leveren en dan door naar de volgende stad. Hierdoor wordt het rustiger op de weg, minder files, kan sneller zijn ronde maken, minder $CO_2$ uitstoot, etc.

Stedelijke hubs moeten White label rijden, neutrale organisatie, bijvoorbeeld een stichting, die geaccepteerd wordt door alle partijen. Het mag geen concurrerende partij zijn en het mag niet gesubsidieerd worden. Subsidie is in wezen valse concurrentie.

Minder voertuig bewegingen, value added, wat weer gekoppeld is aan die white label, want hij kan ten dienste staan van de detaillist, maar ook van de lokale overheid. Zo kunnen ze dat in samenwerkingsvorming doen. Niet alleen retail, maar ook scholen, kinderdagverblijven, allerlei zorgmiddelen. Dit zijn grote flows.

We moeten ook rekening houden dat we met dit systeem minder $CO_2$ kilometers rijden, minder vrachtwagens. Je kunt met grotere vrachtwagens over de weg, meer volume leveren. Rekening houdend met de gemiddelde leeftijd van een distributiechauffeur van ongeveer 55 jaar is, er komt weinig

bij. Een uitdunning van de beroepsbevolking, dit kan mooi samengaan met de verminderde vraag naar chauffeurs.

De vraag is waar we nu naar toe gaan. De gemeente moet zorgen voor veiligheid voor de consumenten en kopend publiek. Dat gaat weer samen met minder vervoersbewegingen. Beleid overheid is dat zij haar bewoners en consumenten gaat informeren wat haar ideeën en plannen zijn. We kondigen aan dat de stad op slot gaat, vijf tot zeven jaar van tevoren, omdat logistiek dienstverleners een contract hebben met verladers voor een periode van drie tot vijf jaar. Als jij een winkel huurt kan je aan contracten zit van drie tot vijf jaar. Daarom op tijd de maatregelen aankondigen, anders heb je een hele batterij aan advocaten op de stoep staan omdat ondernemers halverwege hun contract moeten omschakelen. Je moet hen dus op tijd de boodschap inmasseren dat dit gaat gebeuren.

### D.1.2 Vragen

Kees-Willem Rademakers: Doet de lokale overheid dat of de supra overheid?

- ➔ De lokale overheid doet dat, want niet elke stad is hetzelfde. Ik denk niet dat het mogelijk is om elke stad in hetzelfde tempo op slot te gooien.

Joeri Jongeneel: Wat bedoel je met de stad op slot gooien, geen grote vrachtwagens, geen uitstoot?

- ➔ Geen $CO_2$ vrachtwagens meer in de binnenstad.

Joeri Jongeneel: Nog een vraag: stad op slot, maar wel meer vervoersbewegingen met kleinere voertuigen?

- ➔ Peter Kole: Nee, er komen door deze maatregelen minder voertuigen in de binnenstad. Om te zorgen dat er minder uitstoot is, minder vrachtwagens rondrijden en dat het veiliger is moet de gemeente de stad op slot gooien

Joeri Jongeneel: Dunnere stromen in de stad, betekent toch meer stromen?

- ➔ Doordat voorraden op meerdere plekken in de stad liggen, zijn er dunnere stromen vanuit die plekken. Peter Kole: de oplossing ook daar is om voor omni-channel te bundelen, dus minder voertuigbewegingen.

Kees-Willem Rademakers: krijg je daardoor ook andere voertuigen?

- ➔ Ja, vooral elektrisch, maar je kan van alles inzetten. Je moet goed kijken naar welke voertuigen je inzet. Rico van Aggele: Het is ook niet alles om een volle grote vrachtwagen te vervangen door 1000 kleine e-bikes.

Kees-Willem Rademakers: het kan natuurlijk ook zo zijn dat alle verladers – door deze passieve overheid – zelf denken om e-bikes aan te schaffen. Bijvoorbeeld de HEMA wil er 20 en de Albert Heijn wil er 30 en PostNL doet er nog eens een paar. Kan dat in jullie scenario?

