THE ART OF DESIGNING A NEW TECHNOLOGY VENTURE
THE ART OF DESIGNING A NEW TECHNOLOGY VENTURE
MSc. Thesis of Wietske A. Koers

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PREFACE AND EXECUTIVE SUMMARY
Think about the word “design”. What comes to your mind?

Design means different things to different people. Some of you will immediately associate design with fashion and style. Others might think about art, graphics, products, or buildings. And maybe a few of you will relate design to the creative process, which generates something that did not exist before.

During my complete education in Industrial Design Engineering at the Delft University of Technology, I experienced different meanings of the word “design”. First I learned the basics about designing products: from production technologies to aesthetics and design processes. Later I learned about the effects of design and how design tools can be used to create and introduce products, services, and brands that fulfil the strategic objectives of companies and appeal to the needs, wishes, and dreams of the customers. And the more I learn about design, the more I believe that design activity is not restricted to the traditional areas with which it has been associated up till now, but that design practice involves a way of thinking which can be applied to all disciplines in which ideas, origination from one’s mind, are translated into reality.

Therefore this Master thesis is not aimed at designing a new product, marketing strategy, or design tool. And neither does it want to explain or improve the design process of (strategic) product designers. This Master thesis focuses on the design activity of other people with big ideas zooming through their minds: entrepreneurs. Whereas the product designer translates an idea into an appealing and functioning product or service, the entrepreneur is charged with the even bigger task of turning a new business idea into reality by either starting a new enterprise or reviving an existing one. Hence, realising a business idea is a design problem. This formed the inspiration for the topic of this Master thesis. If realising a business idea is a design problem, how do technology-based entrepreneurs tackle this problem in practice? Do they follow specific processes, do they make deliberate choices, or is the design of their firm led by coincidences and luck? With this report I hope to provide some answers to these questions and offer inspiration for the practice of entrepreneurship.

As this project could not have been completed without the help and support of some enthusiastic people, I would like to thank my supervisors Frido Smulders and Han van der Meer, all the entrepreneurs who offered some of their valuable time to answer my questions, and my friends and family who supported me along the way.
Executive summary

Every company, successful or not, starts with one bright idea in an entrepreneurial mind. Through actions of the entrepreneur – let’s call these actions design - this initial idea transforms into a firm that did not exist before. The aim of this Master thesis is to create a better understanding of how technology entrepreneurs design their new venture until this new firm reaches maturity. With this study I hope to contribute to the theory and practice of technology-based entrepreneurship and new venture creation in specific and I hope to provide the Delft University of Technology (TU Delft) with some practical advice for its support to (nascent) technology entrepreneurs.

Central research question
Based on the review of relevant literature in Chapter 2, it is concluded that the creation of a new venture is essentially a design process with the aim to design a mode of opportunity exploitation that yields most value for all stakeholders involved. Designing a good model for creating value of a discovered opportunity is the most crucial task of an entrepreneur, as the business model design determines the set of ‘weapons’ the start-up can use to win the competitive battle for market share. A good understanding of how entrepreneurs choose and develop their business model can therefore help entrepreneurs and supporting organisations to foster and accelerate desired outcomes of entrepreneurial activity. Nevertheless, few existing studies have considered new venture creation as a design activity and even fewer studies have investigated how mode of exploitation is created and evolves in new technology ventures. Therefore the literature review concludes by posing the following main research question:

How does the design of a new technology venture evolve until the firm reaches maturity?

Research approach
In order to discover how technology entrepreneurs design their new venture, an empirical approach was chosen that aims to develop a tentative theory about the evolution of the start-up’s design during the new technology venture creation process based on experiences in the field: the grounded theory method of Glaser and Strauss (1967; Glaser 1992). The research process of this study consists of three stages: scanning, specification and integration. Based on empirical interview data from 10 founders of incubator-based technology start-ups, descriptive codes and preliminary concepts are derived in the scanning stage, which are clustered in more abstract categories in the specification stage and reduced to
core categories in the integration stage. These core categories provide a central theoretic framework that gives a grounded explanation of the business model’s evolution process in new technology ventures.

**Results**

After a thorough analysis of the empirical data it is concluded that the new technology venture creation process consists of three main stages: 1) the exploration stage in which the entrepreneur discovers business opportunities and verifies the potential of these opportunities, 2) the realisation stage, in which the entrepreneur develops both the market and the value proposition and acquires all the required resources and capabilities for creating, manufacturing and offering the envisioned value proposition to the target market, and 3) the exploitation stage in which the new firm engages in exchanges with the created market in order to create true value from all prior efforts.

Furthermore, it was found that throughout these stages the entrepreneur is creating an integrated business model, consisting of three main components: 1) the value proposition, 2) the target market, and 3) the competencies that enable the new firm to perform its business activities properly. This business model is not created in a linear fashion, as it is also found that entrepreneurs learn through reflection on their performed actions. This means that the entrepreneur iterates between the exploration, realisation and exploitation stage until the initial business hypotheses have been sufficiently verified, resulting in a well-functioning business model.

This entire process is not happening in isolation. The entrepreneur should always be attentive to developments in the micro and macro environment, which enable or obstruct the functioning of the business model.

Based on an integration of these insights, it is concluded that, firstly, the new technology venture creation process can be described as the survival of the fitting: to ensure its survival, the business model of the new technology firm should demonstrate a good fit between the firm’s solution and the problem in the market that this solution intends to solve.

Secondly, the process of creating this problem-solution fit can be described as the co-evolution of problem (the market needs) and solution (the value proposition and required competencies). At the start of the new venture creation process, both the problem and solution are indeterminate. More information needs to be gathered to define what the needs in the market are and how the entrepreneur can satisfy them. In order to determine this problem-solution pair, the entrepreneur iterates between the problem and the solution space, as new knowledge about the problem requires adjustments to the solution and vice
versa. Through these iterative cycles, the problem-solution pair becomes gradually fixed, until the new product can be launched onto the market and the new venture can start exploiting the discovered business opportunity. During this new venture creation process the nature of the process changes. Where the exploration and realisation stages are focused on creating a good problem-solution fit through co-evolution of the problem and solution, the exploitation stage is aimed at maintaining and optimising this fit through rational problem solving.

Finally, the entrepreneur who executes the new venture creation process has a large influence on the outcomes of this process. As the new venture creation process is not a linear process that flows from the problem to the solution, it depends on the artistry of the entrepreneur which actions are taken when in order to tackle the new venture design problem.

**Implications and recommendations**

These findings have several implications for the theory and practice of technology-based entrepreneurship.

*Technology-based entrepreneurs*: As the creation of a new technology venture is in essence a design problem, technology-based entrepreneurs should learn from the approaches designers use to solve wicked problems: next to developing a technological product, entrepreneurs must actively frame the need in the market. An effective strategy to develop the product and gain insight in what the market needs, is through co-creation with prominent stakeholders in the targeted market.

*TU Delft*: Entrepreneurship education at the TU Delft is mainly focused on the very first stage of creating a new technology venture: discovering promising business opportunities and developing a sound business plan. However, the biggest challenges are encountered after writing the business plan, when the entrepreneur is testing the hypotheses in the business plan to reality. The results of this study indicate that the artistry of the entrepreneur by which these challenges are tackled can be fostered by the accumulation of experience. The TU Delft should support this accumulation of experience through simulation games in which students encounter the real challenges of new venture creation.

*YES!Delft incubator*: The findings of this study can support YES!Delft in the assessment of applicants for the incubation program and they can support YES!Delft in assessing the progress of its client companies.

*Future research into entrepreneurship*: The findings of this study provide promising new perspectives and directions for future entrepreneurship research.
CHAPTER 1: THE DISCOVERY OF A RESEARCH OPPORTUNITY
1 THE DISCOVERY OF A RESEARCH OPPORTUNITY

Every company, successful or not, starts with one bright idea in an entrepreneurial mind. Through actions of the entrepreneur – let’s call these actions design - this initial idea transforms into a firm that did not exist before. The aim of this Master thesis is to create a better understanding of how technology entrepreneurs design their new venture. With this study I hope to contribute to the theory and practice of entrepreneurship and new venture creation in specific and I hope to provide the Delft University of Technology (TU Delft) with some practical implications for its support to technology entrepreneurs.

This first chapter will give an introduction to the discovered research opportunity and the context of this study. Paragraph 1.1 will introduce the problem of designing a new technology venture and the aim of this study. Paragraph 1.2 will elaborate on the context of this study. First, the concept new technology venture will be defined. And because this study is conducted under the authority of the TU Delft, which supports technology entrepreneurs by means of the Young Entrepreneurs Society Delft (YES!Delft) incubator, this section will continue with background information about business incubators in general and the YES!Delft incubator in specific.
1.1 Introduction

In 2000 the European Union launched the ambitious Lisbon Strategy with the aim to “become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion” by 2010 (European Parliament, 2000). Part of this policy was to stimulate research, innovation, and entrepreneurship as these areas are important drivers for economic growth and job creation. The Netherlands has enthusiastically adopted this strategy: one of the key objectives of the government’s entrepreneurship and innovation policy is to stimulate and anchor entrepreneurship throughout the whole education system. This policy is paying off: 80% of the institutions in upper secondary vocational education, higher professional education, and university education organise specific activities targeted at entrepreneurship or enterprising behaviour; and 62% of their students consider entrepreneurship as a reasonably to very important aspect of their career wish (Gibcus, Overweel, Tan, & Winnubst, 2010).

The TU Delft is one of these institutes where entrepreneurship plays an important role. As a place where many innovations are conceived, the TU Delft realises that both the university and society will benefit when generated knowledge is put into action. Therefore the TU Delft is promoting entrepreneurship among its students and graduates by organising inspiring lectures and courses; conducting research about entrepreneurship; and providing support for new technology ventures by means of the YES!Delft incubator. This focus on entrepreneurship has encouraged more students to start their own firm with an innovative technical product and/or service developed during or after their studies. Furthermore, it has created a thriving entrepreneurial ecosystem that aims to help nascent entrepreneurs to better and more quickly develop their initial ideas into a viable business.

However, during a recent study of Roland Berger Strategy Consultants and IESE Business School (2010), it was found that TU Delft firms grow not as fast as firms of experienced IESE Business School entrepreneurs. In addition, it was found that twice as much YES!Delft entrepreneurs change their target market, position in the value chain, and even their complete business model in comparison to entrepreneurs from IESE Business School (Exhibit 1). The study suggests that the difference in extensive business knowledge and experience between YES!Delft entrepreneurs and IESE business school entrepreneurs might be a reason for these findings, as relevant experience can help entrepreneurs to quicker understand the forces that influence the new venture creation process. To better educate and support nascent entrepreneurs with relevant knowledge, it is
therefore important for the TU Delft to gain more insight in how new technology ventures are created.

This Master thesis intends to study this topic from a design perspective, because according to Herbert Simon “everyone designs, who devises courses of action aimed at changing existing situations into preferred ones” (Simon, 1996, p. 111). From this viewpoint the creation of a new technology venture is in essence a design problem with the ultimate objective to design a business that creates most value for all parties involved. However, little is known about how technology entrepreneurs tackle this problem in practice. To gain a better understanding of the entrepreneurial design process and provide the TU Delft and YES!Delft with some practical advice on how to support its young technology entrepreneurs, the aim of this study is to:

Explore the design process of technology-based entrepreneurs until the new technology venture reaches maturity.

<table>
<thead>
<tr>
<th>Exhibit 1: Business model adaptations</th>
</tr>
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<tbody>
<tr>
<td><strong>Who are my customers?</strong></td>
</tr>
<tr>
<td>We changed our target customer/market</td>
</tr>
<tr>
<td><strong>What is their need?</strong></td>
</tr>
<tr>
<td>We adapted our product specifications</td>
</tr>
<tr>
<td>We added a service component to our business model</td>
</tr>
<tr>
<td><strong>How can we make money fulfilling this need?</strong></td>
</tr>
<tr>
<td>We changed our position in the value chain</td>
</tr>
<tr>
<td>We radically changed the business model of the firm</td>
</tr>
<tr>
<td>Other changes</td>
</tr>
<tr>
<td>No real changes so far</td>
</tr>
</tbody>
</table>

Source: Roland Berger Strategy Consultants & IESE Business School, 2010
This report will present the results of my explorative journey into the design process of technology-based entrepreneurs according to the figure in this exhibit. After defining the problem in chapter 1 and generating first insights based on the available literature in chapter 2, in chapter 3 an empirical research approach is chosen that aims to develop a tentative theory about the new technology venture design process based on experiences in the field: the grounded theory method of Glaser and Strauss (1967; Glaser 1992). Based on empirical interview data from 10 founders of incubator-based technology start-ups, a substantial theory is generated that gives a grounded explanation of the new technology venture design process. The results of this study will be presented in three stages. The tentative theoretic concepts defined in the scanning stage in chapter 4, will provide the foundation for defining broader theoretic categories in chapter 5. These categories will lead to the generation of a substantive theory in chapter 6. This report will conclude by presenting the developed theory and giving recommendations to the TU Delft, YES!Delft and technology-based entrepreneurs, which can hopefully contribute to an accelerated development of new technology ventures.
YES!Delft entrepreneurs represent a specific type of entrepreneurship. Firstly, they create new technology ventures. And secondly, they are supported by a business incubator. To create a better understanding of this type of entrepreneurship, this paragraph will first define what constitutes a new technology venture, subsequently it will provide background information about business incubators in general, followed by a description of the YES!Delft incubator in specific.

1.2.1 Definition of a new technology venture

Through time several terms have been coined to describe newly created technology enterprises, such as new technology venture, new technology-based firm, and technology start-up. These terms are often used interchangeably and the meaning is not always clear. For example, the term new technology-based firm has been invented by the Arthur D. Little Group to describe independently owned companies that have been established for less than 25 years and are based on the exploitation of an invention or technological innovation. Other scholars, however, have used the term in a much broader sense, causing confusion about whether the word new refers to the firm or to the technology (Storey & Tether, 1998). So what is meant when the term new technology venture (or one of its synonyms) is used in this study? The definition of the Arthur D. Little Group of a new technology-based firm offers some useful starting points to define a working definition for this study.

Firstly, the given definition focuses on independently owned companies, excluding new ventures that originate from existing companies. This separation seems a logical one, as studies have found that independent ventures and corporate spin-offs should be studied separately because of their significant differences (McDougall et al, 1994). Secondly, the definition of the Arthur D. Little Group includes all firms that are up to 25 years old. This age threshold has been disputed by other studies, which have found that new ventures start to resemble the characteristics of a mature enterprise after 8 years. This narrow age threshold is nowadays widely accepted amongst entrepreneurship researchers (Bürgel, 2000). Finally, the definition tells something about the nature of the new venture: it exploits an invention or technological innovation. Because no clear definition is given of what constitutes an invention, I have defined an invention as an innovative application of existing technology. In its attempts to exploit an invention or technological innovation, the new venture faces substantial risks: the returns on research and development investments are uncertain, because
the market’s reaction to an innovative product is often difficult to predict due to the absence of comparable solutions. These premises lead to the following working definition for a new technology venture:

*An independently owned company that has been established less than 8 years ago and is based on the exploitation of a technological innovation or innovative application of existing technology with substantial risks.*

### 1.2.2 Business incubators

Starting a new business is always risky: almost 50% of all new ventures do not survive beyond the first five years (Roland Berger & IESE Business School, 2010). Because the value proposition of a technology venture is new to the market, they are facing considerable uncertainty and the risk of failure in this new venture category will probably be even higher than the average of 50%.

In order to improve this survival rate, organisations have been founded that support new ventures. These business incubators nurture new firms (client companies) during the early stages of development, when they are most vulnerable, by providing them with resources and support services on a ‘one-stop’ basis. In doing so, a business incubator significantly improves the survival and growth prospects of its client companies and it subsequently facilitates regional economic development because its clients create jobs, revitalise communities, and commercialise new technology.
Client companies remain on average 2 or 3 years within an incubator, before they become a viable and freestanding firm (Lavrow & Sample, 2000). The success rates of these incubator graduates are high in comparison to other small and medium-sized enterprises (SME): historical figures of the members of the National Business Incubation Association (NBIA) in the United States show that 87% of all incubator graduates, since the NBIA was founded in 1985, are still in business today (NBIA, 2010). With the commencement of the Lisbon Strategy in 2000, business incubators therefore have become a key instrument in EU regional policy to promote entrepreneurship, employment and economic growth. Since then, business incubators have also become more and more popular in The Netherlands. Currently there are approximately 20 business incubators (DIA, 2010) and despite the economic recession the number of client companies in business incubators has grown above average in 2009 (Ernst & Young, 2010) (Exhibit 3).

Because of its popularity, various initiatives that in one way or another help entrepreneurs develop their ideas into a viable business started to carry the label business incubator. Therefore so-called incubators come in many different shapes and sizes and with a variety of intentions. On the top left-hand corner of the spectrum in Exhibit 4 are the industrial estates. This SME promotion structure generally does not follow specific selection criteria with regard to the business activities and technology content of its client companies. It also provides little or no management support to its tenants. In the lower right-hand corner of the typology, the opposite extreme can be found. Technology centres have highly selective admission criteria, with a strong focus on specialised technology.

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Exhibit 4: Incubator typology

Source: Centre for Strategy & Evaluation Services, 2002
ventures, and these incubators provide ample management support (Centre for Strategy & Evaluation Services, 2002). It seems evident that this variety of approaches will also result in a range of different outcomes. To separate the real business incubators from the ones that merely offer office space the NBIA (2010) applies the following definition:

“A business incubator is an economic development tool designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services. A business incubator’s main goal is to produce successful firms that will leave the program financially viable and free-standing.”

Exhibit 5: Incubator services offered in 2007

Source: Aerts, Matthyssens, & Vandenbempt, 2007
Essential to this definition is the supply of business support resources and services. European incubators offer a wide range of services to their tenants (Exhibit 5), which can significantly increase the chances of survival for client companies. Many authors agree that networking is a key factor in the success of start-ups (Freel, 2003; Hansen et al., 2000; Johannison, 1988; Tse, 2002). An incubator can achieve scalability of networking benefits. However, offering a meaningful network requires focused portfolio management of the incubator because the benefits from being linked together and sharing resources is maximised when the portfolio companies are related to each other (Hansen et al., 2000). This is why many incubators focus on catering for a specific type of start-up or industry segment.

1.2.3 YES!Delft

The YES!Delft incubator, which will be the research site for this study, is one of these incubators that is specialised in supporting a specific type of start-up. This business incubator with strong academic ties focuses on creating tomorrow’s leading technology firms. In 2005 the city council of Delft and the TU Delft launched this incubator with the aim to boost the knowledge economy and to stimulate local entrepreneurship by supporting students, professionals, and researchers in all phases of starting and running a high-tech firm. During its five year existence, the YES!Delft incubator has supported 72 start-ups, of which 68 are still operating. These companies, with a total revenue of more than 13 million Euros, have generated 380 direct and 880 indirect jobs (YES!Delft, 2009) (Exhibit 7). These figures show that in the short period of YES!Delft’s existence, its client companies have become a significant factor in the regional economic development.

The vision of YES!Delft is all-inclusive and can be summarised as the “Delft school”: inspire (PhD) students during their studies and subsequently support the companies they found, with the aim to create a continuous flow of promising and fast-growing enterprises. This vision is reflected in the four centers in which the YES!Delft activities are grouped (Exhibit 6). Only less than a decade ago TU Delft graduates gave little consideration to the possibility of becoming an en-
Now the YES!Delft Inspiration Centre successfully makes students aware of the possibilities and challenges of an entrepreneurial career. Inspired students can foster their entrepreneurial knowledge and skills by following a wide variety of courses offered by the Education Centre in cooperation with the Delft Centre for Entrepreneurship (DCE) of the TU Delft. Once these students decide to take the leap and start their own company the Incubation Centre offers infrastructural support, technological and business knowledge, operational guidance, and a relevant network. Nascent entrepreneurs who need more time to properly prepare the start of their company can also choose to first participate in the 100 days lasting Pre-incubation Program. Not every entrepreneur can enter the YES!Delft incubator. Before a start-up gets access to the YES!Delft community, it should pass the following selection requirements (YES!Delft, 2010):

- It has to be a natural or legal person, who runs or plans to run a technology-based enterprise that has not been registered for more than 5 years at the Chamber of Commerce. The enterprise has to sell and supply products, processes or licenses. Consultancy start-ups cannot enter the incubator.
- The technology entrepreneur has to work full-time on the new venture.
- Commercial activity has to be realised within 2 years, unless it is not possible to develop the technological innovation in this time frame.
- The technology entrepreneur should hand in a business plan which demonstrates the technological and commercial feasibility and the scalability of the new venture, including a recommendation letter of a technological expert, an assessment of the potential for acquiring Intellectual Property (IP), a competitor analysis, and an ambitious milestone planning for the incubation period. This milestone planning is used to monitor and assess the achievements of the new technology venture during the incubation period.

The new technology venture can stay at maximum 4 years within the YES!Delft incubator and has to leave the incubator when one of the following events happens (YES!Delft, 2010):

- Outgrowing the incubation phase.
- Needing more office space than 50 m2.
- Not following recommendations of the selection committee.
- Not meeting the predefined goals and milestones.
- Changing from a technology venture into a consultancy firm.

If the new venture successfully meets all the predetermined incubation milestones, the technology start-up becomes a YES!Delft graduate and can enter the YES!Delft Growth Centre, which supports the enterprise with an interesting business network to obtain further growth objectives.
Exhibit 7: YES!Delft facts and figures

General Figures

<table>
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<tr>
<th></th>
<th>2005</th>
<th>2006</th>
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<td>9</td>
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<td>18</td>
<td>25</td>
<td>34</td>
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Figures in 2009

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<td>Employees</td>
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<td>Board of directors</td>
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<tr>
<td>Total staff</td>
<td>155</td>
<td>228</td>
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<td>Revenue through sales in €</td>
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Patents

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<td>Companies that acquired a patent</td>
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<td>Patents in cooperation with TU Delft</td>
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<td>Patents owned by company</td>
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<td>Patens in cooperation with others</td>
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<td>Total patents</td>
<td>22</td>
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Background founders 2005-2009

Source: YES!Delft, 2009
Chapter 1 introduced the research opportunity and the context of this study and defined the following aim for this study: **Explore the design process of technology-based entrepreneurs until the new technology venture reaches maturity.**

This chapter will investigate what is already known about the design process of technology entrepreneurs. This is done according to structure in Exhibit 8. Because the term entrepreneurship is used to describe a variety of phenomena, paragraph 2.1 first tries to answer the question: **what is the definition of entrepreneurship and entrepreneurship research?** Paragraph 2.2 will focus on the new venture creation process and based on the available literature the main phases in the new venture creation process will be defined. Paragraph 2.3 will first elaborate on why creating a company is actually a design problem, before paragraph 2.4 will take a closer look at the object of design. Subsequently, paragraph 2.5 will propose the business model as a promising framework to capture the design a new venture. Paragraph 2.6 will summarise the main findings of the literature review and propose the central research question for the remainder of this study.
2.1 What is entrepreneurship?

The word entrepreneurship stems from the French verb *entreprendre*, which means “to do something” or “to undertake”. In the 16th century the word entrepreneur was first used to describe someone who undertakes a business venture (Sobel, 2008). Nowadays there is much confusion about the correct definition of entrepreneurship. In everyday life the Dutch word for entrepreneur is used to describe a person in a branch of trade or business, who takes on the risk of owning and running a business with the use of foreign labour (Dikke Van Dale, 2010). Based on this broad general definition, a variety of people can be called an entrepreneur: from the small greengrocer on the corner to entrepreneurs like Mark Zuckerberg, whose Facebook is valued at 15 billion Dollars at the moment of writing this report. A typology of different entrepreneurs in Exhibit 9 shows that the ambitions of these entrepreneurs can be very various. But not only do the ambitions of these entrepreneurs differ significantly, also the businesses they create are diverse, as are the challenges these businesses have to overcome. Therefore the question arises: are all these businesses entrepreneurial?

Scholars from various academic domains have studied the entrepreneurial phenomenon and tried to answer the question: what is entrepreneurship? The diversity of these scholars is reflected in the many and various definitions used to explain entrepreneurship. Davidsson (2003) makes a distinction between the
definitions of entrepreneurship as a societal phenomenon and the definitions of entrepreneurship as a scholarly domain, which will be further elaborated on in the next paragraphs.

2.1.1 Entrepreneurship as a societal phenomenon

Entrepreneurship is widely believed to be an important driver for economic growth, job creation, and innovation (OECD, 2010). Therefore many scholars include an outcome criterion in their definition of entrepreneurship: the outcome of entrepreneurship on society has to be successful or influential in some way (Davidsson, 2003). The most influential definitions are summarised here:

- **Entrepreneurship is introducing disruptive innovations.** According to Schumpeter (1912, 1992) entrepreneurs bring about disruptive change in an economy by identifying and introducing innovations: new or improved products, production methods, markets, sources of supply, and organisations or industries. These new combinations disrupt markets, rendering existing goods obsolete. Schumpeter identifies this process of creative destruction as the driving force behind economic development.

- **Entrepreneurship is assuming the consequences of uncertainty.** Knight (1921) focused on the uncertainty entrepreneurs face when introducing innovations. As company owners and thus profit receivers, entrepreneurs carry out three tasks: (1) initiating valuable changes or innovations; (2) adapting to changes in the economic environment; (3) assuming the consequences of un-
certainty related to the business. In this theory the entrepreneur acts as an insurance agent: (s)he predicts where new profit opportunities will arise and makes a judgment about pursuing these opportunities at the risk of own failure, thereby shielding all other stakeholders against this risk.

- **Entrepreneurship is identifying opportunities.** Kirzner (1997, 1999) defines entrepreneurship by the process of opportunity discovery. The alert entrepreneur discovers and exploits opportunities until the market’s attention is drawn to this opportunity, leading to competitor entry. This competition eliminates the opportunity and establishes a new equilibrium. As opposed to Schumpeter’s entrepreneur, who is a disruptive force, Kirzner’s entrepreneur moves the economy from disequilibrium to equilibrium.

- **Entrepreneurship is shifting resources.** Drucker (1985) defines systematic innovation as the specific function of entrepreneurship. In order to create something new and different, entrepreneurs shift resources out of lower productivity areas into higher productivity areas, yielding more value. In this sense entrepreneurship is not limited to individuals who start their own company. Entrepreneurial activities can also be found in large existing firms. These activities should be aimed at purposeful innovation, as according to Drucker a systematic approach can greatly reduce the risk of entrepreneurship.

Let’s reconsider the example of the local greengrocer and the successful entrepreneur Mark Zuckerberg. The greengrocer on the corner does what has been done many times before, while the Mark Zuckerberg has discovered and exploits a new unique way to fulfill customer demands and to create higher value. Both have created a new venture, but are they both entrepreneurial? Considering that the outcome of entrepreneurship as a societal phenomenon is the introduction of new economic activity that leads to significant change in the

Exhibit 10: The blind men and the elephant by John Godfrey Saxe (1816-1887)

*It was six men of Indostan,*  
To learning much inclined,  
Who went to see the elephant  
(Though all of them were blind),  
That each by observation,  
Might satisfy his mind.

The first approached the elephant,  
And, happening to fall,  
Against his broad and sturdy side,  
At once began to bawl:  
“God bless me! but the elephant,  
Is very like a wall!”

The second feeling of the tusk,  
Cried: “Ho! what have we here,  
So very round and smooth and sharp?  
To me tis mighty clear,  
This wonder of an elephant,  
Is very like a spear!”

The third approached the animal,  
And, happening to take,  
The squirming trunk within his hands,  
Thus boldly up and spake  
“I see,” quoth he,  
The elephant is very like a snake!”
marketplace (Schumpeter, 1992; Knight, 1921; Kirzner, 1999; Kirzner, 1997; Drucker, 1985; Davidsson, 2003), the greengrocer does not represent entrepreneur. So just opening up a new shop is not enough to be entrepreneurial. This is also reflected in the official entrepreneurship definition of the OECD, which considers three components (Ahmad & Hoffman, 2007, p.4):

- **Entrepreneurs are those persons (business owners) who seek to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.**
- **Entrepreneurial activity is the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.**
- **Entrepreneurship is the phenomenon associated with entrepreneurial activity.**

2.1.1 Entrepreneurship as a scholarly domain

A good understanding of entrepreneurship as a societal phenomenon can accelerate desired outcomes of entrepreneurial activity, therefore the aim of entrepreneurship research should be to explain and facilitate the role of entrepreneurship in furthering economic progress (Low & MacMillan, 1988). However, entrepreneurship research is like the parable of the blind men and the elephant (Exhibit 10): each study captures an aspect of entrepreneurship, but none captures the complete picture of the complex, multidimensional phenomenon of entrepreneurship.

Early research on entrepreneurship mainly tried to understand entrepreneurship by asking the question: “who is the entrepreneur?”, since the entrepreneur stands at the basis of entrepreneurship. This approach has led to a larger than
life characterisation: based on all research into the ‘who-question’ the entrepreneur should exhibit an impossible amount of (sometimes even conflicting) traits (Gartner, 1988). So THE entrepreneur does not seem to exist (Brockhaus & Horwitz, 1985). Unsatisfied with the outcomes of these trait approaches in entrepreneurial research, Gartner (1988) describes entrepreneurship as just any other job: it is something someone does, not is. Therefore he tentatively defines entrepreneurship as the creation of new organisations. According to him, better starting points for studying entrepreneurship are the actions the entrepreneur takes during the creation of the company. Thus when one wants to understand the phenomenon of entrepreneurship, one should study the behaviour of the entrepreneur in the process by which the new organisation emerges (Davidsson, 2003). This view inspired scholars to study entrepreneurship from a new behavioural perspective.

After comparing 97 entrepreneurship articles Busenitz et al. (2003) found that entrepreneurship is either explained by the characteristics of entrepreneurial individuals and teams, the opportunities to which they respond, the mode of organisation, or the environment, but research into the interactions between these fragments is very limited (Exhibit 11). Therefore a mutual understanding of the entrepreneurial phenomenon as a whole does not yet exist. In an attempt to define an integrated framework for entrepreneurship research, Venkataraman (1997) states that entrepreneurship involves both the presence of Kirzner’s lucrative opportunities and of Schumpeter’s disrupting enterprising individuals, thus defining the scholarly field of entrepreneurship as “the examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated and exploited” (Shane & Venkataraman, 2000, p. 218). This definition represents an important step forward in defining a common ground for entrepreneurship as an academic domain, offering the following

Exhibit 11: The scholarly domain of entrepreneurship

Little research has been conducted into the interactions between individuals and teams, opportunities, mode of organisation, and environment.

Source: Busenitz et al., 2003
basic principles (Davidsson, 2003):

1. **Entrepreneurship is more about behaviour than personal characteristics.** Entrepreneurship studies should primarily focus on the actions of the entrepreneur, while maintaining an interest in the fit between the individual entrepreneur and the discovered opportunity.

2. **Entrepreneurship is about emergence.** This implies that entrepreneurial activity has a start and end point. Entrepreneurial activity ceases once the venture idea has either become an abandoned effort or an established business.

3. **Entrepreneurship is a process, consisting out of two main sub-processes: opportunity discovery and opportunity exploitation.** These processes will be explained in more detail in the next section.

4. **Entrepreneurship leads to the emergence new products and/or services through different modes of exploitation.** New products and/or service opportunities can be exploited in a new organisation, but also in an existing one through corporate entrepreneurship.

5. **The entrepreneurial process has a range of both positive and negative outcomes.** Entrepreneurship research should study both successful and unsuccessful examples of entrepreneurial activity.

All these principles offer important guidelines for this study, both in the areas of which topics to study and which participants to recruit for the study. From these points two main areas of interest have been defined for remainder of this literature review: (1) entrepreneurship is a process and (2) this process has various outcomes. The following paragraphs in this chapter will therefore first elaborate on the process aspect, followed by an investigation into which elements originate from this process.

### 2.2 Creating a new venture: from opportunity discovery to opportunity exploitation

Now that I have established what entrepreneurship actually is, I want to take a closer look at the entrepreneurial process of new venture creation. New venture creation models exist at several levels of detail. Gartner (1985) focuses on the interactions between the individual(s), organisation, process, and environment involved in new venture creation. Larson and Starr (1993) explain new venture creation from a network perspective. Others focus on the life cycle of new organisations (Churchill & Lewis, 1983; Kazanjian & Drazin, 1990). And there are also scholars who study the process and sequences of start-up events in more or less detail (Bhave, 1994; Carter et al., 1996; Kaulio, 2003; Vohora, 2004; Meer, 2007). As it would be too elaborate to explain all these models in detail I want
to focus on two important concepts in new venture creation: opportunity discovery and opportunity exploitation.

The entrepreneurial process starts with opportunity discovery. Even though the term opportunity has a positive connotation, this concept should be viewed in the light of uncertainty: at the start the entrepreneur can never know if pursuing a perceived opportunity will lead to a favourable outcome. Therefore the process of identifying opportunities has important implications to the new venture creation process. If the entrepreneur fails to identify the “right” opportunity, the exploitation of this opportunity very likely will result in the failure of the new venture.

In literature there exist two different explanations for the opportunity discovery process: search and recognition. The search model explains opportunity discovery based on the differences in search costs (i.e. search effort) among people. It assumes that the entrepreneur knows which pieces of information (s)he is lacking and that, as a result, the outcome of the search process is clear from the beginning (Shane, 2000). Therefore people will only search for opportunities when the outcome outweighs the search costs.

However, opportunities are characterised by the fact that nobody knows what they are missing until the opportunity has been discovered (Kirzner, 1997). As the potential entrepreneur does not know what to exactly search for, the search theory does not seem to adequately explain the opportunity discovery process. The recognition model, on the other hand, includes the element of surprise that is part of discovering an opportunity. Based on prior knowledge that the individual already has obtained, (s)he becomes sensitive to the value of new information, which can lead to the recognition of an opportunity (Kirzner, 1997; Venkataraman, 1997; Shane, 2000).

Therefore, individual differences in prior knowledge seem to influence the behaviour of the entrepreneur. It determines which opportunities are discovered and how these opportunities will be exploited (Shane, 2000). This assumption is supported by findings of Baron and Hannan (2002), who discovered that founders of technology ventures have very different mental models – i.e. internal simplified working models of the world that humans develop to cope with new information and to make predictions with little mental effort (Badke-Schaub et al., 2007) – about the initial organisational form of their companies, which largely determine the sequence in which entrepreneurs undertake milestone activities and how the organisational blueprint evolves.

When taking a closer look at the opportunity discovery process, two different routes of opportunity discovery can be distinguished (Bhave, 1994). Some en-
Entrepreneurial processes start when the individual becomes aware of the possibility of an entrepreneurial career and develops the intention to start an enterprise. This intention does not immediately have to result in business start-up. Most of the entrepreneurs who follow this route discover several opportunities before they decide to pursue the one that is best aligned with their knowledge, experience, skills, and/or resources. Therefore some entrepreneurs first take some time to develop these elements before they take the leap. Others have the intention to start a venture, but will never act upon it, because the “right” opportunity or moment never comes along. Bhave (1994) calls this route: externally stimulated opportunity discovery.

Internally stimulated opportunity discovery processes (Bhave, 1994), on the other hand, start with finding a solution for a personal or related person’s need that is not yet satisfied by existing products and/or services. Once the solution has been developed, it is discovered that many other people experience the same “pain”: there exists a market for the product/service. In these cases the opportunity has been discovered before the business potential became apparent.

Once the entrepreneur has decided to commit to a perceived opportunity, the discovery process will continue by refining the conceived venture idea into a fully developed business concept, which explains in detail how the new venture intends to create value. This business concept should demonstrate a good fit between the opportunity, the entrepreneur(s), and the available resources, as according to Bygrave (2010) there is no point in having a first-rate idea when you do not have the first-rate team or the appropriate resources to make this idea work.

The opportunity exploitation phase is the more visible phase in new venture creation, because during this phase the entrepreneur establishes the company as an official entity and engages in exchanges with the market. Exploitation starts with the decision to act upon the discovered opportunity, followed by actions to realise this venture idea (Davidsson, 2003). In Bhave’s (1994) new venture creation model the exploitation phase has been divided in two stages: the technology setup and organisation creation stage; and the exchange stage. During the first stage, resources are acquired for technology set up, organisation creation, and marketing. These efforts result in a market ready product, and the exchange stage is entered when this product is sold over the supply and demand boundary to customers. These customers give feedback that the entrepreneur can use to improve the value proposition, marketing activities, or even the complete business concept. Hence, it seems evident that new venture creation is closely related to new product development (Exhibit 12).

The discovery and exploitation phase do not represent a linear process. These phases can occur in any sequence and can even overlap (Carter, Gartner, &
In technology start-ups the new product development process plays an important role. Simultaneously with the product, the company is designed. In the field of Industrial Design Engineering this process of developing new business activity around a new product is known as the product innovation process. The Delft Innovation Model (DIM) (Buijs, 2003) is one of the models that have been developed to represent this process and which offers good insight in the interactions between company, new product development, and the environment.

The DIM is a circular representation of the product innovation process, representing the five main stages in integral product development: strategy formulation, design brief formulation, product development, market introduction, and product use. The product innovation process ends in products use, but at the same time this will also form the starting point for new product innovation processes. Therefore the model is a never ending cycle. Furthermore, the model represents how a company functions in its environment: the company in the centre reacts to environmental changes by developing new products.