- ➔ Je moet in gedachte houden dat de beladingsgraad in de final mile ligt op zo'n 32%, dus daar kunnen we nog heel veel aan doen.
- ➔ Anne-Marie Nelck: er wordt een rit gemaakt waar de vrachtwagen vol begint en dat hij leeg uit de stad terug komt, gemiddeld komt dat dan op 32% uit ja. Joeri Jongeneel: helemaal afhankelijk van welke keten je bekijkt!
- ➔ Daar kan je weer kijken wat voor goederen uit de stad komen. Als je dat weer bundelt aan de rand van de stad, dan kan het worden meegenomen aan het einde van de middag. Hierdoor gaat de beladingsgraad verhogen.
- ➔ Rico van Aggele, sowieso altijd kijken hoe je een voertuig maximaal inzet.
- ➔ Anne-Marie Nelck: wat ik hier mis, misschien door de scenario's, is dat ik de kleine lokale kruideniers en broodjes zaken met klein vervoer mis. Henny Jordaan: door die White label willen we dat verplichten.
- ➔ Peter Kole: Joeri had nog een opmerking dat de marges erg dun zijn, dus dat we dan kosten aan het toevoegen zijn. Maar het is al aangetoond op meerdere plaatsen dat het toevoegen

van een bundel locatie niet leidt tot hogere kosten voor de keten. De kosten moeten over de hele keten verdelen.

➔ Rico van Aggele, een bestendige gedragsrichtlijn.
➔ Bas van Bree: heeft de overheid een rol bij het opzetten van die neutrale entiteit?
➔ Nee, dit doet de markt.

Joeri Jongeneel: dus wij als overheid gaan dreigen dat de stad op slot gaat om te zorgen dat de markt actie gaat ondernemen?

➔ Ja, dat is wat dit scenario zegt.

## D.2 Scenario 2: Pragmatic government

Presented by Joeri Jongeneel, Gemeente Rotterdam

### D.2.1 De problemen

Actieve, pragmatische overheid waar de leefbaarheid heel belangrijk is. Physical Internet is een van de speerpunten. Hele korte samenvatting van het scenario.

Kennis en expertise is er niet bij de gemeente, want er is een terugtrekkende rol voor de gemeente

Winkeliers, vooral kleine, hebben moeite met hun rol te vinden en daar een business model aan over te houden.

Logistieke hubs hebben ook moeite om een business model te formuleren dat ook los van subsidies kan blijven draaien.

Vervoerders kennen veel verliezers en winnaars, afhankelijk hoe adaptief deze bedrijven zijn.

Verladers is het eigenlijk hetzelfde als vervoerders. Ze moeten verschillende ketens opzetten, eentje voor grotere steden en eentje voor kleinere steden waar ze wel hun huidige logistieke keten kunnen uitvoeren.

Allemaal krijgen ze te maken met meer regelgeving omdat de overheid meer gaat sturen. Alle ondernemers in de keten gaan hier last van hebben.

### D.2.2 De tijdslijn

In dit scenario liggen de acties ook allemaal in het begin van de tijdslijn, omdat we snel actie willen ondernemen. Zodat alles in 2025 allemaal kan gebeuren. Winkeliers zijn aan zet als winkelstraat. Samen moeten ze gaan zoeken naar nieuwe modellen, samen denken over het vervoer er omheen, daar moet een mind shift plaatsvinden.

Gemeenten moeten een platform krijgen waar ze zitting in kunnen nemen om zo een uniforme eenduidige regelgeving en subsidies krijgen. Ook moet daar extern expertise inzitten, dan hoeft niet iedere gemeente voor zich expertise in te kopen. Gemeente moeten helder beleid voeren op de langere termijn, maar ook helder zijn in de korte termijn zoals de piketpaaltjes. Er moet ruimte gecreëerd worden voor ‘disruptive innovation’, om te zorgen dat de juiste oplossingen en nieuwe dingen niet komt uit klassieke kanalen, maar uit andere sectoren. Gemeente moet vooral de ruimte hiervoor creëren. Als gemeente en sector moet kenbaar gemaakt wordt hoe belangrijk stedelijke logistiek is, hoeveel geld hier in om gaat. Dan wordt het een hot topic.

“Freight doesn’t vote”. Veel geld en aandacht naar persoonsvervoer, maar weinig naar vrachtvervoer, omdat er weinig publiek belang bij wordt gezien, maar er wel is.

### D.2.3 Vragen

Kees-Willem Rademakers: hoe gaan gemeenten om met bijvoorbeeld Uber? Wordt dat toegelaten en geaccepteerd?

➔ Ja, die zou dit moeten toelaten: ruimte creëren.

Henny Jordaan: zie je een bepaalde rol weggelegd voor opleidingsinstituten en brancheorganisaties.