The DIM has been developed based on the product innovation processes in existing companies, but it could also proof to be useful for studying how start-ups design their own firm. When starting a new venture, there is no fully defined and functioning company yet that influences the kind of products being developed. The company is only represented by the entrepreneur, who wants to realise a product idea by creating a new business. This forms the starting point for both the new venture creation and new product development processes. Based on the DIM it can be assumed that these processes will interact (green arrows). Decisions regarding new product development will influence decisions regarding the company, and vice versa.
Reynolds, 1996; Davidsson, 2003). According to Van der Meer (2007) the entrepreneur, after deciding to act upon a venture idea, goes through a process of finding the company’s main focus. During this focusing process the entrepreneur can switch multiple times between the discovery and exploitation phase. For example, the entrepreneur tests the business concept in practice and through contact with investors, suppliers, and/or customers (exploitation) it might become clear that the initial business concept is not a viable one (feedback). Based on this insight, the entrepreneur can start a new discovery process in which the business concept is adapted, refined, or completely abandoned. Once the entrepreneur has successfully found the golden formula to create value, the organisation can be expanded and the business can continue to grow. The new venture creation process finishes when the created business reaches maturity (Churchill & Lewis, 1983) (Exhibit 13).

2.3 New venture creation as a design activity

The previous paragraph demonstrates that an entrepreneur will not know immediately how to transform a potential business opportunity into a healthy future business at the moment of discovery, because the entrepreneur might miss relevant knowledge about the current situation, the final objective, or the actions needed in between those two. Hence, the entrepreneur is facing a problem. During the new venture creation process the entrepreneur will devise courses of action to overcome the barriers between the initial moment of opportunity discovery and the desired state of profitable opportunity exploitation in the new firm. According to Simon (1996) all intellectual activity that is aimed at devising courses of action to change existing situations into preferred ones, can be called design. Therefore the activity of new venture creation can be considered a design activity in which the entrepreneur tackles the design problem of creating value from a perceived opportunity. Moreover, it seems that this design problem can be described as wicked, because it exhibits the following characteristics (Rittel & Webber, 1973):

- Every new venture design problem is essentially unique, as it is embedded in a specific context.
- There is no definitive formulation of the new venture design problem. During the development of the company, the entrepreneur will gather more and more information, which changes the initial understanding of the problem and thus its definition.
- There is no stopping rule for the new venture design problem. Actually this problem is never solved, as the problem definition keeps on evolving based on new information that is gathered during the process and from the
environment. Therefore there only exist sufficient solutions at certain points in time. The entrepreneur decides to terminate the problem solving process, because (s)he runs out of money, time, or patience, until a new problem solving process has to be started based on newly acquired information.

- **There are an infinite number of potential solutions** to the new venture design problem. These solutions are neither right nor wrong; a solution is simply better, worse, or sufficient. Even though there is no provable right solution to the new venture design problem, it is possible to define criteria that help judge the quality of the proposed solution.

- **Every implementation of a solution has significant consequences.** This means that there are limited chances to develop the best solution. The entrepreneur commits (often scarce) resources to the implementation of a solution. This leaves little room for unbridled experimentation, else the entrepreneur will soon run out of resources. Furthermore, the implemented solution will affect the market. For example, implementing a bad solution can damage the company’s reputation, while implementing a good solution can create positive word-of-mouth marketing that results in a larger market share.

For a long time strategic planning based on systematic analysis was the dominant doctrine in the business arena (Mintzberg, 1994). This approach assumes that the entrepreneur has all the available data to make informed decisions about
the strategic direction for the new firm. However, the main characteristic of the wicked new venture design problem is uncertainty, rendering the analytic and deductive planning approach ill-suited for solving it. The design approach, on the other hand, better copes with this uncertainty, because of its innovative abductive (Rosenburg & Eekels, 2003) and opportunistic nature. This means that design is an open and creative activity, which is concerned with visualising what might be and creating a strategy to realise the desired future, while leaving room to incorporate newly emerging opportunities during the process. Unlike strategic planning, design is about synthesis: creating a coherent harmonious whole out of often contrasting demands (Liedtka, 2000). This characteristic of design is especially useful during the new venture creation process in which the entrepreneur continuously has to balance the demands from the market, the own company, and all other stakeholders with the objective to create the most amount of value for all stakeholders involved.

Consequently, considering new venture creation as a design activity seems to better fit the nature of this process than considering it as a planning activity. Manzini (2003) supports this assumption and recommends strategic design as a new approach for entrepreneurs to take on the challenge of creating a business, as this design activity aims at creating an integrated system of products, services, communications, organisation, and stakeholders to generate value. Martin (2004) even takes it one step further and poses the opinion that businesspeople should become designers in order to purposefully create their own company.

2.4 Mode of exploitation as the object of design

Design is a word with a range of different meanings. In some cases it is used as a verb, in others as a noun. Design can thus refer to both the activity as the outcomes of that same activity. The preceding paragraph poses the assumption that new venture creation can be best described as a design activity. But what are the outcomes of this design activity? This paragraph will try to find an answer to this question by defining the object of the new venture design activity.

Consider the case of Virus Free Air B.V., a YES!Delft technology start-up that has developed an innovative technology for air purification. High concentrations of microbes and particulates in the air within buildings can pose a significant health hazard. The technology of Virus Free Air catches 90% of all these microbes and particulates in the air, thus significantly improving the internal air quality and reducing related health problems. This technology has the potential to become a commercial success in a variety of markets, from healthcare to agriculture. But will this happen?
From the principles of entrepreneurship research in paragraph 2.1.2, we learned that an entrepreneur can use different modes of exploitation to create value from an opportunity (principle 4). This leaves ample possibilities for Virus Free Air to commercialise its technology. For example, the company can choose to become a product manufacturer, but it can also sell its technology through licenses to other manufacturers. This choice has important implications for which market the company will target, the activities the company will perform to bring the value proposition to this market, the resources needed to perform these activities, and eventually the profitability of the entire business venture. The complete system that is created based on these decisions forms the mode of exploitation. Therefore it can be concluded that the mode of exploitation is the object of the new venture creation process.

It seems that the mode of exploitation can be a strong indicator of the company’s future success. How entrepreneurs create this mode of exploitation should therefore be an important topic in entrepreneurship research. However, the new venture creation models that have been described in paragraph 2.2 give little insight into how the mode of exploitation develops during the new venture creation process. To create this insight, a framework has to be defined which captures the design of a company. Even though it is mostly used in the context of existing enterprises, the theory on business models seems to provide an adequate framework, as it captures how businesspeople intend to create value, i.e. the mode of exploitation. The following paragraphs will further elaborate on the business model, its relation to strategy and business tactics, and will conclude with what is already known and what is not known about business model design and dynamics.

### 2.5 What is a business model and how is it designed?

Since the e-business boom of the late 90s the term “business model” has become increasingly popular. Just type “business model” in Google and you will receive over 7 million hits. But the meaning of the term is vague, as it is often used to portray three distinctively different things: components of business models, real operating business models and change models (Linder & Cantrell, 2000). So what exactly is a business model?

This is a question that has attracted the interest of many scholars from both business and technological disciplines with a diverse scope of research interests (Pateli, 2002). For that reason there exists a wide array of definitions (Appendix A) and so far there is no agreement on a dominant one. Some authors perceive
the business model as a business concept which explains how a company does business (Pateli, 2002; Osterwalder et al., 2005). Examples of this view are Linder and Cantrell who describe the business model as “the organisation’s core logic for creating value” (Linder & Cantrell, 2000, p.2) and Magretta (2002) who perceives the business model as a story that explains how the enterprise works. Other researchers focus on the model aspect and explain the business model as the link between strategy, business processes and information systems (Pateli, 2002; Osterwalder et al., 2005). The definition of Osterwalder and Pigneur is probably one of the most complete examples in this category: “A business model is nothing else than a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenues stream” (Osterwalder & Pigneur, 2002, p.2). Still other authors emphasise the strategic parts of the business model, like Morris et al.: “A business model is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture and economics are addressed to create sustainable competitive advantage in defined markets” (Morris et al., 2005, p. 727).

This overview shows that business model definitions can be divided in several categories. The preceding discussion also highlights that the business model is closely related to strategy. Therefore the following section will first elaborate on this relationship, before defining a working definition of the business model for this study.

### 2.5.1 Business model and strategy: what is the difference?

The business model is closely related to strategy, but scholars are divided about the nature of this relationship. Some authors include strategy as a component of the business model (e.g. Chesbrough & Rosenbloom, 2002; Morris et al., 2005). Others perceive the business model as an abstraction of the company’s strategy (e.g. Seddon & Lewis, 2003). And still others perceive the business model as the link between strategy and business processes (e.g. Osterwalder & Pigneur, 2002; Osterwalder, 2004). In order to investigate the relation between both concepts, two theories from authorities in their respective field of research will be discussed here: the business model theory of Osterwalder and Pigneur and the strategic positioning theory of Porter.

One of the most elaborated theories about business models comes from Osterwalder and Pigneur (2002, 2004, 2010) who reviewed many other business model studies to establish the main elements that explain how a company works. To help managers visualise how their companies create value, they developed
the business model canvas consisting of nine basic building blocks that cover the four main areas of business: customers, offer, infrastructure, and financial viability (Exhibit 14). This canvas can be used as a tool to design, evaluate, and communicate a company’s business model, which will form the blueprint for the company’s strategy. Therefore the business model theory seems to advocate an inside-out approach to designing the company: the entrepreneur seeks innovative ways to fill and connect all business model building blocks of the company in order to create, deliver and capture value.

This view is common among scholars who study the business model in the domain of e-businesses. Instead of thinking in terms of competitive strategy, managers of e-businesses in the late 90s started thinking in terms of business models. But according to Porter (2001) this approach to management will only lead to faulty thinking and self-delusion, as just having a business model is a very low standard for starting a company. To become successful, companies should have a strategy which will set them apart from the competitors: entrepreneurs should choose a different set of activities or perform activities differently to deliver a unique mix of value (Porter, 1996). To attain this, Porter (1996; 2001) describes six principles of strategic positioning:
1. Strategic positioning should start with the right goal of superior long-term return on investment.
2. The strategy should enable the company to deliver a different value proposition than competitors.
3. The strategy needs to be reflected in the value chain, by performing activities differently than competitors.
4. Strategy will involve trade-off decisions in both the company’s value proposition and value chain.
5. Strategy defines how all the elements of what a company does fit together.

The essence of strategic positioning is thus in differentiating from competitors by choosing a certain set of activities to create a unique position in the market: an outside-in approach to designing the company. An activity-system map can visualise the strategic positioning of a company and can be useful to check if all the activities fit together and how this fit can be strengthened (Porter, 1996). This activity-system map closely resembles some authors’ notions of the business model, but is firmly anchored in an analysis of the competitive environment.

Based on the previous, it can be concluded that the business model and strategy are actually two sides of the same coin. First, there seems to be a remarkable similarity between the business model theory of Osterwalder and Pigneur and the strategic positioning theory of Porter, as both authors stress the importance of choosing well-fitting internal business elements to create unique value. The business model or – as Porter calls it – the activity-system map gives insight in how all these elements are linked together and can be a helpful tool in assessing the internal fit. However, unlike the business model theory, strategic positioning puts a strong emphasis on setting goals and analysing the competitive environment. Therefore the strategic approach to developing a company is characterised by an outside-in process: the entrepreneur analyses the competitive environment for opportunities to position the company differently than rivals in order to achieve superior long-term return on investment. By making trade-off decisions, the entrepreneur will create the company’s business model.

The business model approach, on the other hand, tries to create a company by an inside-out approach: the entrepreneur identifies the internal elements needed to create value and tries to find innovative ways to organise these elements in the business model in order to create a unique company. The resulting business model design will be the blueprint for the company’s strategy. As Porter points out, this seems an illogical approach to designing a company: how does an entrepreneur know if the company’s business model is creating economic value if (s)he, for example, does not know which other commercial initiatives are out there in the market or which technological trends take place in the industry?
Therefore in their later work Osterwalder and Pigneur (2010) emphasise that developing a competitive business model is impossible without a good overview of the environment in which this model will function. Only after the major strategic decisions have been made, such as choosing a target market, the business model can be designed around those decisions. Consequently, the business model and strategy are not conflicting concepts that describe the same phenomenon, but they can be used to describe the same phenomenon on different levels of abstraction.

Let’s elucidate this relationship with an analogy based on the work of Casadesus-Masanell and Ricart (2009). Consider the design of a new computer. At the start of the design process the possibilities are endless. The designer can choose from a huge amount of features: it can become a desktop, a notebook, or even a tablet computer. Based on an analysis of the design problem, the designer defines a list of requirements and wishes for the final computer design. The subsequent creative process involves the development of and choice between multiple alternative computer designs, which satisfy the predefined demands. During this process the designer creates sketches, mock-ups, prototypes, and eventually the final computer. All these outcomes reflect design decisions taken at a specific point in time during the design process.

This story about designing a computer highlights the difference between design as a process and design as an outcome. This distinction between process and outcome also seems relevant when explaining the concepts of strategy and business model. From the literature on business models we can learn that a business model consists out of several components which are arranged to operate in a way that it creates value for the company and all involved stakeholders. Now reconsider the analogy with a product, in this case the computer. In the computer the separate components are also arranged in a way that it fulfils a particular function. By fulfilling that function, the product creates value for the user. In the process of creating a new computer, a designer has to consider the separate components and how they should work together in order to fulfil a specific function. This bears a strong resembles with Porter’s fifth principle of strategic positioning: strategy defines how all the elements of what company does fits together. Furthermore, the analogy shows that the design process includes the activities problem analysis and goal definition. Both these activities play a prominent role in Porter’s principles of strategic positioning. Based on the defined strategic objectives, trade-off decisions are made between alternative strategic options, which results in the business model design. Accordingly, strategy is not the business model itself, but the activity of designing the business model (Casadesus-Masanell & Ricart, 2009). Or in the words of the analogy: the design process by which the computer is created is strategy; all tangible intermediate design outcomes and the final computer itself are the business model.
This means that the business model is the result of a strategic design process and thus the reflection of the company’s intended or operational strategic decisions at a specific point in time. In light of this discussion the business model can therefore be defined as:

_A tool which gives insight in the company’s core logic for creating value in a competitive environment at a specific point in time._

### 2.5.2 Business model: the boundary for business tactics

So what happens when the entrepreneur has made the strategic choice for a specific business model? Let’s reconsider the computer design analogy. In this analogy the business model is the computer design, which fully defines the actions that are at the user’s disposal. For example, a desktop computer is easier to work at when spending long hours on the computer, because of the ergonomic design and flexible positioning of the monitor, keyboard and mouse. A laptop can also be used in this situation, but would put more strain on the user’s hands and posture, creating less value for the user. In the former situation both the desktop and laptop design can be used, but there are also user actions that are possible with a laptop, like carrying the computer around and using it on the train, which are impossible with a desktop. In these situations a desktop design would not create any value for the user.
Like the computer design defines all possible user actions, the business model
design defines the set of business tactics that are at the entrepreneur’s disposal
(Casadesus-Masanell & Ricart, 2009). Whereas strategy defines the business
goals and all ideas for achieving these goals, resulting in the company’s business
model, business tactics refer to the detailed actions that are actually taken to
achieve the defined strategic goals. As the analogy shows, these actions define
how much value is actually created. Because the set of value-creating business
tactics is limited by the design of the business model, the strategic choice for a
particular business model design is a crucial factor in determining the amount
of value that will be generated by a new business venture (Exhibit 15).

2.5.3 Principles of business model design

A tool for designing the company’s business model is the business model canvas
of Osterwalder and Pigneur (2010) (Exhibit 14). This canvas can be used to map
decisions about four different areas: customer, offer, infrastructure, and financial
viability. Amit and Zott (2009) propose that the following design elements should
be considered when making those decisions:

- **Content.** Which activities should the company perform to realise its strategic
goals in the intended market?
- **Structure.** How are the chosen activities linked in a coherent system? Does
  the activity play a core, supporting, or peripheral role in the system?
- **Governance.** Who performs the activity? Should the company perform the
  activity itself, cooperate with another company, or outsource the activity?

Designing a business model thus means: creating an intricate system of activities,
resources and stakeholders that can deliver value to the customer, while
generating value for the company and its stakeholders. Like Amit and Zott (2009),
Mintzberg (1981) is of the opinion that effective businesses achieve coherence
among the different components of this system. As mismatched components
can seriously reduce the effectiveness of the entire system, businesspeople
should take a holistic approach to designing the business model and not change
any element without considering the consequences of this change to all the
other elements in the system. In other words, they should be attentive to the
*internal fit* of the system.

A special part of the business model in which this internal fit is clearly demon-
strated, is the core competence. The core competence theory comes from the
capability school in strategy, which argues that companies can create a competitive
advantage by focusing on core competencies, which arise from unique integrated
systems of both tangible and intangible resources. These core competencies
form the foundation of the company and are translated in core- and eventually
end-products. A core competence distinguishes itself from other resources within in the company based on its potential to access a variety of markets; its significant contribution to the perceived customer benefits of the end product; and the difficulty with which it can be copied by competitors, especially when it is an intricate network of resources (Prahalad & Hamel, 1990). Core competencies can be strengthened over time, as they are used and shared. However, they can also diminish when they are not applied.

Even though the core competence theory focuses on the company’s internal assets, it also highlights the need for a fit between the company’s capabilities and the external competitive environment. To maintain a sustainable competitive advantage, the company has to continuously develop existing core competencies and create new ones in response to the evolving competitive environment in which the company operates. This external fit is not only important to the core competencies of the company, but to the entire business model. Without a good fit between the business model and the external environment, the set of business tactics available to the company will not be suitable to yield the maximal amount of value.

### 2.5.4 Business model dynamics

Based on the definition of the business model in paragraph 2.5.1 it can be concluded that the business model is a static concept. It captures the company’s logic for creating value at a specific point in time. However, organisations go through clear phases of stability and change. Because the world around the organisation constantly changes in incremental or radical steps, a previously well-fitting business model becomes surely mismatched if the company does not fine-tune, adjust, or totally transform it to fit its new environment (Mintzberg, 1987; Linder & Cantrell, 2000; McGrath, 2010). This means that the business model has to move through a dynamic period of change to reach a new equilibrium. Only a few scholars have developed theories that aim to describe the periods of change between two equilibrium states of the business model in existing organisations. Linder and Cantrell (2000) propose a new type of business model – the change model – which captures the core logic for how a firm will change over time to remain profitable. They distinguish four different types of change models:

- **Realisation model.** This model aims at maximising the value created by the existing operating business model. It represents little change, as the core logic for creating value remains the same.
- **Renewal model.** Companies constantly renew their products, services, brands, cost structures, and technologies based on their core competences to maintain profitable margins in a changing competitive environment.
• **Extension model.** Extending companies expand their current business models by adding new markets, value chain functions, and product/service lines.

• **Journey model.** This model represents the most radical type of change, as it takes companies to completely new business models, permanently leaving the old model behind.

In a study about organisational configurations and fit, Siggelkow (2002) describes a firm as an organisational system composed of core, elaborating, independent, and inconsistent elements. He identifies four different processes that describe the creation and elaboration of the organisation’s core elements:

• The process of **thickening** describes how a company reinforces existing core elements by introducing new elaborating elements in the company’s system.

• **Patching** refers to the incorporation of a new core element and subsequent reinforcement of this element.

• Companies are **coasting** when they decide not to elaborate a core element for a period of time.

• The process of **trimming** is used to delete core elements and their elaborating elements when these components cause mismatches with the rest of the organisational system.

The separation of the concepts strategy, business model, and business tactics also offers interesting insights about business model dynamics. Based on strategic choices, the business model is developed, which determines the available set of business tactics that can be applied in interactions with the competitive environment. These interactions can lead to tactical altercations with the intended customers and competitors. For example, target customers do not buy the company’s offer, because of an ineffective marketing campaign, or because the price is too high in comparison to the price of a similar competitive product. The first example indicates a tactical mismatch with the target customer, while the second example indicates that the competitor sports superior tactics in the competitive battle. Both situations call for action of the company, which can react by optimising the operative business model. This is comparable with applying the realisation change model of Linder and Cantrell. However, the high price of the company’s offer can also be caused by strategic decisions made earlier in the business model design process. The company might have chosen to self-manufacture the product in the Netherlands, while a competitor outsources this task to a low-wage country like China. This strategic choice of the focal company excludes lowering the offer’s price from the available set of business tactics. In order to fix this mismatch with the competitive environment the company should reconsider its strategic decisions.
However, strategic choices cannot easily be modified (Casadesus-Masanell & Ricart, 2009). A possible reason for this can be found in the wicked nature of the business model design problem, which implies that every implementation of a business model has significant consequences. Self-manufacturing asks for different resources than outsourcing: the company invests in buildings, machines and qualified personnel, which cannot be easily abandoned overnight. In this case, the company might need to search for new applications of the acquired competences and resources, similar to Linder and Cantrell’s renewal and extension model, or it has to embark on a journey to a completely new business model, which requires the most amount of change and the largest investment of money and effort (Exhibit 16).

The dynamics described in this paragraph are not limited to the business models of existing organisations, but also occur in the business models of start-ups. In paragraph 2.2 it was established that the entrepreneur has to go through a focusing-process to find the golden formula for creating value. McGrath (2010)

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**Exhibit 16: Costs of business model change**

- **Journey model**: High costs, large change in core logic
- **Extension model**: Medium costs, moderate change in core logic
- **Renewal model**: Low costs, minor change in core logic
- **Realisation model**: No change in core logic

*Based on Linder & Cantrell, 2000*
Little more than a year ago almost nobody had heard about the Lean Start-up theory, which originated from product development processes applied in software start-ups. Since then it has become the strategy of some of the largest and most successful start-ups and companies in the world, such as Facebook, because of its power to identify where an entrepreneur’s vision meets with what reality can accommodate. As a result it helps entrepreneurs to quickly tell the difference between value-added activities and waste.

The Lean Start-up theory combines the processes of agile product development and customer development with the aim to build low-burn companies by design. It advocates the creation of rapid prototypes to test hypotheses about the market and competitive environment. Based on customer feedback the value proposition is developed, until market traction is found. This means that start-ups should be organised around learning and discovery to dramatically lower development costs, achieve a faster time-to-market, and higher quality products.

![Diagram of the Lean Start-up theory](source: Ries, 2008 & 2009)

**Example of a lean company: Booking.com**

Booking.com, established in 1996, is one of the world’s leading online hotel reservations agencies by room nights sold, attracting over 30 million unique visitors each month via the internet from both leisure and business markets worldwide. This company successfully applies the principles of the lean start-up. Through constant experimentation, hypothesis about the value proposition are quickly tested because, according to CEO Kees Koolen, first assumptions often prove to be the wrong ones. Therefore employees are not managed, but decide themselves on which projects they work. Projects take at maximum 3 weeks, but the company can also test new prototypes within minutes. For example, if a programmer decides he wants to know the effect of changing the dot in the price of the hotel room into a comma, he can quickly adapt the website and test it. This has resulted in a highly valued web-service that is customised for every country the company does business in. Furthermore, it has resulted in a very flexible organisation. When in April 2010 the European airspace was closed down because of a volcanic eruption in Iceland and many people became stranded at a foreign location, all employees had to drop what they were doing and help customers of Booking.com with their questions. This way the company could solve all customer questions within a couple of weeks, while it took other companies a couple of months.
describes this process as a discovery-driven process. According to her, the uncertainty about the future functionality of the business model calls for experimentation and discovery, rather than systematic analysis and rigid implementation. This principle is also applied in the lean start-up philosophy, which rapidly is becoming a popular strategy to create new ventures (Exhibit 17).

This need for experimentation could stem from the wicked nature of the new venture design problem. When entrepreneurs embark on their quest to create a new venture, they do not possess all information required to fully define the new venture design problem. At the start there exists a high degree of uncertainty. Only by taking action, more information can be gathered to partially reduce the initial uncertainty, but this process will also raise additional questions and new opportunities, which require new actions. It seems evident that the business model will evolve during this new venture creation process, as it, according to the definition in paragraph 2.5.1, reflects which strategic decisions are made based on available information at specific points during the process. At these moments the business model can be tested and evaluated and decisions can be made to continue, stop, adjust, or make radical changes.

However, little research has been conducted into how this process happens in start-up companies, while insight into the evolution process of the business model design during the new venture creation process can help entrepreneurs to better and quicker develop a well-fitting business model. Therefore, this seems to be a relevant topic for this study.

2.6 Conclusions of the literature review

Because the TU Delft wants to gain a better understanding of what is actually happening during the creation of a new technology venture in order to improve its education and support to nascent technology-based entrepreneurs, Chapter 1 proposed the following objective of this study:

Explore the design process of technology-based entrepreneurs until the new venture reaches maturity.

This section will summarise the main insights about this topic from the literature on entrepreneurship, new venture creation and business models in order to define the central research question for this study and identify some first insights that could guide the study and the development of a conceptual framework about the design process of new technology ventures.
2.6.1 Defining the central research question

From the literature on entrepreneurship we have learned that the term entrepreneurship is used to describe both the societal phenomenon and the scholarly domain. Entrepreneurship as a societal phenomenon refers to the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets (Ahmad & Hoffman, 2007, p.4). Therefore, entrepreneurship research should study the behaviour of the entrepreneur, the process by which new products and/or services immerge, and with what effects these new product and/or service opportunities are discovered and exploited.

This study aims to contribute to entrepreneurship research by investigating how technology-based entrepreneurs develop a new venture until it reaches maturity. During this process, entrepreneurs create courses of action to arrive at a desired visualised future, while coping with uncertainty and missing information about the underlying assumptions and while leaving room to incorporate surfacing opportunities. Because this process exhibits the characteristics of a design process, the assumption is made that new venture creation is basically a design process. As a design process always has an outcome, this assumption evokes both a process-oriented as an outcome-oriented research question:

- **How do technology-based entrepreneurs design their new technology venture until this new venture reaches maturity?**
- **Which elements constitute the design of a new technology venture?**

The literature review provides some basic insights on both these questions. According to the literature on new venture creation, the process consists out of two main phases: opportunity discovery and opportunity exploitation, which represent an iterative process. The entrepreneur’s mental model seems to be an important factor in this process, because it determines how the entrepreneur perceives and interprets the world (s)he lives in. As such, the mental model seems to determine which opportunities are recognised by the entrepreneur and how these opportunities are exploited.

Once entrepreneurs have discovered opportunities through either an externally or internally stimulated discovery process, they can choose different modes of exploitation to create value from the same opportunity. Hence, the entrepreneur is designing the mode of exploitation. This mode of exploitation comprises strategic choices about which market the company will target, the activities the company will perform to deliver a value proposition to that market, and the resources needed to perform these activities. A framework which seems to
adequately capture this mode of exploitation is the business model, as it gives insight in the company’s core logic for creating value in a competitive environment at a specific point in time.

The literature also gives some more concrete insights about the content of this design object. According to Osterwalder and Pigneur (2010) the business model is a system that consists out of four main design elements: customers, offer, infrastructure, and financial viability. The strategic design of this system eventually determines the amount of value that is created by the new firm, as it defines the set of business tactics at the company’s disposal in the competitive battle for market share.

As we can see, the business model is a complex system of resources and stakeholders, which is designed with the objective to create most value for the stakeholders involved. To design an effective business model it seems very important to create a good fit between the different internal components of the system. If the company manages to create a unique integrated system, this can become the core competence of the company. However, just a good internal fit seems not enough to sustain the business. As the system has to function in a competitive environment, the company should also consider how the business model fits this environment. Because the environment is constantly evolving, the company will need to adapt the business model through time to prevent mismatches with the new state of the environment.

Because starting entrepreneurs in most cases miss relevant information to fully understand to new venture design problem at the start of the design process, there are many uncertainties about how the designed business model will function in practice. To reduce this uncertainty, some scholars propose that entrepreneurs should use an approach of constant experimentation and discovery, through which more information can be gathered about the functionality of the business model and the new venture design problem. Therefore entrepreneurs seem to iterate several times between opportunity discovery and opportunity exploitation in order to find the best formula for creating value and based on this fact it can be established that business model dynamics also occur in new ventures.

Based on the findings of the literature review, it can be concluded that the design of a new venture’s business model can have important consequences for the new venture’s performance. From Chapter 1 it can also be learned that the road towards a well-functioning business model is paved with obstacles, because almost 90% of the start-ups included in the survey of Roland Berger Strategy Consultants and IESE Business School (2010) indicate that they made changes to their initial business model. A good understanding of how technology-based
entrepreneurs design their venture’s business model and the obstacles they encounter during this process can therefore help these entrepreneurs and supporting organisations to foster and accelerate desired outcomes of their entrepreneurial activity. However, little research has been conducted into how this design process is conducted in new technology ventures. This leads to the formulation of the following main research question for the further course of this study:

*How does the design of a new technology venture evolve until the firm reaches maturity?*

### 2.6.2 First insights about new venture design

From the literature review some tentative theoretic concepts can be derived, which might be important in answering the proposed research question. This paragraph will give a short overview of these insights.

- **Mental model of the entrepreneur(ial team)** (paragraph 2.1.2 & 2.2). Entrepreneurs stand at the origin of new ventures. Throughout their life they collect knowledge (which can be incomplete or even wrong) and experiences, which determine their image of the world around them. This representation of the surrounding world, or the so-called mental model, shapes the entrepreneurs’ behaviour and defines their approach to problem solving. Based on the literature review the mental model seems to act as a filter in the discovery of opportunities. Furthermore, it seems to influence how entrepreneurs decide to exploit the discovered opportunity. Because mental models are not necessarily true representations of reality, the decisions made based on these mental models might need adaptation when they meet reality.

- **Opportunity discovery** (paragraph 2.1.2 & 2.2). According to the literature the new venture creation process starts with opportunity discovery. Entrepreneurs can follow different routes of opportunity discovery. The way in which an entrepreneur discovers an opportunity might influence how the opportunity will be exploited. For example, an entrepreneur who discovers demand for a product that has been developed to satisfy a personal need, might follow a different new venture creation process than the entrepreneur who starts the new venture from scratch.

- **Opportunity exploitation** (paragraph 2.1.2 & 2.2). The opportunity exploitation phase commences when the entrepreneur decides to act on the discovered business opportunity by performing concrete actions. During this phase the new venture starts to become something tangible that generates feedback. For example, the entrepreneur can discover that the envisioned product cannot be created with the available resources, or it
can become clear that the proposed value proposition does not receive a positive market reaction. Based on this feedback in the exploitation phase, adaptation to the initial venture design might be necessary.

- **Internal and external fit** (paragraph 2.5.3). The design of a new venture comprises an intricate system of resource and stakeholders. It seems that this system needs to be designed holistically in order to ensure that this system fuses into an effective and coherent whole. When the separate pieces of the system do not fit together, adaptations to the new venture design might be needed. Furthermore, it seems that the new venture design has to fit the environment in which it will function. If there is a mismatch between the new venture design and the environment, the design might also have to be adapted.

- **Experimentation** (paragraph 2.2 & 2.5.3). It appears that designing a new venture needs a considerable amount of experimentation. Because the entrepreneur might miss relevant information at the start of the design process, (s)he needs to make assumptions during the opportunity discovery phase about how the new venture design will function in its intended environment. Because new technology ventures often create something new to the market, it seems that most assumptions can only be tested in the exploitation phase by making them tangible to both the entrepreneur and the marketplace.
This chapter will describe the research approach of this study. First the aim and research questions are summarised in paragraph 3.1, followed by the definition of the scope in paragraph 3.2. This leads to the selection of grounded theory as the research method in paragraph 3.3. This chapter will conclude with presenting the research procedure in paragraph 3.4.
3.1 Research aim

This Master thesis aims to create insight into the design process of technology-based entrepreneurs until their new venture reaches maturity. Based on the review of relevant literature in Chapter 2, it was concluded that the creation of a new venture is essentially a design process with the aim to design a mode of opportunity exploitation that yields most value for all stakeholders involved. However, few existing studies have considered new venture creation as a design activity and even fewer studies have investigated how the mode of exploitation is created and evolves in new technology ventures. Therefore the literature review concluded by posing the following main research question:

*How does the design of a new technology venture evolve until the firm reaches maturity?*

This question forms the starting point for finding a coherent framework that explains the design process of new technology ventures. As existing literature offers few leads on this topic, this study aims to explore which theoretic concepts play an important role in the design process of new technology ventures and how these concepts are related. This results in two additional guiding research questions for this study:

- *Which theoretical constructs play an important role in the evolution of a new technology venture’s design?*
- *How are these theoretical constructs related in explaining the evolution of a new technology venture’s design?*

3.2 Scope of this study

The definition of entrepreneurship in paragraph 2.1.1 designates the discovery and exploitation of new products, processes or markets as focal to entrepreneurial activity. This discovery and exploitation of new products, processes or markets can be done in various ways, both in existing companies and in new ventures. This study will focus on the creation of independent new ventures, but new ventures come in many shapes and sizes, which might influence the new venture design problem and the subsequent design process. In order to develop a meaningful explanatory framework about new venture design, this study will therefore focus on a specific category of start-ups: new technology ventures that are supported by a business incubator.
This scope is chosen, because technology ventures in a business incubator all meet the incubator’s selection criteria and they all receive the same level of support. This reduces the heterogeneity in the research sample and the sources of extraneous variation, which will make it possible to develop a theory that explains design dynamics across the separate technology companies in an incubator. Furthermore, because this study is conducted under the authority of the TU Delft, which wants to gain insight in the new venture creation process of the technology entrepreneurs it supports, the specific business incubator that will be used as research site for this study is the YES!Delft incubator.

### 3.3 Method selection

Now that the aim and scope of this study have been defined, a method has to be selected for conducting this study. Based on the research aim in paragraph 3.1 the following requirements for the research method can be defined:

- It should be possible to answer how questions.
- It should be possible to explore on an empirical base what happens to the new venture’s design, as existing literature offers little explanation for this process. This means that the research method should be inductive and does not require control of events.

An additional requirement comes from the nature of this study, which is a Master thesis. This thesis has to be conducted within half a year. This leads to the following requirement:

- It should be possible to conduct the research within the time span of half a year.

Based on these requirements the possible research methods have been assessed (Exhibit 18). Quantitative methods such as experimental and survey research are not qualified for the aim of this study, as both these methods are used to confirm or deny predefined hypotheses. The research method should therefore be qualitative. Ethnography and action research seem to be suitable approaches for this study, as these methods aim to study phenomena in their natural context. Both these approaches can also be used to inductively develop theories. However, there is a practical reason why these methods are not very suitable for this study. Action research requires the researcher to actually participate in the process of designing the company under research; during ethnographic research the researcher will have to observe the evolution process in its natural context. Both these methods will be very time-consuming, as companies are not created in
just one day, but designed over several years. Since this study should be conducted within half a year, it will not be possible to use these methods. Consequently, case study research is the most suitable approach for studying the evolution of the company’s design within the time frame of this project, as the case study method is especially advantageous when asking how or why questions about contemporary phenomena, over which the researcher has little or no control (Yin, 2003b).

As this study aims to investigate a process, a longitudinal research design would fit best. This means that cases have to be studied over a longer period of time. However, due to the same time constraints as mentioned earlier, a cross-sectional research design will be used instead. To still account for the process aspect of new venture creation, cases have to be selected that reflect different parts of the process (see paragraph 3.4.3).

3.3.1 Building grounded theory from case studies

Within case study research several types can be distinguished, based on the purpose and design of the study: the exploratory, descriptive, and explanatory case study (Yin, 2003a; Yin, 2003b). An explanatory case study is a useful strategy when the researcher aims to contribute to the knowledge of a contemporary phenomenon within its real-life context. This type of case study will be used as a research strategy for this study, as it best fits the study’s purpose.

A method which is particularly useful for conducting an explanatory case study

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**Exhibit 18: Comparison of research methods**

<table>
<thead>
<tr>
<th></th>
<th>Experiment</th>
<th>Survey</th>
<th>Ethnography</th>
<th>Action research</th>
<th>Case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answers how questions?</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Inductive approach</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Requires control of events?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Possible to conduct within time span of project?</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Based on Yin, 2003a; Christiaans et al., 2004; Graziano & Raulin, 2007*
when little is known about the topic under study, is the grounded theory approach of Glaser and Strauss (1967). Unsatisfied with the prevalent deductive research strategies that were primarily focused on verifying hypotheses and which, in their opinion, only enlarge the gap between theory and practice, they proposed grounded theory as a method to discover theory from systematically obtained empirical data about social phenomena. This means that the researcher will build theory based on collected data from hands-on experts on the research topic. The term grounded thus reflects the source of the theory under development, which is grounded in empirical data about the phenomenon under study (Exhibit 19).

Grounded theory can result in several types of theories: substantive, formal or meta-theories (Glaser & Strauss, 1967; Smulders, 2006). Substantive theory offers an explanation for a specific area of inquiry, which in this case has been defined as: the design process of incubator-based new technology ventures. Formal theory is more abstract and can be applied to explain a conceptual area of inquiry, for example all new technology ventures. Meta-theory is the most abstract level of theory, which means that its explanation is not limited to one specific area of inquiry, but can be used on a general level, such as all new ventures. As grounded theory is concerned with creating theory from empirical data in a specific area of inquiry, it is best to start with generating a substantive theory. This substantive theory can form the basis for a more general theory.

The main strategy Glaser and Strauss propose to develop grounded theory is a general method of constant comparative analysis. As the term “comparative
analysis” already implies, this method entails comparing several cases to identify emerging patterns and themes, which can be built into theory (Goulding, 1999). Based on a first exploration of the data, codes are derived that describe seemingly important incidents in the data. These codes are then tested and refined by comparing them with other incidents that seem to belong to the same theoretic concept. This eventually leads to the generation of overarching categories that aim to explain the relationships between and across the previously identified theoretic concepts. These categories further evolve into a core theoretical abstraction of the topic under study, which again has to be evaluated and tested against comparative empirical data.

The development of the theory and all observations and decisions regarding this theory and the research actions to advance theory development are documented in memos. These memos, which can be just a few lines or a couple of pages, form the documentation of the research and can be used to assess the researcher’s process and reasoning (Wester, 1991).