- ➔ Opleidingsinstituten zeker, je ziet ook steeds meer belangstelling ontstaan onder de studenten, getuigen ook het aantal studenten aanwezig hier. Mobiliteitsmanagement is op een gegeven moment ook booming geworden, ik denk dat dit nu ook aan het geburen is met vrachtvervoer. Brancheorganisaties ook, maar die zijn afhankelijk van hun grote achterban Het zijn belangen organisaties voor de hele achterban, van vooruitstrevenden, maar ook hele conservatieven.
- ➔ Anne-Marie Nelck: juist brancheorganisaties moeten hierbij betrokken worden, want de grote middengroep gaat voor de kritieke en benodigde massa zorgen. In onderhandeling met de Green Deal ZES hebben we ook gezegd dat het belangrijk is om niet alleen met de koplopers aan de slag te gaan in de living labs, maar juist ook de massa er bij te betrekken om die in beweging komt. Denk hierbij aan een reële planning, uitzicht op de langer termijn, dat soort zaken.

Peter Kole: je hebt een stukje rol van de centrale overheid, de gemeentes gaan samen een soort van algemene maatregelen nemen. Nog steeds het probleem van de verkiezingen. De Automotive kan niet bouwen op de politieke cyclus. Zij gaan niet in actie komen als besluiten niet zwart op wit staan, omdat een volgende college alles van tafel kan vegen. Hoe gaan we hiermee om? Vastleggen in wetgeving?

- ➔ Verkiezingen blijven, dus als partij moet je nu laten zien dat je nu goed bezig bent, dan krijg je stemmen en kan je beleid doorvoeren.
- ➔ Peter Kole: Het moet een hogere macht zijn die over de collegeperiode heen regeert.
- ➔ Rico van Aggele: met de pet op van vervoerder zijn we enorm gebaat bij centrale regelgeving vanuit de landelijke overheid. Wij hebben duidelijkheid nodig! Het maakt niet uit of het landelijk of Europees is.

## D.3 Scenario 3: Shop Vacancies

Presented by Bas van Bree, Dinalog

### D.3.1 De problemen

Meer volume de stad in gereden, minder gebruik van fijnmazige distributie. Problemen aan de kant van de winkelier is minder bezoekers, economisch probleem. In het scenario werd gesteld dat het slim is om gebruik te maken van de leegstand van andere winkels, maar dit is helemaal niet slim, omdat je dan hogere kosten maakt in moeilijkere omstandigheden. Vandalisme en verloedering zijn andere problemen.

Vervoerders hebben het lastig omdat er minder personeel in de binnenstad is. Grotere voertuigen de binnenstad in, maar die zijn niet berekend op grote voertuigen. Daarnaast ook veel last van congestie op de wegen tijdens de spits. Infrastructureel probleem.

Verladers hebben last van verminderde vraag, minder afname van producten. Door bundeling moet je meer en betere afspraken maken, afstemming en voorwaarden. Ook een imagoprobleem, geen ruimte om duurzaam te investeren in de keten.

Een logistieke hub heeft helemaal een probleem. Omdat er al gebundeld naar de stad geleverd wordt, hierdoor mist zij volume en ontbreekt het volledig aan een business case. Einde oefening dus.

Gemeente heeft ook een probleem. Onaantrekkelijkheid van de binnenstad, minder bezetting van de winkelpanden, grote voertuigen komen de binnenstad in en zorgt voor een onveilige binnenstad en de luchtkwaliteit neemt zienderogen af omdat er veel meer voertuigen de binnenstad binnenkomen waardoor de leefbaarheid afneemt.

### D.3.2 De oplossingen

We hebben gezegd dat je in het hele scenario zelf actie ondernemen, dat zijn de geeltjes aan de onderkant. Hoe sneller je iets kunt doen, hoe sneller de oplossing eigenlijk. Hoe lastiger, hoe verder de post-its op de tijdlijn. Strengere emissie eisen, grotere voertuigen weren, slimmere logistieke routes inclusief laad- en losplaatsen. Winkeliers verplichten goederen te lossen bij Logistieke Ontkoppel Punten (LOP) en ophalen. Hierop moet worden ingespeeld door supra overheid. Door op tijd aan te kondigen (NU) dat er wetgeving komt, kunnen marktpartijen hierop inspelen. Dit doe je door procedures

te starten, maar vooral ook fysiek ook door te vertellen waar de ontkoppelpunten zijn. Ruimtelijke ordening beleid op orde te maken. Dit alles nodig om maatregelen af te dwingen.

Als winkelier zoek je naar andere afzetkanalen zoals omni-channel en e-commerce. Als overheid kan je hierin faciliterend in optreden. Een webshop voor de hele binnenstad bijvoorbeeld.