During the iterative theory generation process, the researcher may explore the same type of cases more deeply or seek out contrasting cases. The researcher should be theoretically sensitive for where the data is taking the study and what to do next. Case selection in grounded theory is therefore not based on random sampling, but on theoretical sampling. This means that cases are chosen for theoretical reasons and not statistical reasons. The selected cases should either replicate results from previous cases in the study, or expand the theory under development (Eisenhardt, 1989). Sampling of new cases ceases when saturation of categories has been established. This is the point at which the researcher observes incidents seen before and little new insight can be created about the topic under study. According to Glaser and Strauss this process of theory generation does not require many cases, as the researcher’s “job is not to provide a perfect description of an area, but to develop a theory that accounts for much of the relevant behaviour” (Glaser & Strauss, 1967, p. 30). In fact, it is possible to analyse just one case to develop theoretic concepts, which subsequently have to be evaluated with a theoretical sample of other cases.

Grounded theory usually involves the collection and analysis of multiple types of data simultaneously. Using multiple sources of data helps improve the theory under development, because triangulation is made possible. This ensures that the hypothesised constructs work from multiple perspectives. This has led to the Glaser dictum “all is data” (Glaser, 2002), which means that researchers should use all relevant data that comes their way, no matter the source or type.

Grounded theory often gets criticised, because it does not transcend the exploratory descriptive level or because it leads to overly complex theory
(Eisenhardt, 1989). To avoid these pitfalls, the following evaluative criteria should be used to increase the credibility of the generated theory (Glaser, 2002; Charmaz, 2000):

- **Fit**: Grounded theory should fit the substantive area it originates from.
- **Relevance**: Grounded theory has to conceptualise core problems and basic processes in the area of inquiry.
- **Work**: Grounded theory should provide a useful interpretation and explanation of the events that have been identified as relevant to the studied phenomenon.
- **Modifiability**: Because good grounded theory fits the area of inquiry, it can take advantage of new insights that are generated by gathering more data or changing conditions in the substantive area of study.

### 3.4 Research procedure

In the previous paragraph grounded theory has been chosen as a suitable method for conducting this study. Based on the central work of Glaser and Strauss (1967) the generation of grounded theory can be divided in four stages that should be passed through in several iterative cycles: exploration, specification, reduction, and integration (Wester, 1991). These stages together with the instructions of Wester (1991) and Eisenhardt (1989) formed the inspiration for the research plan for this study, which is presented in this section.

#### 3.4.1 General guidelines

One of the strengths of grounded theory is the overlap between data collection and data analysis, as it gives researchers a head start in analysis and allows them to explore new leads that emerge from the collected data. This means that the researcher can easily make adjustments during the data collection process with the aim to further the emergent grounded theory. Therefore the steps described in this paragraph form not a static research method, but will be used in a dynamic way*.

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*The fact that grounded theory is an iterative method has important implications for the way the results of this study came into being. While it may seem that this report has been written in a logical chronological order, this is not the case. For example, the literature review is the result of several iterative cycles and most of it has actually been written after thorough analysis of the empirical data, which provided new leads for exploring the literature.*
To keep track of all observations and decisions regarding the emergent theory and research actions, memos are written throughout the whole process of developing grounded theory.

3.4.2 Case selection procedure

Case selection is an important aspect of grounded theory. In paragraph 3.2 a scope is chosen that (1) limits the population from which the research sample is drawn, (2) controls for sources of extraneous variation, and (3) defines the limits for generalising the findings of this study. This scope is used to select cases that can contribute to the development of theory about designing a technology start-up.

As mentioned before in paragraph 3.3.1, case selection in grounded theory is based on theoretical sampling. This does not mean that the number of cases cannot be planned in advance. In this study planning is necessary, because of time constraints. Therefore multiple cases are developed in parallel. Based on the suggestion of Eisenhardt (1989) that less than 4 cases offer too little data to generate convincing grounded theory and more than 10 cases will lead to an overload of data, 10 cases are chosen according to the following criteria:

- **Affiliation with the YES!Delft incubator.** This criterion follows from the defined scope in paragraph 3.2
- **The entrepreneur is in the process of creating a new technology venture.** As this study is about emergent companies, the selected cases should be in the act of creating a new venture. Because these entrepreneurs are confronted with the process of designing a new venture on a daily basis, it is expected that it will be easier for them to recollect important decisions and crucial moments in the new venture creation process. The definition of a new technology venture in paragraph 1.2.1 states that a firm is a new technology venture when it has been established less than 8 years ago. Therefore companies that have been founded more than 8 years ago will not be included in the sample. These companies are no longer new ventures and their founders are most likely influenced by memory bias: they probably remember the previous events in the light of the current results.
- **The selected cases should reflect the different stages in new venture creation.** The literature study shows that new venture creation consists out of two main phases: opportunity discovery and opportunity exploitation. As mentioned in paragraph 1.3, a longitudinal research design would fit best to explore this complete process. However, it was also established that this is not possible within the time frame of this research. Therefore a cross-sectional research design is chosen. To still investigate the full range of changes that occur during this process and the reasons why these changes
occur, cases are selected in the different stages of new venture creation. This selection is done based on the year of start-up. Multiple cases that are in the same stage of new venture creation are selected in order to compare and replicate findings.

- **The selection of cases should capture the diversity within the scope of the study.** The YES!Delft incubator hosts a range of different technology companies (e.g. different background of the entrepreneur, market, or outcome). Choosing a set of diverse cases from YES!Delft’s client companies can help elaborate the tentative theory, as a variety of views and insights can be incorporated into the analysis. This diversity can be used for triangulation. If the tentative theory fits and works in the whole range of cases, it becomes more credible, transcending the specific to the more general.

Based on the defined case selection criteria an inventory was made of possible participants for this study of which 10 cases have been selected. To ensure the anonymity of the participants, only an overview of the cases’ characteristics is displayed in Exhibit 20. If needed, more details about the cases can be requested by contacting the researcher.

### 3.4.3 Development of instruments to collect data

Now that the cases for this study have been selected, the next question in is how to gather the empirical data. According to Charmaz (2001) in-depth qualitative interviewing fits the grounded theory method particularly well, because it is an open-ended, flexible, and in-depth exploration of a topic on which the interviewee is a ‘hands-on’ expert. During an interview the participant can elicit personal views and experiences regarding new venture creation. And as interviewing is a flexible technique, the researcher can immediately investigate emerging issues during the interview by asking questions about the new lead. For these reasons empirical data will be gathered by interviewing the founders of the selected companies.

In order to direct the interview, an interview guide is developed that addresses the topic of new venture creation and issues that appeared important during the literature review. The interview guide has a funnel structure: every topic starts with general questions and subsequently the questions become more specific. This way the participants are first gently introduced to a topic with the aim to make them feel comfortable, before more detailed questions are asked. Open-ended questions are asked to evoke extensive and meaningful answers. It is avoided to mention the term business model, until the term is used by the participant, to prevent the participant from fixating on this topic and trying to give desirable answers. The interview guide is not used as a static tool, but is adapted based on the interview situation and the analysis of already gathered
Exhibit 20: Overview of the characteristics of the selected cases

**Level of work experience of the participant**
- No previous work experience: 4
- Work experience: 4
- Entrepreneurial experience: 2

**Year of start-up**
- 2005: 3
- 2006: 2
- 2007: 1
- 2008: 2
- 2009: 1

**Full time-equivalent (FTE) of the organisation**
- < 5: 5
- 5 - 10: 4
- > 10: 1

**Industry in which the new venture operates**
- Design: 1
- Engineering: 1
- Furniture: 1
- Healthcare: 1
- Infrastructure: 2
- Internet: 1
- Offshore: 2
- Transport: 1

**Educational background of the participant**
- Aerospace Engineering: 1
- Applied Sciences: 1
- Civil Engineering and Geosciences: 2
- Electrical Engineering, Mathematics and Computer Sciences: 3
- Industrial Design Engineering: 1
- Mechanical, Maritime and Materials Engineering: 1
- Not TU Delft: 1
data, which might indicate new topics for investigation. Therefore none of the conducted interviews will be completely the same. The full rationale behind the interview guide can be found in Appendix B and the complete interview guide can be found in Appendix C.

### 3.4.4 Data collection procedure

The procedure for the in-depth interview is as follows. The interview of approximately 1 hour is held at the office of the new venture and is either held in Dutch or in English based on the nationality of the participant. The interview starts with an introduction of the researcher and the general aim of the interview and permission is asked to record the interview with a memo recorder. Directly after the interview a field note is written in which first impressions and analyses of the researcher are captured based on questions like: “What am I learning?” and “How does this case differ from the other case(s)?” These field notes together with the transcripts of the interview recordings form the main dataset for further analysis (Appendix I). This dataset is expanded with any other relevant data that comes the researcher’s way. Sources of other data for this study include new venture visits; lectures from entrepreneurs; interviews with entrepreneurs in magazines and papers; conversations; and online blogs.

### 3.4.5 Research plan: an iterative three stage approach

This paragraph will describe the main steps during the grounded theory process based on the visualisation of the research plan in Exhibit 21.

*Scanning stage*

The scanning stage is aimed at becoming familiar with the area of entrepreneurship and developing first insights about the research topic that form the foundation for the subsequent stages. The scanning stage in this study consists of three different parts: reviewing some basic literature about entrepreneurship (Chapter 2), a quantitative scan of the collected empirical data, and a qualitative scan of the collected empirical data (Chapter 4).

The study starts with a review of some basic literature about entrepreneurship in order to sensitise the researcher and direct data collection and analysis. This approach is not completely true to the original idea of grounded theory, which advocates the principle of beginning with a clean theoretical slate: “*An effective strategy is, at first, literally to ignore the literature of theory and fact on the area under study, in order to assure that the emergence of categories will not be contaminated by concepts more suited to different areas*” (Glaser & Strauss, 1967, p. 37). In this study, however, it is chosen to first read some basic literature to quickly define the boundaries and direction for the research, because there
will not be enough time for unbridled exploration of the complete area of entrepreneurship. Even though this study does not start with a completely clean slate, it is still important to keep the ideal of Glaser and Strauss in mind in order to prevent bias during the collection and analysis of the empirical data. Therefore it is essential to realise that the literature review is meant to get acquainted with the research area, not to define specific relationships at the outset of the process.

Based on the insights gained from the literature, cases are selected for theoretical reasons and data are collected. A quantitative scan is used to discover possibly important topics and themes in the empirical data. Once tentative insights are created about the research topic, the empirical data will be analysed more thoroughly through a qualitative scan. The events in the empirical data are coded based on the open coding principle of Glaser (1978), until the collection of new material does not give cause for the development of new codes. These codes are grouped into collections of codes with similar content, so-called concepts, which will form the input for the subsequent specification stage.

**Specification stage**
The second stage in my application of grounded theory, which will be presented in Chapter 5, is primarily about specifying the concepts that have been identified during the exploration stage by grouping them into broader categories. Based on constant comparison of similarities and differences across cases, the properties of each category are defined and the relationships between these categories are specified.

**Integration stage**
The scanning and specification stages have created insight in the theoretic concepts and categories that explain the process of designing a new technology venture. The purpose of the final integration stage (Chapter 6) is to delimit the emergent theory by grouping the developed categories into one higher level umbrella category: the core category. In this stage the emergent theory moves away from the descriptive to the conceptual level. Important during this stage is to constantly assess how well or poor the developed analytic framework satisfies the criteria fit, relevance, work, and modifiability by comparing it to the evidence from the collected empirical data.

As grounded theory improves with the use of multiple sources of data, interview data are not the only data that are used during this stage. Based on the categories generated from the empirical data, literature is sought after that can verify or extend the theory under development. When the generated analytic framework resembles an accurate representation of the design process in new technology ventures, it is formalised as a substantive theory.
Exhibit 21: Research approach

**Scanning stage**

- **Topics and themes**: Quantitative scan of manifest content
- **Codes**: Fragments of data that allow analysis of key events
- **Concepts**: Collections of codes with similar content
- **Categories**: Abstracted groups of similar concepts
- **Grounded theory**: Core category that (1) fits the substantive area, (2) is relevant, (3) works, and (4) is modifiable

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**Integration stage**

**Specification stage**

**Quantitative scan**

**Qualitative scan**

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POOL OF EMPirical DATA

SUBSTANTIVE AREA OF RESEARCH

---

THE ART OF DESIGNING A NEW TECHNOLOGY VENTURE
CHAPTER 4: SCANNING THE DATA TO FIND THEORETIC CONCEPTS
The first step in my application of the grounded theory method is to scan the area of research, both quantitatively and qualitatively, in order to get familiar with the research topic and to develop first insights about the design process of new technology ventures. Based on the insights gained from studying basic literature, empirical data have been collected by means of interviews. This chapter will first present a quantitative scan of the collected empirical data in order to identify emergent topics and themes. This quantitative scan is conducted by means of the word frequency count method, as described in paragraph 4.1. The results of this scan are presented and discussed in paragraph 4.2, which will conclude with the formulation of new questions regarding new technology venture design in order to further the development of grounded theory.

Because the quantitative scan severs words from their original context, the second part of this chapter consists of a qualitative scan of the collected interview data. Through the procedure of open coding in paragraph 4.3.1, theoretic concepts are formulated. These concepts, which are presented in paragraph 4.4, will form the starting point for defining more abstract theoretic categories in Chapter 5.
4.1 Quantitative scan: word frequency count

To get a first impression of all collected interview data, a word frequency count is conducted. This quantitative technique is often used in content analysis, and aims to describe the manifest content of spoken or written text by analysing how often certain words are (not) used. Word frequency counts are believed to indicate the following aspects about the messages in which these words are contained (Krippendorff, 2004):

1. **Awareness or knowledge.** The presence or absence of terms indicates if the interviewee is aware or knowledgeable about the topics being discussed.
2. **Importance, attention, or emphasis.** The frequency with which a word is used during the interview indicates the importance, attention or emphasis on that word.
3. **Attitudes.** The frequencies of positive or negative characteristics mentioned about a certain topic indicate the attitude of the interviewee towards that topic.
4. **Degree of intensity or certainty.** The kinds of adjectives used in statements about a topic indicate the degree of intensity or certainty of the interviewee’s beliefs, convictions and motivations.
5. **Strength of association.** The frequency of co-occurrence of two terms that do not commonly occur together indicates the strength of association between those terms in the mind of the interviewee.

This enumeration shows that a word frequency count can be conducted for a range of different reasons: from very explorative (analysis 1) to more in-depth analysis (analysis 5). In this study the word frequency count has an explorative character and will therefore be used as a tool to uncover awareness or knowledge; importance, attention, or emphasis; and attitudes within all the collected interview data (analysis 1 to 3). Instead of performing analysis 4 and 5, a qualitative method will be used to gain a deeper understanding of the interview data and develop substantive theory, since a qualitative analysis gives more consideration to the context of the acquired data. The aim of the word frequency count analysis is therefore to answer the following research question:

*Which topics and themes can be discovered in the collected manifest empirical data from entrepreneurs about designing a new technology venture?*
4.1.1 Word frequency count procedure

The first step in conducting the word frequency count is compiling the frequency table. This is done by the following procedure:

1. **Remove questions and comments of the researcher.** To make valid inferences concerning the manifest messages of the 10 interviewed entrepreneurs, it is important that only their answers are included in the word frequency count analysis. Therefore all questions posed by the interviewer and all comments made by the transcriber are removed from the dataset.

2. **Count words.** Subsequently a word frequency count is conducted based on the cleaned-up dataset with the use of an online application (available on www.wordle.net). This yields a frequency table of all words used in the dataset.

3. **Remove common words and combine different forms of the same word.** This frequency table is not yet the final result, as it contains many common meaningless words and several forms of the same word. Therefore all common words (e.g. articles, adverbs, and adjectives) are removed from the frequency table based on the researcher’s insight. Singular and plural forms of the same noun are all counted as the same noun and different forms of the same verb are all counted as the same verb.

4. **Combine synonyms and separate homonyms.** When conducting a word frequency count, the use of synonyms and homonyms in the text should be taken into consideration, as these may lead to under- or overestimation of the word’s importance (Weber, 1990; Stemler, 2001). This means that synonyms have to be counted as the same word and homonyms as two different words. Based on the cleaned-up frequency table that resulted from step 3, synonyms for the same word are searched and counted under the most often mentioned synonym. Furthermore, verbs that can be used as a noun, and nouns that can be used as a verb are searched for and split into separate frequencies based on their use in the original dataset.

5. **Remove words with a frequency below 20.** As a final clean-up step, all words with a frequency below 20 are removed from the frequency table because low frequencies indicate that topics are not (that) important to the author of the message, as is stated in paragraph 4.1. Words that are mentioned less than 20 times in all 10 interviews do not represent very important instances in the collected interview data and therefore these words are excluded from the frequency table.

Once the final frequency table is compiled, the following steps are taken in order to analyse the results:
6. **Translate.** All remaining words are translated from Dutch into English based on the translation in the Van Dale Online Dictionary (Van Dale, 2010).
7. **Categorise.** In order to discover the most important topics and themes contained in the collected empirical data, the words in the frequency table are categorised in groups of words that relate to the same central topic. The developed topics are again sorted in more abstracted overarching themes.

### 4.2 Results and discussion of the word frequency count

The procedure in paragraph 4.2 resulted in a word frequency table (Appendix D), which is visualised in the word cloud in Exhibit 22. This frequency table contains the 107 words that were mentioned most often during all 10 interviews. For the Dutch readers of this report, a Dutch word cloud is also included on this page to give additional insight in the original Dutch dataset and the process followed by the researcher.

Exhibit 22: Most frequently used words in the empirical dataset

*English word cloud*
Exhibit 22 continued: Most frequently used words in the empirical dataset

Dutch word cloud

Top 10 of most frequently used words

<table>
<thead>
<tr>
<th>Rank</th>
<th>Word (Dutch)</th>
<th>Word (English)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mensen</td>
<td>people</td>
<td>402</td>
</tr>
<tr>
<td>2</td>
<td>bedrijf</td>
<td>business</td>
<td>355</td>
</tr>
<tr>
<td>3</td>
<td>product</td>
<td>product</td>
<td>261</td>
</tr>
<tr>
<td>4</td>
<td>maken</td>
<td>make</td>
<td>258</td>
</tr>
<tr>
<td>5</td>
<td>tijd</td>
<td>time</td>
<td>235</td>
</tr>
<tr>
<td>6</td>
<td>beginnen</td>
<td>begin</td>
<td>161</td>
</tr>
<tr>
<td>7</td>
<td>klant</td>
<td>Customer</td>
<td>155</td>
</tr>
<tr>
<td>8</td>
<td>markt</td>
<td>Market</td>
<td>146</td>
</tr>
<tr>
<td>9</td>
<td>jaar</td>
<td>Year</td>
<td>141</td>
</tr>
<tr>
<td>10</td>
<td>geld</td>
<td>Money</td>
<td>135</td>
</tr>
</tbody>
</table>
In order to explore which issues are important to the interviewed entrepreneurs and to answer the research question for this analysis, the 107 most frequently used words have been grouped into topics according to their use in the original data.

A drawback of analysing how frequently a word is mentioned in the dataset is that it removes the term from its original context. Therefore the results in this section are not only based on the mere frequency with which a term is used, but it is also taken into account how the term is used in its original context. This approach is especially useful when the same word can mean various things. For example, the word "people" is used to indicate people in a variety of roles. In order to assess to which role the word people referred the most, I analysed all instances of the word people in the original dataset. This exploration resulted in 17 frequently discussed topics (Exhibit 23), which will be described in the remainder of this section.

**Running a business**


The first topic contains general words referring to the everyday activity of running a business, such as the organisational structure and everyday work within a new venture. Because running a business is aimed at achieving results while dealing with many uncertainties, the words “result” and “risk” are also included in this grouping.

**Activities in the development process**


The second topic includes words that refer to the activities that belong to the development process of both the company and the new product. From the words in this topic it can be learned that this process involves both diverging and converging activities. First several concepts and prototypes are researched and designed (diverging), before a choice is made that eventually will lead to production (converging). Furthermore, the words “try” and “test” indicate that the activities in the development process are aimed at experimentation.
Exhibit 23: Most frequently discussed topics

- Running a business (961)
- Activities in development process (681)
- Competitive market (527)
- Social network (673)
- Value proposition (613)
- Emergence (356)
- Positive attitude (232)
- Communication (185)
- Finances (561)
- Being in development (350)
- Difficulties (215)
- Marketing (173)
- Planning (486)
- Support (302)
- Expertise (214)
- Learning (98)
Social network
People – together – team – party – partner – network

From the word frequency count it can be concluded that “people” is the most used word in the complete dataset. However, “people” is a generic word which can be used to indicate people in a range of different roles. Therefore all instances of the word “people” and its synonyms were located in the dataset, to determine the meaning based on the context in which it was used. The following uses can be discerned, in order of frequency:

- Team: entrepreneurs, and employees
- Target market: customers, and market
- Extensive network: partners, knowledge institutes, advisors, and investors
- Undefined
- Competitors

It is not surprising that words referring to human roles have been used very frequently, as starting a company is a process in which many different parties are involved. In this process entrepreneurs create, maintain and modify their company in a larger social network consisting of (potential) customers, business partners, investors, knowledge institutes, advisors, and competitors. All these autonomous actors are linked to each other through technical, economic, legal and personal relationships. The most important relationship in this social network is the one between the start-up and its market, which I will elaborate on the topics “value proposition” and “competitive market”. All other relationships in the social network are entered into with the purpose to support this main relationship.

Value proposition

The start-up’s most important interaction with the social network consists of offering a value proposition to the market. This value proposition can consist out of multiple elements, which all aim to provide added value to the market. Most of the interviewed entrepreneurs offer a physical product, sometimes accompanied by a complete system or a service. Some entrepreneurs offer additional value propositions next to their main value proposition to supplement their revenues, such as advice. The new venture needs resources to create and offer its value proposition. In order to gather these resources, the start-up company often needs to establish new relationships with other players in the network. The start-up might engage in partnerships with other companies, hire new employees, or acquire foreign money from investors or banks.
**Finances**


It is not unexpected that the entrepreneurs talk repeatedly about finances, because the purpose of their relationship with the market is to make more money than it costs to offer the value proposition. Even though the term “revenue model” has only been used once during all interviews, this does not indicate that the entrepreneurs do not know how they are making money. They frequently talk about their expenditures, which price the customer pays and how much revenues they make. Hence, it seems that acquiring money is an important issue during the new venture creation process.

**Competitive market**


The most important relationship in the social network is the relationship between the company and its market, because the success of the company depends on how well this relationship has been designed to create most value for all stakeholders involved in this interaction. Therefore it is important that the company actually solves a need in the market. The interviewed entrepreneurs all seem aware of the importance of the market and frequently talk about their target market and elements that define the relationship with their customer, such as expectations and trust, but also elements that can disturb this relationship, like competitors.

**Timing**

Time – year – day – month

During the interviews many words have been used that indicate time. The word “time” has been used in different contexts:

- Efficiency
- Timing
- Indicating a period in time
- Effort
- Good and bad times

Time seems to be an important aspect of creating a new technology venture. Developing a product costs time (effort), but an entrepreneur also has to introduce the product on the right time by making efficient use of time.
Plan of action

Idea – goal – step – plan – focus – vision – strategy

Every entrepreneur starts out with an idea. Sometimes this idea is just a solution to a perceived problem. When the entrepreneur realises the business potential of a conceived idea, the strategy seems to evolve and a business plan is written. An important word in this topic is the word “focus”. Entrepreneurs seem to be searching for the focus of their new venture’s activities. For example, if entrepreneurs start with a wide-ranging strategy, they are often forced to focus on doing one business activity very well instead of doing three mediocre business activities. This focus determines the future strategy and the future products that will be developed.

Emergence

Begin – new – beginning

From the words the entrepreneurs use during the interviews it seems evident that creating a new venture is about emergence. During this process both an innovative value proposition and a new organisation are created from scratch.

Being in development


Just like many words are used to describe activities in a development process, also many words are used to describe the development itself. This indicates that the design of a new venture is indeed something that is under constant development.

Support


There exists a close link between the interviewed start-ups and the TU Delft and YES!Delft. The TU Delft supports the start-ups with expert knowledge about the technologies they develop, while YES!Delft helps them with more practical advice about running a business in general. Based on how often both these institutes are mentioned, it seems that they play an important supporting role in the new venture creation process.

Positive attitude


It is interesting to notice that the entrepreneurs use many positive words to describe the creation of their venture. This might indicate that the entrepreneurs
have a very strong conviction in their own company or that they remember the positive outcomes of their struggles better than the negative ones.

**Difficulties**
*Problem – difficult – crucial*

Even though many positive words are used in the answers of the entrepreneurs, running a new venture is not without difficulties, as the words in this topic illustrate.

**Expertise**
*Technology – knowledge – technical*

Most of the YES!Delft entrepreneurs are engineers who have been educated at the TU Delft. Their companies often originate from a technology they invented during their studies. Their new venture is thus based on their acquired expertise about this technology. That this expertise plays an important role in the development of the new venture is reflected in how often these words are used during the interviews.

**Communication**
*Ask – talk – tell – contact*

It was established previously that working within a social network is an important issue during the interviews. It is therefore remarkable that words indicating some form of communication are only used sparsely during all the interviews. An explanation for this might be found in the background of the interviewed entrepreneurs. All of them are engineers, who are passionate about the technology they started their business with. This might explain why they talk frequently about product development and technology, which is their passion, and less about communication within the network.

**Marketing**
*Name – story – presentation – marketing – brand*

This topic includes both words about the marketing outcomes, such as the *brand*, and the marketing action. As the relationship with the market seems to be such an important one, it is also striking that words related to marketing almost did not end up in the final frequency table, because they are only mentioned slightly more than 20 times. Marketing seems to be a neglected topic amongst technology entrepreneurs. This might also be caused by the background of the entrepreneurs. Based on the word frequency count marketing seems to be their blind spot.
**Learning**

Learn – experience

From the topic “activities in the development process”, it was found that the activities try and test indicate some form of experimentation. Based on experimentation new insights are gathered, which are used to improve the aspects that have been tested. Therefore an important part of the experimentation process consists out of learning. Even though it has not been mentioned explicitly very often, designing a new technology venture seems to be a learning process for the entrepreneur and his team.

### 4.2.2 Exploring the underexposed topics

Not only does the word frequency count give insight in the words and topics that have been used the most during the interviews, it also give insight in the topics that were expected to come up during the interview based on the development of the interview guide (Appendix C), but received little attention in reality. This section will discuss these underexposed topics.

**The business model: Lack of importance or awareness?**

One of the most striking inferences of this word frequency count analysis is not based on what is present in the word cloud of the collected data, but on what is absent. The literature review proposed that new venture creation is a design process with the aim to design the new venture’s business model. During the interviews the strategy of the researcher was not to mention the term “business model” to prevent socially acceptable answers about this topic. Instead, questions were asked about components of the business model with the intention that the interviewee should mention the term first, before the interviewer would present it in the questions. However, only 3 of the 10 entrepreneurs used the term “business model” with a total frequency of 4. This indicates that it is not a term that easily comes to the entrepreneur’s mind when talking about the development of the business. This can imply the following:

1. The business model is not important to the entrepreneurs.
2. The entrepreneurs are not aware of their business model.
3. The entrepreneurs are not aware of the term business model.

When looking at the word cloud in Exhibit 22, it can be noticed that the entrepreneurs talk frequently about components of the business model using words like “product”, “customer”, “market”, “money”, “technology”, “sell”. Therefore the omission of the term “business model” does not seem to indicate that it is not important to the entrepreneurs. Also, all entrepreneurs have developed a business plan, in which they describe their goals and how they want to achieve
These goals. This document forces the entrepreneurs to think about the (financial) logic behind their business and therefore the entrepreneurs will at least be aware of the outlines of their business model. These observations indicate that the interviewed entrepreneurs are not aware of the term “business model”, although they all have applied some kind of business model in their company.

To create more insight into these issues, the actual quotes in which an opinion about the business model is expressed were analysed. These original quotes can be found in Appendix E. One of the entrepreneurs, who mentions the business model during the interview, seems to be aware of the content of the business model and according to him it is best to stick to simple business models:

“It is all very cool and all very 2010 and so, but for us it is just very clear. We make something and then we sell it again and we do that in this way and not that we arrange all very difficult constructions or vague collaborations, like: you do this for us and then we do this for you. Actually simple business models that you agree on with your partners.” – Entrepreneur J, Appendix E: quote 1

This specific entrepreneur seems to be aware of his company’s business model and the meaning of the term business model. However, this entrepreneur seems to be the only one who knows exactly what a business model is. The two other entrepreneurs who mention the term “business model”, use it to describe parts of the business model:

“License, franchise, how that works we don’t know yet, but it is the intention that the business model is scalable.” – Entrepreneur B, Appendix E: quote 2

“Make sure you have to right qualities on board and if you lack them, that you should get them as quick as possible. Only then the real plan will come around: how exactly are you going to earn money with it? [...] Your business model can also be shaped after that. The most important in my opinion is indeed the team and if there is any demand at all for your product. And if it then costs 10 Euro per month or 100 Euro, what it is exactly, that is step 3 according to me.” – Entrepreneur C, Appendix E: quote 3

From these quotes it can be learned that the entrepreneurs equate the business model with the revenue model, which is only a part of the complete business model. However, the other elements that the latter entrepreneur mentions (product, market demand, and organisation) are also part of the business model. To this specific entrepreneur these elements are more important during the first
stages of start-up than the revenue model. This observation seems relevant in answering how the design of a new technology venture evolves until the start-up matures. Based on this quote, it seems that first main strategic decisions have to be made regarding the value proposition and the market and that the most important competencies for reaching the envisioned goals have to be in place, before the entrepreneur can start detailing the revenue model. The quote of Entrepreneur B supports the assumption that the revenue model is developed later in the new venture creation process. Hence, not all business model elements seem to be designed at the same time. However, this assumption has only been made based on two quotes. More in-depth data analysis has to verify if this sequence of events really occurs during the creation of a new technology venture.

**Communication with the extensive social network**

A topic that has not received much attention in the literature review, but which turned out to be very important during the interviews, is the social network. To establish a new firm, the entrepreneur has to engage in relationships with other parties, of which the relationship between the new company and the market is the most important one, as was pointed out in the previous paragraph. It is expected that when someone talks about people, some form of communication will also be mentioned. However, words referring to any form of communication are only used sparsely during the interviews. This is also true for words referring to marketing, which can be defined as a special form of communication from the company to the market. In the previous paragraph the assumption is posed that this sparse use of words referring to communication might be explained by the engineering background of the interviewed entrepreneurs. During the next stages of the research it would be interesting to investigate if it is really true that the entrepreneurs communicate sparsely with their social network and, might this assumption prove to be true, if this sparse communication leads to any specific problems and changes during the new venture creation process.

**A lot of talk about the market, little about its needs**

The market is a very important topic during the interviews. However, the entrepreneurs hardly talk about the needs of their market. Only after adding up all synonyms referring to the market’s needs, it ended up in the final list of 107 frequent used words with a total frequency of 29. This is remarkable, because a company’s value proposition has to appeal to a certain market need in order to actually create value for both the user and the company. Based on the word frequency count it seems that technology entrepreneurs are not very much concerned with solving specific needs in the market. However, also this assumption has to be verified by studying complete cases instead of mere word frequencies.
4.2.3 Main themes in the manifest interview data

The word frequency count gives some interesting insights in the collected empirical data and new directions for further analysis. However, not all the topics that have been discovered during the word frequency count describe the discovered phenomena at the same level of abstraction. For example, the topic “running a business” describes an action, while the topic “value proposition” describes an element that can be designed. To conclude this chapter, the 17 topics have therefore been grouped into 4 main themes: design elements, actions, processes, and enablers and obstructions (Exhibit 24). These themes, which clearly demonstrate the process and outcome aspects of new venture creation, will be discussed in this section and new questions will be formulated to guide the remainder of the study.

Design elements
As we saw in the previous paragraph, the term “business model” has hardly been mentioned throughout all interviews, even though the literature review proposed the business model as the object of design. It is therefore important to know which elements the entrepreneurs do design during the creation of their technology venture. When clustering the topics that have been discovered during the word frequency count, several design elements can be revealed. This theme gives an overview of these elements.

The objective of a new technology venture is to earn money by offering an innovative value proposition to a specific target market. In order to do so, the entrepreneur needs to develop the value proposition. However, also the market needs to be developed because it is expected that there is often no clear existing market for the innovations of technology-based start-ups. To facilitate
the development of these elements, the entrepreneur needs to build a larger social network, expertise on the technology and the market, financial resources, and a strong corporate image. This complete system results in the financial infrastructure of the firm, with on the one side the costs of creating as well as offering the value proposition to the target market and on the other side gained revenues from customers. During the new venture creation process the entrepreneur develops ideas about how all these elements should come together and plans of action are devised to reach envisioned goals. The topic “plan of action” is therefore an overarching topic that includes ideas and decisions regarding all other design elements.

Based on this description, it seems that there is a hierarchic structure in the discovered design elements. There seem to be some basic elements, such as expertise and financial resources, which are needed to create higher level elements, such as the value proposition. And the cost structure of this value proposition and the revenues from the market seem to result in an even higher level design element, which is the financial infrastructure. Because of this hierarchic structure it might be that some elements start to evolve later in the new technology venture design process than others. This leads to the following questions:

• Which core elements are designed during the new technology venture design process?
• Which supporting elements are designed during the new technology venture design process?
• How are these elements designed?

Actions
To create the design elements from the previous theme, the entrepreneur has to perform certain actions. The entrepreneur needs to undertake actions to create the value proposition, which have been captured in the topic “activities in the development process”. In addition the entrepreneur needs conduct marketing activities to reach the intended customer. Next to these activities that are aimed at creating the new venture, the entrepreneur also has to conduct activities to sustain the created business, which have been captured in the topic “running a business”.

Based on the topics that are included in this theme, many aspects remain unclear. Because the topics are very general, little can be said about how and in which order in the activities are conducted. The following questions remain unanswered at this point:
• Which actions are conducted during the new technology venture design process?
• How are these actions conducted?

Processes
It is very clear from the topics in this theme, that the creation of a new venture is a development process in which a new firm emerges. However, two other processes also seem important in this development process. The first one is timing. Based on the number of words that have been used to indicate time, it seems very important to conduct actions at the right time in the development process. This seems evident. For example, if an entrepreneur is too late with gathering financial resources, product development might run into serious delays, which allows competitors to catch up in the competitive race. But again, the word frequency count gives little insight into the timing of actions. Therefore this issue also has to be further explored by studying what the entrepreneurs actually said during the interviews. This leads to the following question:

• How does the timing of actions influence the new technology venture design process?

Another process that seems to be happening throughout the new venture development process is learning. This indicates that new venture creation is not a linear process, but an iterative one, which has also been suggested in paragraph 2.2. Entrepreneurs seem to learn from their mistakes and well-performed actions, so that they can improve their behaviour when they encounter the same situation again.

• Which role does learning play during the new technology venture design process?

Enablers and obstructions
Some topics refer to elements that can help or obstruct the entrepreneur in the development of the new firm. The entrepreneur can seek connections with supporting organisations, such as the YES!Delft incubator or the TU Delft, which provide the starting entrepreneur with relevant knowledge about running a business or about the developed technology, but which do not become risk-bearing stakeholders in the new venture.

Another element that seems to enable the new venture creation process is a positive attitude of the entrepreneur. Based on the discovered topics it seems that the new venture creation process can be a bumpy road full of difficulties. The discovered topics also indicate that the entrepreneurs exhibit a positive mind-set about the new venture creation process. This positive mind-set might
enable entrepreneurs to better cope with setbacks during the development of their firm. This is nicely illustrated by the following quote of one of the entrepreneurs:

“You can live off the few peak moments for a long time. That’s so awesome. If your idea succeeds, that is great, but you have many moments of concern about it. People don’t know that,”
– Entrepreneur D, Appendix E: quote 4

A final element that can prove to be an enabler or an obstruction is the communication, or lack thereof, between the entrepreneur and other people in the new venture’s social network. It is expected that good communication skills will enable the entrepreneur to build a strong relationships with all stakeholders in the firm’s social network, while inefficient communication might deteriorate these relationships.

Because the word frequency count only indicates that there are enabling and obstructing elements in the new venture creation process, in-depth exploration of the interview data has to create more insight in the nature of these elements:

- Which elements enable the new technology venture design process?
- Which elements obstruct the new technology venture design process?
- How do these elements enable or obstruct the new technology venture design process?

4.3 Qualitative scan: Exploring important start-up events to find theoretic concepts

Because the word frequency count does not give much consideration to the context in which each word is used, the second part of the scanning stage will be based on a qualitative exploration of start-up events, as they have been told by the participants. This qualitative scan has the purpose to detect tentative theoretic concepts that can be used to develop a substantive theory about the design process of new technology ventures. This leads to the following research question for this part of the scanning stage:

- Which theoretic concepts describe the events that have taken place between the initial business idea and the current operational business design of the studied technology ventures?
4.3.1 Open coding procedure

This qualitative part of the scanning stage starts with the process of open coding: perceived phenomena within the separate cases are labelled with a code that describes the observed event. This process aims to break the dataset down into new fragmented pieces of data, which allow comparison between instances across cases that seem to belong to the same theoretical concept. To develop open codes, the following questions are asked to the data (based on Smulders, 2006):

- Which event is happening here? Is this event related to the process of creating a new technology firm?
- What are possible explanations for this event?
- What does this event make me think of?
- Have I noticed similar events? What did these events look like? What are the similarities or differences between these events?