### D.3.3 Reacties

Henny Jordaan: “ik vind het wel een goeie, zo’n super overheid er boven hangen om de lokale overheid aan te sturen. Maar wie is die super overheid? Is dat de vereniging van gemeenten?

- ➔ De precieze organisatiestructuur hebben we hiervan nog niet bedacht

Kees-Willem Rademakers: “de laatste vier jaar gebeurt er dus vrij weinig?

- ➔ Door de slagkracht van die superoverheid kunnen een hoop acties al in een vroeg stadium worden uitgerold. Je gaat NU al maatregelen nemen om de problemen te voorkomen.

Kees-Willem Rademakers: “je hebt een doorlooptijd van 4 jaar, is dat arbitrair, zou dat ook twee jaar of een jaar kunnen zijn? De laatste paar jaar worden er geen maatregelen doorgevoerd.

- ➔ Het is nu al noodzakelijk om te beginnen met het doorvoeren van maatregelen, om er voor te zorgen dat de doelstellingen voor 2025 worden gehaald. Als we dus gelijk handelen, dan heb je richting het einde geen acties meer nodig.

Jasper Bauwens: “ik ben benieuwd naar die supra overheid, die staat helemaal aan het begin van de tijdlijn, zo’n beetje 2015. Eerdaags de bevoegdheden van die supra overheid zijn uitgekristalliseerd en ze de bevoegdheden hebben, ben je maanden of zelfs jaren al verder. Hoe zien jullie dat?

- ➔ We hebben het hier praktisch over de lokale overheid die de rol aanneemt van supra overheid in het proces. Dit zijn allemaal maatregelen die een lokale overheid nu zou kunnen nemen. Het is een gemeente die een hele actieve rol speelt.

Algemeen Joeri Jongeneel: wat is nu de functie van deze roadmaps voor de verschillende scenario’s, want we weten momenteel toch niet naar welk scenario we toe aan het bewegen zijn?

- ➔ Dat klopt, maar de scenario’s zijn bedoelt om rekening te houden met verschillende externe factoren en evenementen die plaats gaan vinden. Door roadmaps te maken voor verschillende scenario’s, kan gekeken worden welke maatregelen robuust zijn in meerdere omgevingen, dus ook als leefbaarheid minder hoog op de agenda staat.
- ➔ Rico van Aggele: Is het dan niet zo dat de roadmap alleen maar vertraagd? Joeri Jongeneel, ja, dat is wat ik wilde zeggen.

# APPENDIX E: RESULTS OF THE WORKSHOP 'ROADMAP URBAN LOGISTICS 2025'

This appendix contains the results of the workshop 'Roadmap Urban Logistics 2025'. This workshop took place on the 22nd of September in Schiphol. The people that were attending this workshop in showed in Table 21. Some parts of the minutes are in Dutch since the workshop was held in Dutch. However, most of the results are translated in English. The minutes of the conclusion can be found in Appendix B.

Ten participants attended the workshop. To improve to interaction during the sessions, three scenarios were dealt during the workshop. Reason for this choice is the principle that each subgroup should exist of at least three people to ensure sufficient discussion. An aim in designing the scenarios is to outbalance the radicalness amongst them. Although this aim, the fourth scenario - *Resilience of Urban Logistics* – is a bit more radical than the other scenarios. Therefor this scenario was not elaborated in the workshop.

## E.1 Identified problems in the workshop

*Table 22: Identified problems in the workshop, sorted to scenario and stakeholder*

| SCENARIO | STAKEHOLDER | PROBLEM |
|---|---|---|
| 1 | Municipality | Safety |
| 1 | Municipality | Emissions |
| 1 | Municipality | Congestion |
| 1 | City Hub | Load factor |
| 1 | City Hub | No alignment |
| 1 | City Hub | No business case |
| 1 | Shipper | Thick flows to hub |
| 1 | Shipper | Small flows into city |
| 1 | Shipper | Contact consumer |
| 1 | Carrier | More transhipments |
| 1 | Carrier | Nuisance |
| 1 | Retailer | Stock determination |
| 1 | Retailer | Vacancy |
| 1 | Retailer | Physical shops |
| 2 | Municipality | Uniform regulations |
| 2 | Municipality | No cooperation with other municipalities |
| 2 | Municipality | Insufficient knowledge |
| 2 | Municipality | Pushing instead of pulling |
| 2 | Municipality | Elections |
| 2 | City Hub | Controlled competition |
| 2 | City Hub | Restricted due to policy |
| 2 | City Hub | Dependent on short term subsidy |
| 2 | City Hub | No business case |
| 2 | Shipper | Bounded regulation |
| 2 | Shipper | Multiple freight chains |
| 2 | Shipper | City dependency |
| 2 | Carrier | Measurements requires investments |
| 2 | Carrier | Some win, other loose |
| 2 | Carrier | Bad cooperation |
| 2 | Retailer | Customer approach |
| 2 | Retailer | Practical organisation |
| 2 | Retailer | Delayed stockings |
| 2 | Retailer | New role entrepreneurs |
| 3 | Municipality | Unattractive centre |
| 3 | Municipality | Lack of liveability due heavy vehicles |
| 3 | Municipality | Bad air quality |
| 3 | City Hub | Lack of bargaining power |
| 3 | City Hub | No revenues |
| 3 | Shipper | Low demand of products |
| 3 | Shipper | Bundling needs agreements |
| 3 | Shipper | Bad image |
| 3 | Carrier | Low hit rate of deliveries |
| 3 | Carrier | Infrastructural problems |
| 3 | Carrier | Congestion |
| 3 | Retailer | Less customers in centre |
| 3 | Retailer | Limited stocks |
| 3 | Retailer | Vandalism |

## E.2 Identified tactics in the workshop

*Table 23: Identified tactics in the workshop, sorted to scenario and stakeholder*

| SCENARIO | STAKEHOLDER | TACTIC | AGGREGATED | TIMELINE |
|---|---|---|---|---|
| 1 | Municipality | Less transhipments | Bundling | 2021 |
| 1 | Municipality | New technologies | Governmental policy | 2019 |
| 1 | Municipality | Moderate policy | Governmental policy | 2015 |
| 1 | Municipality | Convince residents | Inform | 2019 |
| 1 | Municipality | Announce city lock down | Inform | 2016 |
| 1 | Municipality | Inform customers | Inform | 2015 |
| 1 | Municipality | Balance between online/offline | Others | 2018 |
| 1 | Municipality | Limit city access | Restrictions | 2021 |
| 1 | Municipality | Parking free zones | Restrictions | 2016 |
| 1 | City Hub | Value adding | Bundling | 2022 |
| 1 | City Hub | White label | Bundling | 2020 |
| 1 | City Hub | Sharing economy | Bundling | 2017 |
| 1 | Shipper | Bundling | Bundling | 2022 |
| 1 | Shipper | Bundling | Bundling | 2020 |
| 1 | Shipper | Local stocks | Local stocks | 2019 |
| 1 | Carrier | Local-to-local | Local stocks | 2017 |
| 1 | Carrier | Same day delivery | Local stocks | 2016 |
| 1 | Carrier | 24/7 distribution | Others | 2019 |
| 1 | Carrier | Consumer determines | Others | 2015 |
| 1 | Retailer | ICT solution | ICT solution | 2017 |
| 1 | Retailer | Shopping experience | Omni-channel | 2017 |
| 2 | Municipality | Start subsidies | Governmental policy | 2016 |
| 2 | Municipality | Make retailers conscious | Inform | 2016 |
| 2 | Municipality | Facilitate disruptive innovations | Platform | 2017 |
| 2 | Municipality | Start G30 city logistics platform | Platform | 2016 |
| 2 | Municipality | Cooperate with other parties | Platform | 2016 |
| 2 | Municipality | Long term policy with poles | Restrictions | 2016 |
| 2 | City Hub | White label | Bundling | 2019 |
| 2 | City Hub | Alliances with shippers and carriers | Cooperation | 2018 |
| 2 | City Hub | Cooperation in the logistic chain | Cooperation | 2017 |
| 2 | City Hub | Logistics planning tool | ICT solution | 2017 |
| 2 | Shipper | Force uniform policy | Platform | 2015 |
| 2 | Carrier | Change mind-set | Inform | 2018 |
| 2 | Retailer | Cooperation between retailers | Bundling | 2015 |
| 2 | Retailer | Green logistics in terms | Inform | 2017 |
| 2 | Retailer | Omni-channel | Omni-channel | 2015 |
| 2 | Retailer | Retailer associations | Others | 2015 |
| 2 | Retailer | Green logistics as requirement | Restrictions | 2019 |
| 2 | Retailer | Shopping concept | Omni-channel | 2016 |
| 2 | Retailer | Home deliveries | Omni-channel | 2015 |
| 3 | Municipality | Create space for hubs | Bundling | 2016 |
| 3 | Municipality | Facilitate retailers' cooperation | Cooperation | 2015 |
| 3 | Municipality | Lower m2 price | Governmental policy | 2020 |
| 3 | Municipality | Improve city's attractiveness | Governmental policy | 2017 |
| 3 | Municipality | Subsidize low emission vehicles | Governmental policy | 2015 |
| 3 | Municipality | Announce policy change | Inform | 2016 |
| 3 | Municipality | Load and unloading zones | Infrastructure | 2019 |
| 3 | Municipality | Improve infrastructure | Infrastructure | 2016 |
| 3 | Municipality | Oblige retailers to work with hubs | Local stocks | 2020 |
| 3 | Municipality | Stricter emission restrictions | Restrictions | 2020 |
| 3 | Municipality | Repel heavy vehicles | Restrictions | 2019 |
| 3 | Municipality | Privileges for clean vehicles | Restrictions | 2015 |
| 3 | City Hub | Own responsibilities | Bundling | 2019 |
| 3 | City Hub | Media attention | Inform | 2017 |