As the original interviews in the dataset were conducted in Dutch, first the original Dutch data are coded to keep the nuances of the Dutch language. Then these coded fragments are translated into English, based on the translation in the Van Dale Online Dictionary (Van Dale, 2010) which best fits the original meaning of the participant. These English fragments are put on statement cards (Exhibit 25), which are used to compare fragments and find collections of codes with similar content. When there is uncertainty about where to group the English fragment, the final decision is made based on the Dutch text.

Exhibit 25: Statement cards
Chapter 4: Scanning the Data to Find Theoretic Concepts

Exhibit 25: Overview of the characteristics of the cases used in the qualitative scan

- **Level of work experience of the participant**
  - No previous work experience: 2
  - Work experience: 3

- **Year of start-up**
  - 2005: 1
  - 2006: 2
  - 2008: 1
  - 2009: 1

- **Full time-equivalent (FTE) of the organisation**
  - < 5: 2
  - 5 - 10: 2
  - > 10: 1

- **Industry in which the new venture operates**
  - Design: 1
  - Engineering: 1
  - Infrastructure: 1
  - Internet: 1
  - Offshore: 1

- **Educational background of the participant**
  - Aerospace Engineering: 1
  - Civil Engineering and Geosciences: 1
  - Industrial Design Engineering: 1
  - Mechanical, Maritime and Materials Engineering: 1
  - Not TU Delft: 1

- **Obstacles encountered during the new venture creation process**
  - Few obstacles: 1
  - Some obstacles: 2
  - Large obstacles: 2
4.3.2 Case selection for the qualitative scan

Because the word frequency count indicates that starting a new technology venture is a multi-faceted process, it has been decided to conduct the qualitative scan with only half of the gathered data to prevent an overload of data in this stage of the research. Five cases have been chosen for the following theoretical reasons (based on paragraph 3.4.2):

- *The selected cases reflect different stages in the new venture creation process.* Cases from different start-up years have been chosen to cover the entire new venture creation process. More cases from earlier start-up years have been selected, because these cases are expected to have been through more stages in the process, which will help in mapping the new venture creation process. These cases are compared with cases that are still in the beginning of the start-up process.

- *The selected cases should capture the diversity within the scope of the study.* The five cases all operate in a different industry and their founders have different levels of previous experience. Furthermore the cases have been selected based on the process they have been through. Some of the selected cases have gone through a very smooth new venture creation process, while other start-ups have encountered many obstacles on their path. By comparing these cases, it can be assessed which factors influence the course of the new venture creation process.

An overview of the selected cases’ characteristics is presented in Exhibit 26.

4.4 Results of the qualitative scan: formulation of theoretic concepts

In the open coding process 292 fragments were identified in the interview data of the 5 cases that seem relevant to designing a technology firm. These fragments have been grouped into 27 concepts (Appendix I), of which an overview is presented in this section. All concepts are illustrated with a representative quote from the analysed data. In some quotes words have been added or removed by the researcher to improve the readability of the quote or to ensure the anonymity of the source. These additions and subtractions are indicated by square brackets [example]. The quote is followed by the entrepreneur who said it and a number. This number corresponds with the original quote in Appendix E. This notation will be used for all quotes in the remainder of this report.
<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
<th>Illustrative quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquiring financial resources</td>
<td>All financial resources that are acquired to make it possible to run a business</td>
<td>“Once we talked to 30 investors, because we needed money then. [...] Did nothing to our technology. That was a bit of a shortcoming on our part.” – Entrepreneur D, 5</td>
</tr>
<tr>
<td>Assuming business hypotheses</td>
<td>Assumptions about how the new firm will create value.</td>
<td>“Of course, in the first year we’ll immediately sell the whole setup and after that we’ll sell 5 and then we’ll sell 20 and after 3 years everything is fine, then the company runs superb. That was a very good fantastic story.” – Entrepreneur C, 6</td>
</tr>
<tr>
<td>Baggage of the entrepreneur</td>
<td>The experience, knowledge, and skills the entrepreneur has collected before starting the business.</td>
<td>“However, I think I have brought along aspects from all my previous roles. [...] And, I’ve questioned myself about it, were all these experiences necessary to bring to company where it is now? They did help.” – Entrepreneur G, 7</td>
</tr>
<tr>
<td>Building a larger organisation</td>
<td>Employing new people to extend and strengthen the team</td>
<td>“A company which is first you as a person with your story [...] now we are at the point that the company is more than just me. That it becomes an entity outside yourself and that others continue with it and can shape that as well.” – Entrepreneur G, 8</td>
</tr>
<tr>
<td>Building a network</td>
<td>People, companies and other organisations with whom the start-up maintains relations to help it in its quest to develop a healthy business</td>
<td>“Did a company acquisition to boost turnover and to build a network [...]” – Entrepreneur H, 9</td>
</tr>
<tr>
<td>Co-creation</td>
<td>Developing the value proposition together with potential customers.</td>
<td>“Everything is developed together with customers. We try to make as many decisions together with the customers.” – Entrepreneur H, 10</td>
</tr>
<tr>
<td>Determining the focus</td>
<td>Allocating scarce resources to core business in order to maximise outcome</td>
<td>“Peel, and with peel I mean making smaller. [...] You have little resources and then you should focus on one thing.” – Entrepreneur H, 11</td>
</tr>
<tr>
<td>Developing competencies</td>
<td>Building key knowledge and skills that enable the start-up to offer its value proposition and differentiate from competitors.</td>
<td>“You search for: what can I do? You’re continuously busy with that. What can we do? What are we good at? What do we want to be good at in the future? So where do we need to invest in to be able to do that?” – Entrepreneur C, 12</td>
</tr>
<tr>
<td>Concept</td>
<td>Description</td>
<td>Illustrative quote</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Developing the actual</td>
<td>Activities that are conducted to create and produce the envisioned product</td>
<td>“Now we are developing that technologically and only now it really starts to take shape in an understandable product. The technology is nice, but how are you going to sell it clearly to someone?” – Entrepreneur C, 13</td>
</tr>
<tr>
<td>product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discovering a market</td>
<td>Starting a company or diversify the business after discovering a specific</td>
<td>“The establishment of the company was not the objective. The objective was: there is a problem, for which I have a solution.” – Entrepreneur A, 14</td>
</tr>
<tr>
<td>need</td>
<td>need in the market</td>
<td></td>
</tr>
<tr>
<td>Earning money</td>
<td>Deliver value to the market and receive revenues above the costs made by</td>
<td>“You invent something and that is nice, but it only works if people want to pay for it. [...] Once you have found the right formula for that then you should go for it and at the moment that has happened.” – Entrepreneur A, 15</td>
</tr>
<tr>
<td></td>
<td>the start-up</td>
<td></td>
</tr>
<tr>
<td>Establishing partnerships</td>
<td>Cooperation with other companies to enhance own value proposition.</td>
<td>“Our first business idea was to build our first system in a joint venture with that company: you are good in building those things, we have an invention [...] if we combine your systems and knowledge about those systems with our plan, than we can take on the market together.” – Entrepreneur A, 16</td>
</tr>
<tr>
<td>Evolution of the</td>
<td>The development of the entrepreneurial tasks</td>
<td>“I have slowly been growing from scientist, where you do everything by yourself, to project manager, where you only facilitate, into my function, CEO, in which, when you do it right, you are actually only busy with the vision and the managing of managers [...]” – Entrepreneur A, 17</td>
</tr>
<tr>
<td>entrepreneurial role</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimenting and</td>
<td>Considering different options before choosing the one that works best</td>
<td>“We have noticed in the beginning that doing a little for 5 markets or doing it really well for 1 market, in that case doing it really well for 1 market yields the highest results. And it also provides a better base for further diversification.” – Entrepreneur G, 18</td>
</tr>
<tr>
<td>learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External trends</td>
<td>Trends in the micro and macro environment outside the entrepreneur’s sphere</td>
<td>“If the crisis would not have been there, we would have grown apart at the seams.” – Entrepreneur D, 19</td>
</tr>
<tr>
<td></td>
<td>of influence that can positively or negatively influence the business.</td>
<td></td>
</tr>
<tr>
<td>Concept</td>
<td>Description</td>
<td>Illustrative quote</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Formalising ideas into plans</td>
<td>Translating the vision into goals and actions, and connecting them to a timeframe</td>
<td>“When you write down a business plan you won’t get a story with open endings. When you write it down, you see: here we have a problem. [...] You can have an idea about how much you will ask, but when you write it down then you see there are holes in it.”</td>
</tr>
<tr>
<td>Having a job on the side</td>
<td>Acquiring extra revenues to sustain the core business by doing jobs that do not fit the main business focus</td>
<td>“That consulting work is also practical when you are in the development, because there are always holes in the development. That you can fill those holes with consulting work.”</td>
</tr>
<tr>
<td>Listening to environment</td>
<td>Interacting with other parties to gain information or get advice</td>
<td>“Talking with parties is free and they can push you in the right direction.”</td>
</tr>
<tr>
<td>Maintaining a unique market position</td>
<td>Doing things differently than competitors to distinguish the new company in the market</td>
<td>“You make conscious changes to improve your competitiveness. [...] It is a kind of zigzag. You are searching for that unique position you can maintain in the market. That is why it was troublesome for us, because we did not know the market that well and we did not know the technology that well. Therefore our swings were quite coarse.”</td>
</tr>
<tr>
<td>Marketing</td>
<td>Activities to promote the value proposition to the market with the aim to enlarge market share</td>
<td>“Our product is positioned in the market under the brand [...] and from the beginning we have tried to make [this brand name] a synonym for [product category] [...] get clearly on people’s mind.”</td>
</tr>
<tr>
<td>Measuring market demand</td>
<td>Determining the size of the target market and the interest in the value proposition</td>
<td>“We went to talk with 10 parties to ask if they perceived this as a problem and [...] if they thought they would become a customer. We tested that. That was very positive.”</td>
</tr>
<tr>
<td>Preparing the market</td>
<td>Activities with the aim to create a market for an innovative value proposition from a new company without any track record</td>
<td>“Customers are elastic concepts. You have a nice idea, at a certain moment that becomes something that could become something and then someone sees it could be a solution for him. Not that there is suddenly someone at the doorstep shouting: I want a [product]!”</td>
</tr>
</tbody>
</table>
The theoretic concepts that have been presented in this paragraph will form the starting point for the development of more abstract theoretic categories in the next chapter.
The previous chapter concluded with formulating 27 theoretic concepts based on a qualitative analysis of the collected empirical data. In this chapter these 27 concepts, together with the insights gained from the quantitative scan and the literature, will be used to formulate more abstract categories that explain how the design of a new technology venture evolves until it reaches maturity. In order to create more insight in the connections between the discovered concepts, first 5 within-case analyses are conducted of which the results are presented in paragraph 5.2. The new insights that are being created by these case studies, together with all insights gained from the previous chapters, will be used in paragraph 5.3 to formulate categories that describe the theoretic new technology venture creation process. In addition to these process categories, outcome categories will be formulated in paragraph 5.4. Paragraph 5.5 will summarise the findings of this chapter.
5.1 Specification stage: from theoretic concepts to theoretic categories

The literature review, the quantitative scan and the qualitative scan have resulted in various concepts that describe pieces of the evolution process of a new technology venture’s design. The aim of this specification stage is to categorise these concepts into more abstracted categories that describe key components of the new technology venture design process and the relationships between these key components. This chapter therefore aims to answer the following research questions:

• Which main categories explain how the design of a new technology venture evolves until the new firm matures?
• How are these categories related in explaining the evolution of a new technology venture’s design?

5.1.1 Procedure of the specification stage

The quantitative scan in paragraph 4.2 resulted in the discovery of four main themes in the collected interview data: design elements, actions, processes, and enablers and obstructions. Based on the conclusions of this quantitative scan, it is assumed that there is a certain order in the creation of separate new venture design elements and new venture design activities. Therefore it seems relevant to first investigate at which moments in the process the discovered concepts of the qualitative scan will manifest. This leads to the following questions:

1. When do the discovered concepts become manifest in the process?
2. How does the new venture design evolve during this process?
3. What are the relationships between the discovered concepts?

As the open coding method gives little insight in the order and connections between concepts, it is decided to carry out within-case studies in order to become familiar with the patterns within separate cases. Each case that has been selected in paragraph 4.3.2 is therefore analysed on its own. The interview data are reread and events that correspond with the discovered theoretic concepts in paragraph 4.4 are highlighted. Based on this analysis a roadmap is made, which visualises and describes the development process of the analysed case in abstract terms, thereby providing answers to first question in this sub-paragraph. While generating these roadmaps, additional insight was obtained about the elements that constitute the new venture design (Exhibit 27) which I will elaborate on in paragraph 5.4. Therefore, together with the roadmap, a
The division between design process and design outcome will be used to structure the formulation of abstract categories, which aim to elucidate how the design of a new technology venture evolves until the new firm reaches maturity. An abstract theoretical explanation of this process will be created by clustering the discovered concepts of paragraph 4.4 in theoretic categories based on the researcher’s interpretation of the collected empirical data, insights and questions from the quantitative scan, and the results of the within-case analyses. To guide the clustering of theoretic concepts into categories with a higher level of abstraction, the following questions are asked throughout the clustering process:

- What is this concept a part of?
- Which other concepts does this concept make me think of? What are the similarities or differences?
- What could be the main category for these concepts?

5.2 Visualisations of the new technology venture creation process and its outcomes

This paragraph presents the results of the within-case analyses (Exhibit 28 to 37). The exhibits on the left represent the process by which the new firm has been created. The icons correspond with the icons of the formulated theoretic concepts in paragraph 4.4. The white arrows indicate which route the entrepreneur has taken to reach the current destination. Note that the current destination does not always represent a mature firm, as cases in various stages of the new venture creation process have been investigated. Alongside the roads in these exhibits are road signs that indicate roadblocks and new directions in the process. The blue direction signs indicate which business design is being developed along the road that has been signposted. The exhibits on the left zoom in on these blue direction signs by showing the business design in detail, using the icons of Exhibit 27. The particular focus of the stakeholder or element is described in the area under or next to the icon.
The road map of Case A indicates this new technology venture has changed its design three times during its existence. This exhibit gives an overview of these design changes.

**Design 1: Joint venture**
- Partner company: Technological competencies
- Case A: Invention
- Co-creation
- Customer buys product
- Conservative B2B niche market
- Several financiers: subsidy, sponsorships, loans
- Invention
- Complex and expensive product
- Customer buys product
- Conservative B2B niche market
- Several financiers: subsidy, sponsorships, loans

**Design 2: Outsource production, sales and rental model**
- Outsource production of parts
- Bank
- Dependent organization to gather required competencies
- Revenue model 1
- Complex and expensive product
- Customer buys product
- Conservative B2B niche market
- Revenue model 2
- Product + service
- Customer rents product + service
- Conservative B2B niche market

**Design 3: Rental model, consultancy on the side**
- Outsource production of parts
- Bank
- Unique technological competencies
- Consultancy
- Customer pays for consultancy
- TU Delft
- Customer rents product + service
- Conservative B2B niche market
Design 1

- Matching competencies with fellow student: start company together based on different but complementary passions
- Developing product based on specific demands of one client
- Recognizing business potential
- MSc of TU Delft

Design 2

- Attempts to sell the product to target market
- Expand the network by entering YES!Delft
- Writing business plan based on assumed business hypothesis
- Adjusting business hypothesis: Deciding to focus on different market
- Adjusting product: clearer customer benefits
- Business model: First sell the product, then make it

Design 3

- Having job on the side to earn extra money
- First sales: Monitor user experience to improve understanding of the market
- Technology driven marketing tactics: emphasis on technological specifications
- Develop brand based on determined core competencies
- Establish partnership based on complementary competencies
- Adjusting product: clearer customer benefits
- Market driven marketing tactics: emphasis on customer benefits
- Focus on core competencies
- Adjusting product for new market

Exhibit 30: Road map Case C

CHAPTER 5: FROM THEORETIC CONCEPTS TO SPECIFIED CATEGORIES
Exhibit 31: Design changes Case C

The road map of Case C indicates this new technology venture has changed its design three times during its existence. This exhibit gives an overview of these design changes.

Design 1: Sales model

Case C: Invention

Technological product

Customer buys product

B2B niche market

Design 2: On demand production and delivery

Partner company: Technological competencies

R&D and marketing organisation

Customer buys product

New B2B market

Design 3: On demand production and delivery, custom-made jobs on the side

Partner company: Technological competencies

R&D and marketing organisation

Customer buys product

B2B market

Clear market-focused brand

Custom-made product

Orders from range of different customers
Exhibit 32: Road map Case D

Design 1

- Technology-based vision: applying developed technology of one industry in another industry
- Matching competencies with fellow student: start company together based on different but complementary passions
- MSc of TU Delft

Design 2

- Writing business plan based on assumed business hypothesis
- Applying for subsidies

Design 3

- Decreased demand for products because of economic crisis
- Diversify product portfolio into different markets
- Having consultancy job on the side
- Expanding the organisation

Out of money

- Improved understanding of market: technology is not allowed
- Attempts to sell the product to target market
- Developing full-scale prototype
- Acquiring a patent on the developed technology

Reflection on failed attempt: what to do next?

Recognising new opportunity based on market needs -> Develop consultancy branch

- Acquiring subsidy -> convincing first customer -> convincing large investor
- Using TU Delft image to reach potential customers
- Expanding organisation to continue technological development
- Acquiring financial resources, because some investors backed out
- New approach works -> Growing market demand

Decreased demand for products because of economic crisis

- Adjusting business hypothesis: Applying developed technology in different market
- Expanding the organisation to continue technological development

New model: Develop product together with customer License IP to customer

Acquiring subsidy -> convinciing first customer -> convincing large investor

- Using TU Delft image to reach potential customers
- Expanding organisation to continue technological development
- Acquiring financial resources, because some investors backed out
- New approach works -> Growing market demand

Expanding the organisation

- New model: Develop product together with customer License IP to customer
- Acquiring subsidy -> convincing first customer -> convincing large investor
- Using TU Delft image to reach potential customers
- Expanding organisation to continue technological development
- Acquiring financial resources, because some investors backed out
- New approach works -> Growing market demand

CHAPTER 5: FROM THEORETIC CONCEPTS TO SPECIFIED CATEGORIES

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Exhibit 33: Design changes Case D

The road map of Case D indicates this new technology venture has changed its design three times during its existence. This exhibit gives an overview of these design changes.