| SCENARIO | STAKEHOLDER | TACTIC | AGGREGATED | TIMELINE |
|---|---|---|---|---|
| 3 | Shipper | Cooperation with non-competitive parties | Cooperation | 2018 |
| 3 | Shipper | Green logistics in tendering | Governmental policy | 2015 |
| 3 | Shipper | Omni-channel | Omni-channel | 2015 |
| 3 | Carrier | Cooperation with city hub | Bundling | 2018 |
| 3 | Carrier | Live trace and communication | Cooperation | 2016 |
| 3 | Carrier | Avoid rush hours | Others | 2016 |
| 3 | Retailer | No stockings | Bundling | 2016 |
| 3 | Retailer | Omni-channel | Omni-channel | 2015 |
| 3 | Retailer | Omni-channel | Omni-channel | 2015 |

*Table 24: Identified tactics in the workshop, sorted to aggregated tactic*

| SCENARIO | STAKEHOLDER | TACTIC | AGGREGATED | TIMELINE |
|---|---|---|---|---|
| 3 | Carrier | Cooperation with city hub | Bundling | 2018 |
| 1 | City Hub | Value adding | Bundling | 2022 |
| 1 | City Hub | White label | Bundling | 2020 |
| 1 | City Hub | Sharing economy | Bundling | 2017 |
| 2 | City Hub | White label | Bundling | 2019 |
| 3 | City Hub | Own responsibilities | Bundling | 2019 |
| 1 | Municipality | Less transhipments | Bundling | 2021 |
| 3 | Municipality | Create space for hubs | Bundling | 2016 |
| 2 | Retailer | Cooperation between retailers | Bundling | 2015 |
| 3 | Retailer | No stockings | Bundling | 2016 |
| 1 | Shipper | Bundling | Bundling | 2022 |
| 1 | Shipper | Bundling | Bundling | 2020 |
| 3 | Carrier | Live trace and communication | Cooperation | 2016 |
| 2 | City Hub | Alliances with shippers and carriers | Cooperation | 2018 |
| 2 | City Hub | Cooperation in the logistic chain | Cooperation | 2017 |
| 3 | Municipality | Facilitate retailers' cooperation | Cooperation | 2015 |
| 3 | Shipper | Cooperation with non-competitive parties | Cooperation | 2018 |
| 1 | Municipality | New technologies | Governmental policy | 2019 |
| 1 | Municipality | Moderate policy | Governmental policy | 2015 |
| 2 | Municipality | Start subsidies | Governmental policy | 2016 |
| 3 | Municipality | Lower m2 price | Governmental policy | 2020 |
| 3 | Municipality | Improve city's attractiveness | Governmental policy | 2017 |
| 3 | Municipality | Subsidize low emission vehicles | Governmental policy | 2015 |
| 3 | Shipper | Green logistics in tendering | Governmental policy | 2015 |
| 2 | City Hub | Logistics planning tool | ICT solution | 2017 |
| 1 | Retailer | ICT solution | ICT solution | 2017 |
| 2 | Carrier | Change mind-set | Inform | 2018 |
| 3 | City Hub | Media attention | Inform | 2017 |
| 1 | Municipality | Convince residents | Inform | 2019 |
| 1 | Municipality | Announce city lock down | Inform | 2016 |
| 1 | Municipality | Inform customers | Inform | 2015 |
| 2 | Municipality | Make retailers conscious | Inform | 2016 |
| 3 | Municipality | Announce policy change | Inform | 2016 |
| 2 | Retailer | Green logistics in terms | Inform | 2017 |
| 3 | Municipality | Load and unloading zones | Infrastructure | 2019 |
| 3 | Municipality | Improve infrastructure | Infrastructure | 2016 |
| 1 | Carrier | Local-to-local | Local stocks | 2017 |
| 1 | Carrier | Same day delivery | Local stocks | 2016 |
| 3 | Municipality | Oblige retailers to work with hubs | Local stocks | 2020 |
| 1 | Shipper | Local stocks | Local stocks | 2019 |
| 1 | Retailer | Shopping experience | Omni-channel | 2017 |
| 2 | Retailer | Shopping concept | Omni-channel | 2016 |

| SCENARIO | STAKEHOLDER | TACTIC | AGGREGATED | TIMELINE |
|---|---|---|---|---|
| 2 | Retailer | Home deliveries | Omni-channel | 2015 |
| 2 | Retailer | Omni-channel | Omni-channel | 2015 |
| 3 | Retailer | Omni-channel | Omni-channel | 2015 |
| 3 | Retailer | Omni-channel | Omni-channel | 2015 |
| 3 | Shipper | Omni-channel | Omni-channel | 2015 |
| 1 | Carrier | 24/7 distribution | Overige | 2019 |
| 1 | Carrier | Consumer determines | Overige | 2015 |
| 3 | Carrier | Avoid rush hours | Overige | 2016 |
| 1 | Municipality | Balance between online/offline | Overige | 2018 |
| 2 | Retailer | Retailer associations | Overige | 2015 |
| 2 | Municipality | Facilitate disruptive innovations | Platform | 2017 |
| 2 | Municipality | Start G30 city logistics platform | Platform | 2016 |
| 2 | Municipality | Cooperate with other parties | Platform | 2016 |
| 2 | Shipper | Force uniform policy | Platform | 2015 |
| 1 | Municipality | Limit city access | Restrictions | 2021 |
| 1 | Municipality | Parking free zones | Restrictions | 2016 |
| 2 | Municipality | Long term policy with poles | Restrictions | 2016 |
| 3 | Municipality | Stricter emission restrictions | Restrictions | 2020 |
| 3 | Municipality | Repel heavy vehicles | Restrictions | 2019 |
| 3 | Municipality | Privileges for clean vehicles | Restrictions | 2015 |
| 2 | Retailer | Green logistics as requirement | Restrictions | 2019 |

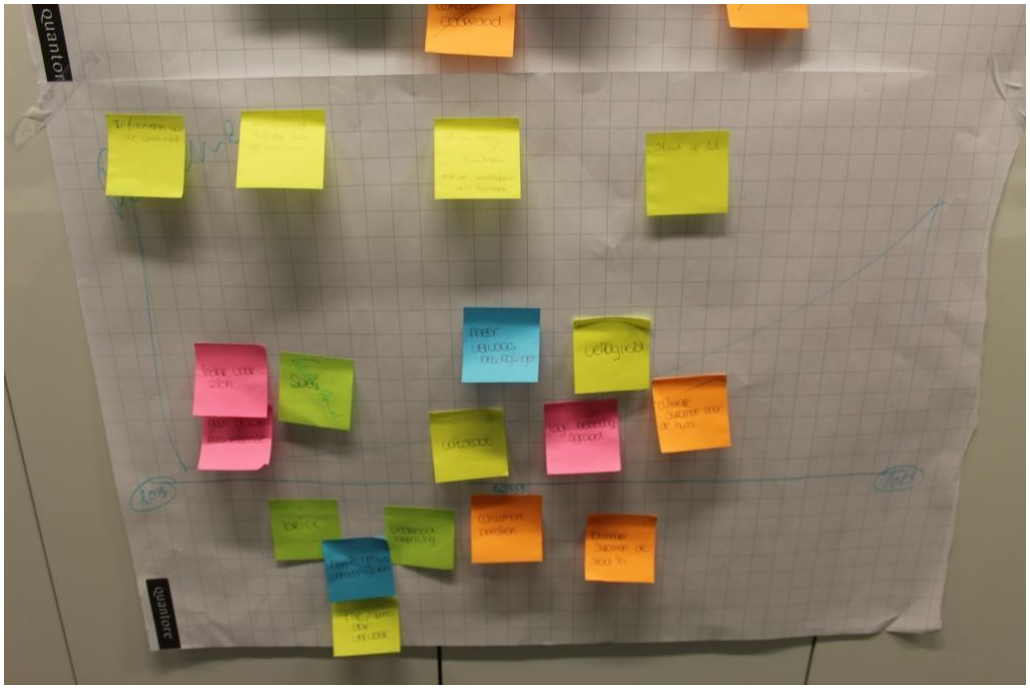
## E.3 Responsibility stakeholders

*Table 25: Responsible stakeholders for realizing tactics*

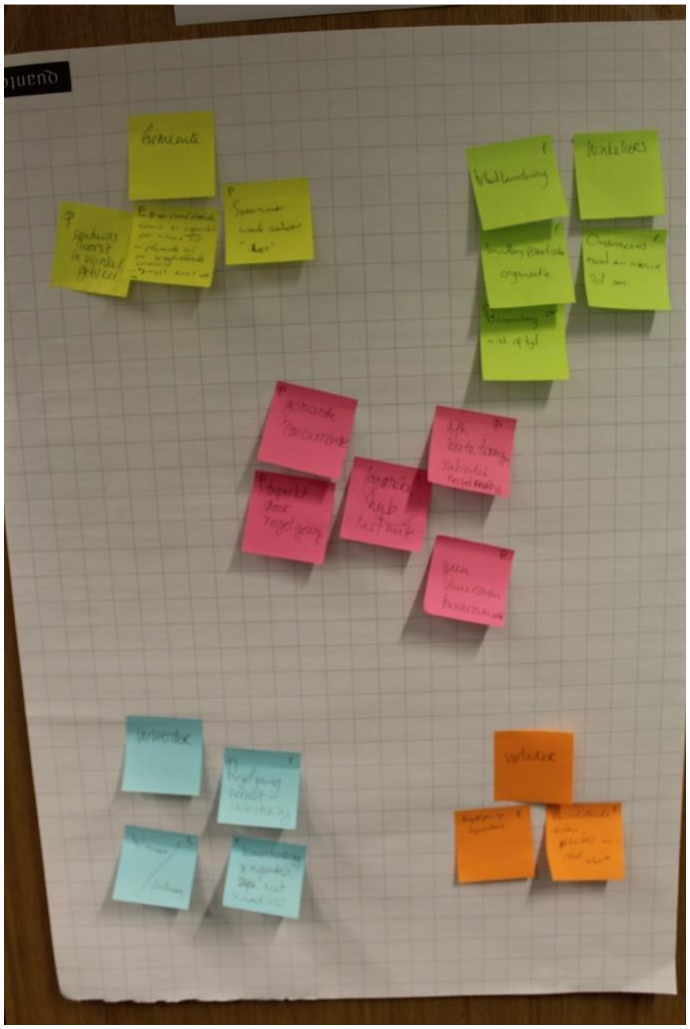
| AGGREGATE ACTION | INVOLVED STAKEHOLDER(S) |
|---|---|
| Bundling | |
| White label | Carrier, Hub, |
| Bundling | Carrier, Hub, Retailer, Shipper |
| Cooperation | |
| Cooperation logistic parties | Carrier, Hub, Shipper |
| Governmental policy | |
| Rental price shops | Retailer, Municipality |
| Sustainability in tender | Shipper, Municipality |
| Subsidy | Municipality |
| ICT solution | |
| Planning tool | Carrier, Hub, Retailer |
| Physical Internet | Carrier, Hub, Retailer, Shipper |
| Inform | |
| Change mind-set | Municipality |
| Inform citizen | Municipality |
| Innovate | Carrier |
| Terms and conditions of shop owners | Retailer |
| Infrastructure | |
| Loading and unloading zones | Carrier, Retailer, Municipality |
| Infrastructure shopping friendly | Municipality |
| Local stocks | |
| Local stocks | Carrier, Hub, Retailer, Shipper |
| Local-local | Carrier, Retailer |
| Omni-channel | |
| Omni channel | Retailer, Shipper |
| Platform | |
| Governments of G30 united | Municipality |
| Business, research and non-profit organisations | Carrier, Hub, Retailer, Shipper, Municipality |
| Restrictions | |
| Parking | Municipality |
| Zero-emission zones | Carrier, Hub, Retailer, Shipper, Municipality |
| Heavy vehicles | Carrier, Shipper, Municipality |
| Shopping concept | |
| Shopping concept | Retailer |
| Others | |
| Avoid rush hours | Carrier, Retailer, Shipper, Municipality |
| SMS | Carrier, Shipper |

## E.4 Pictures of the final results

### E.4.1 Scenario 1 – Conscious Entrepreneurship



### E.4.2 Scenario 2 – Pragmatic Governance

### E.4.3 Scenario 3 – Shop Vacancy