**Design 1: Sell invention**
- **Financier:** subsidy
- **Case D:** Invention
- **Product:** Direct payment from customer
- **Niche market with strict regulations**

**Design 2: Licensing model, new target market**
- **Investors**
- **Intellectual Property (IP):**
- **Co-creation:** IP license
- **Customer pays for use of IP:** B2B market with production capacity

**Design 3: Market expansion, adding engineering consultancy**
- **Investors**
- **Unique technological competencies**
- **Engineering consultancy**
- **Customer pays for consultancy:** Engineering firms
- **Customer pays for use of IP:** 4 different B2B markets with production capacity
Design 1

Recognising market need

Design 2

Building larger organisation

Design 1 continued

Conducting market research to understand needs and measure demand

CHAPTER 5: FROM THEORETICAL CONCEPTS TO SPECIFIED CATEGORIES
The road map of Case G indicates this new technology venture has not made much changes to its design. The new venture actually has had the same design since it started, with the only exception of trying to cater to different markets in the middle of the new venture creation process. This exhibit gives an overview of the business design of Case G.
Design 1

- Business partner’s vision about future
- Vision about future
- Work experience
- Relevant network

Design 2

- Taking over other company to expand own competencies
- Reflection on failed market introduction
- Outsourcing complete product development to specialists
- Developing marketing strategy
- Product launch

Design 3

- Making the decision to focus on market segment
- Putting the development of service on hold
- Adjusting hypothesis: Part visions, develop product and service separately

Design 4

- Deciding to change revenue model
- Incorporating discovered innovation in product
- Noticing external technological development that offers new
- Selling developed products

Decisions regarding adopted technology might have negative effect

Determining focus for future developments

Strengthening own position by forging alliances with other companies

Receiving positive feedback on marketing

Tipping point: market is not ready for innovation

Determining focus for future developments

Noticing a trend in the market

Recognizing business potential: Combining visions into one hypothesis

Acquiring financial resources

Visions about future

CHAPTER 5: FROM THEORETICAL CONCEPTS TO SPECIFIED CATEGORIES

Exhibit 36: Road map Case H
The road map of Case H indicates this new technology venture has changed its design four times during its existence and this firm is still struggling to find its direction. This exhibit gives an overview of the design changes that happened in Case H.

Design 1: Outsource product development, online sales model

Outsource complete product development → Case A: Vision → Online product (version 1) → Customer buys product → Professional organisations

Design 2: Company take-over, 2 value propositions

Expand organisation by taking over supplier → Online product (version 2) → Customer buys product → Value proposition 1 → Service (version 1) → Subscription fee → Professional organisations

Value proposition 2

Design 3: Focus on sales model

Product development and sales → Co-creation → Online product (version 2) → Customer buys product → Professional organisations

Design 3: Switch to subscription model, focus on one target market

Alliances with other companies in same industry → Co-creation → Service provider → Service developed from product version 2 → Subscription fee → Specific professional organisations
The results of the within-case analyses that have been presented in this paragraph, will be a tool in clustering the theoretic concepts in categories. This clustering is done based on the division between new venture creation process and its outcome. Therefore paragraph 5.3 will present the categories that give a theoretical explanation of the new technology venture creation process and paragraph 5.4 will present the categories that give a theoretical description of the new technology venture design elements.

5.3 The theoretical new technology venture creation process

Based on the roadmaps of the new ventures’ development processes in the previous paragraph, it can be concluded that there are several roads that lead to an established firm. This is not a surprising finding, as it was already proposed in paragraph 2.3 that designing a new venture should be considered a wicked problem. This means that every new venture design problem is unique and that there are various good solutions for one and the same new venture design problem. Hence, there is not one “right” order of events that leads to the establishment of a new firm.

However, it is possible to discover three categories that describe theoretic stages in the new technology venture design process: exploration, realisation, and exploitation. These three stages do not present a linear process, but an iterative one, which is confirmed by the discovery of a fourth process category: experiential learning. As new venture creation does not happen in isolation, the fifth category, which will be discussed in this section, comprises external enablers and obstructions of the new venture creation process.

Each discovered category will be described based on the theoretic concepts (paragraph 4.4) it contains. Some concepts appear in more than one category, which indicates that these specific concepts play an important role in the complete new venture creation process. Only the concept “evolution of the entrepreneurial role” has not been grouped in a category, as it describes a minor sub-process in the larger process of new venture creation. The description of this concept can be found in Appendix F.
5.3.1 Exploration

“For me the focus was very important, to just know where we are going to. You have a good idea and you can do 10 nice things with that idea, but there are only a few that are profitable. And as an entrepreneur you are someone who is looking for added value. Something where someone pays more for than normal or something where eventually a positive number remains on the counter.”
– Entrepreneur B, 32

In the beginning of the new venture creation process there is nothing, except for an entrepreneur or team of entrepreneurs who explore opportunities for creating a business from a discovered innovation or problem in the market. The first category therefore contains theoretic concepts which are related to the exploration of opportunities (in order of appearance in this paragraph):

- Baggage of the entrepreneur
- Technology driven business development
- Discovering a market need
- Vision
- Assuming a business hypothesis
- Understanding the market
- Measuring market demand
- Determining the focus
- Formalising ideas into plans

During the exploration phase entrepreneurs generate possible solutions for perceived needs in the market or they search markets for a discovered innovation on which a future business can thrive. This category is therefore characterised by (not always conscious) activities aimed at discovering technological and/or market opportunities. Entrepreneurs have to explore and converge the solution space (technological invention or innovation) and problem space (market need) to make them a good fit, in order to make the most of scarce resources and the own capabilities. These explorative activities result in a plan on which the entrepreneurs can act in the second stage: realisation.

This subparagraph will illustrate the exploration process of technology entrepreneurs according to the theoretic concepts that belong to this category. The order in which these concepts are described is based on the insights gained from all previous analyses and the personal interpretation of the researcher.
Baggage of the entrepreneur

Every new technology start-up originates from the initiative of one entrepreneur or a team of entrepreneurs. These entrepreneurs are not blank slates, but they have collected many experiences, knowledge and skills during the course of their lives and they have different ambitions and objectives. Each entrepreneur therefore brings along his or her own personal baggage according to which (s)he processes new information and makes decisions regarding the new venture.

The first aspect in which this baggage of the entrepreneur becomes visible, is the kind of opportunity that is discovered by the entrepreneur. Entrepreneurs interpret new information according to their own knowledge and experiences, which can lead to the recognition of an opportunity. The interviewed entrepreneurs discovered their business opportunities according to their own interest and/or expertise, as it seems easier for them to rate new information at its true value within their own domain:

“It’s more my colleague who is a car enthusiast. I love airplanes. He is a car enthusiast, aircraft does not say much to him. He said: can’t you apply that technology from aerospace to vehicles? You can build it and I... We will do that together.”
– Entrepreneur D, 33

When the opportunity has been discovered, it is important for the entrepreneur to survey the own capabilities, as in most cases the entrepreneur’s personal capabilities are not enough to reach the envisioned business goals. Therefore nascent entrepreneurs often search for other people, organisations, or companies who can supplement their own baggage:

“So actually the formal substantive background and experience is good when it is supplementary, and this was the case: an economist with marketing experience stepped on board. I was the technician with commercial experience. This complements each other well.”
– Entrepreneur G, 34

Technology driven business development

Based on the case studies, it seems that entrepreneurs can discover two types of opportunities on which they establish their company: technological opportunities and market opportunities. I will first describe the discovery of technological opportunities, before I will discuss the discovery of market opportunities.

The concept of technology driven business development is nicely illustrated by
the following saying in favour of technological innovation:

“Build a better mousetrap, and the world will beat a path to your door.” – Ralph Waldo Emerson, essayist and poet, 1803 –1882

This logic also seems to be applied in some of the studied cases. Because the interviewed founders have completed an engineering degree, they are susceptible to discovering technological innovations. Therefore it does not come as a surprise that most of the interviewees have started their firm based on a discovered technological opportunity:

“That is the process of thinking up the technology. Subsequently you will test if it is possible. Then you will do scale model tests to prove it really works. Then you build a prototype. And yes, then you want to introduce that to the market, and then develops, say, the business.” – Entrepreneur A, 28

Some interviewed technology entrepreneurs deliberately search for a market to sell their technological innovation to:

“A third problem is customers, binding enough customers to you. And we solved that by, like Ken Morse... He is pretty clear about the fact that you should choose a vertical [target market] and recently we did just that. I have to say that it is a big relief, because now you exactly know what to do every day.”
– Entrepreneur H, 35

In this case the entrepreneur develops a product and introduces it to the market, because the entrepreneur thinks that the market needs it. The entrepreneur has completely defined the solution, but does not know much about the actual problem this solution should solve. This description reveals a fundamental weakness of a completely technology driven strategy: the new venture might end up with the better mousetrap nobody wants.

Discovering a market need
In most cases following a mere technology driven business development process does not result in creating the most value for all parties involved. In addition it is important to know which need the product is actually satisfying:

“The establishment of the company was not the objective. The objective was: there is a problem, for which I have a solution.”
– Entrepreneur A, 14
In this case the entrepreneur responds to a discovered need in the market: he has defined the problem space. However, not all market needs are manifest. In some cases the entrepreneur perceives a market trend and needs to deduce a possible future need (I will elaborate on this process later in this paragraph under the concept “understanding the market”):

“The first idea we started with was the notion, vision, that if Internet would develop the way it was developing at that moment, there would be a large need for filtering in the future[...] And the second notion we had was if you look at email on the one hand and large networks on the other hand [...] than there will be a very large need for what we call niche communities in the future. [...] That were two ideas we had and we have matched those.”

– Entrepreneur H, 36

Market needs are not only discovered at the start of the new venture creation process. New needs can and must be discovered throughout the firm’s lifespan to ensure its survival:

“You employ smart engineers, who will become annoyed when they have nothing to do. [...] And it’s so nice when someone comes at you with a technical question. [...] Short assignments, and you also earn money with it. [...] Perhaps we should try to acquire a little more work like that. Counterbalance peaks within the company, creating peace in the company. So maybe you should not always wait for people to come to you, maybe we should just go and see if we can sell it.”

– Entrepreneur D, 37

Vision

The discovered technological and market opportunities are translated into a long term vision on the desired future state and the role of the new company in that future. This vision is used as guideline and inspiration for the new venture creation process:

“That vision is actually in the centre of our brand. Around that we started creating an identity. Around that is the logo, slogan and additional artefacts for a good communication of that vision. From that vision and that identity we try to communicate well, both externally and internally, and adapt the organisation and the product.”

– Entrepreneur C, 38

When studying the roadmaps of the analysed cases, it becomes clear that the vision never changes during the new venture creation process. It seems that
when the entrepreneur has crafted a strong vision, it can last for a long time, even if the company has gone through several large changes:

“Over five years we hope to be one of the largest [...] engineering offices in Europe. We just go for it. That vision in itself has not changed. If you look at where we would get our revenues from and the products we were going to do: lots of changes. But the area where we are in... It’s not that we as boot manufacturers eventually switched to selling phones.” – Entrepreneur D, 39

Therefore it is important to spend time in developing a strong vision during the exploration phase:

“I still think the vision was the smartest. The capability to run a business from a vision [...] So far that has ensured our survival.” – Entrepreneur H, 40

This is especially important when the business is started with a larger entrepreneurial team:

“[…] you should be able to tune your plans. How do you see yourself in 3 years, within 5 years, what if it fails? Something about the finances. Just each other’s vision and those didn’t match from the first day.” – Entrepreneur D, 31

This need for tuning the visions is caused by the baggage of the entrepreneurs. Based on their prior knowledge and experiences, entrepreneurs often perceive the task at hand in different ways. It seems important to communicate these differences in the first stage of new venture creation in order to prevent personal altercations later in the process.

Assuming business hypotheses

Based on the entrepreneur’s baggage, the discovered technological and market opportunities, and the entrepreneur’s vision for the future, business hypotheses are formulated. These business hypotheses combine all gained insights into verifiable assumptions about how the new firm can create value for all parties involved, for example:

“We started with the idea that through commissioning a number of assignments to specialists we could provide an environment that we could sell and that we could build a company based on that.” – Entrepreneur H, 41
A business hypothesis is in most cases something that exists implicitly in the mind of the entrepreneur and which is inductively conceived based on the entrepreneur’s observations. The activities after formulating the business hypotheses should be aimed at deductively verifying these hypotheses. If a hypothesis is proven wrong, a new hypothesis has to be formed and verified. This process continues until the entrepreneur has found a well-functioning business formula.

**Understanding the market**

Before entrepreneurs actually start making large investments to transform the discovered opportunity into a functioning company, they have to verify their initial business hypotheses. This can be done both qualitatively and quantitatively. Creating an understanding of the market is an important qualitative step in this verification process. Does the envisioned value proposition really satisfy a need? The entrepreneur has to understand the needs of the target market, i.e. the problem space, in order to create a viable business:

“To do it right and also to differentiate yourself and the opportunity to follow that up with a new project, depends strongly on the attention you have paid in the beginning to the market and taking them along in the use of this innovative product.[...]Understand the market, so you set the price at the correct level.” – Entrepreneur G, 42

A potential pitfall for entrepreneurs with an engineering background is that they are too invested in the technology and underestimate the importance of the market:

“And that is maybe particular to Delft that you think it is very fantastic how the technology is put together [...] but we also have to check which precise benefits it has to the customer. And then the idea evolves to something you can communicate more clearly and which makes it compact, as a whole, which you can just give to your customer.” – Entrepreneur C, 43

This can lead to a situation in which the entrepreneur has developed a perfectly functioning product, but completely misunderstood the market:

“After we had contacted [the target group], it became clear that the technology was not allowed. The grey zone, wrong side of the grey zone. Then there you have it.” – Entrepreneur D, 30

The roadmaps also indicate that none of the investigated cases encountered
major difficulties because it was not possible to develop the envisioned product technologically. Problems seem to arise when the product is introduced to the market. Hence, a company can only produce a really powerful product when it appeals to a clear need: the solution space and the problem space should converge to make them a good fit. But not all market needs are expressed explicitly, which was already noticed in the concept “discovering a market need”. What people say, is often not what they actually want, as the following famous quote demonstrates:

“If I’d asked my customers what they wanted, they’d have said a faster horse.” – Henry Ford, founder of the Ford Motor Company, 1863 – 1947

Henry Ford understood that the speed of the horse was not the actual problem. He grasped the underlying need for faster transportation: he understood the tacit need of his market. And with his pioneering work in the mass production of automobiles, Henry Ford awoke people to many other needs they had not been aware of before he presented them with this new way of transportation. Once people had a car, they wanted highways to travel faster from A to B, they needed fuel to keep their cars running, and they needed traffic lights to prevent accidents. The introduction of the mass-produced car revealed many latent needs, which opened up many new business opportunities for car related products (Exhibit 38).

Exhibit 38: Accessing different levels of knowledge

Source: Sleeswijk Visser, Stappers & Van der Lugt, 2007
To prevent entrepreneurs from building the better mousetrap nobody wants, they have to verify if the technology they are developing fits an actual explicit, tacit, or latent need in the market. They have to explore the problem space in order to develop a meaningful solution. Only when there is a good fit between product and need, the start-up can create satisfied customers:

“That is why the launching customer is always left holding the baby. He never gets what he thought he would get. The chance that there is a perfect match between your long term vision and what the customer thought he would get as first, that chance only exists if someone has peeled it all off.” – Entrepreneur H, 44

Next to understanding the needs that live in the market, the entrepreneur also has to know which other products aim to fulfil these needs to prevent the reinvention of the wheel and ensure a unique selling point:

“Off course. If there are no competitors, there is also no market. There are x-number of companies which I keep in sight.”
– Entrepreneur C, 45

Measuring market demand

The quantitative step in the verification process of the initial business hypotheses is the sizing of the expected demand in the market. This concept has some overlap with the previously described concept, but they are not completely the same. Consider the following statement:

“In the beginning you just need people to believe in it and the best is, according to me, when a customer believes in it, because that says that there apparently are more people with a similar problem and who would also buy the product.” – Entrepreneur C, 46

Is this true? It might be that the entrepreneur completely understands the needs of this single customer, but that nobody else has the exact same need. In this extreme case the market would only exist out of 1 customer, which does not provide a solid basis for starting a company. To assess if the market will be worth the effort of pursuing, the entrepreneur has to size the total potential market demand by conducting market research:

“We went to talk with 10 parties to ask if they perceived this as a problem and […] if they thought they would become a customer. We tested that. That was very positive.” – Entrepreneur H, 27

Only if this verification shows there will be enough potential customers to reach
the envisioned business goals, the entrepreneur should continue with the new venture creation process.

**Determining the focus**

If the verification of the business hypothesis (in its original or in an altered form) leads to positive results, it can be used to determine the main focus of the new venture’s business activities. Based on the number of quotes that are related to this concept and the roadmaps in paragraph 5.2, it seems that determining the company’s focus is one of the most important reoccurring issues during the creation of a new technology venture:

“As long as you do not choose, you can do everything.”
– Entrepreneur H, 47

This focus is so important, because it guides the company’s efforts and the allocation of the start-up’s scarce resources:

“Peel, and with peel I mean making smaller. […] You have little resources and then you should focus on one thing.”
– Entrepreneur H, 11

Furthermore, having a clear point of focus can help the new company in explaining itself to its market:

“Later on, and then I think over about 5, 10 years, you can do lots of things with it, but we have consciously chosen for 1 aspect in order to be clear towards the customers.”
– Entrepreneur C, 48

The process of finding the company’s focus can also be described as a trial and error learning process. At the start the entrepreneur’s ambitions surpass the actual resources that are at the new venture’s disposal and in some cases, instead of making the conscious choice to do one thing really well, the entrepreneur decides to immediately pursue all ambitions. However, usually the entrepreneur is forced to make this decision later in the process, when it becomes clear that the selected approach does not yield the expected results:

“Then after several months it became apparent that it was too complex. It put too much pressure on the organisation and then we decided to stop the development of the service and first straighten out the custom-made goods with the future intention to change the custom-made goods into a service, which might look different than the original service.” – Entrepreneur H, 49
It seems that not defining a clear focus during the exploration phase has a large impact on the progress a firm makes during the subsequent process. The companies in the dataset that did have a clear and verified focus from the start, which fitted their capabilities, (case A and G) seem to outgrow the start-up phase much faster than the company that tried to do too many things simultaneously (case H).

**Formalising ideas into plans**
All previous explorative activities converge into a concrete plan, which will guide the activities aimed at realising this plan. Plans within the new venture can be conceived at different levels. Strategic plans contain long-term objectives and strategies which aim to realise the entrepreneur’s future vision:

“What is funny: In the turning technology into business course, which we started with, there is a schedule printed [about how to realise the vision]. How funny, we follow that schedule perfectly. [...] That plan was not so stupid invented back then.” – Entrepreneur D, 50

Tactical plans, on the other hand, break the long-term strategic plan down into specific, short-term goals and actions:

“Selling that thing in the first place, that was the first goal.”
– Entrepreneur C, 51

The transition between the explorative activities and the formal realisation process is marked by writing a business plan:

“Within a month or 3 weeks’ time – a real madhouse – we wrote a business plan. I had been working on the idea for quite a while, but not with the business story behind it.” – Entrepreneur C, 52

Based on the assumed business hypotheses, the vision is translated and formalised into concrete goals, activities, and milestones upon which the entrepreneur, the employees, and external parties (e.g. investors) can base their acts. The business plan is therefore an important instrument in the start-up’s communication with both the internal organisation and the external environment:

“The business plan.... Actually the moment you write it down, it is already out-of-date. [...] But you need something to discuss about and to tell your story.” – Entrepreneur D, 53

This quote also reveals that the business plan should not be cast in stone. Devising the plan is not something that is done once, but it is something that takes place
throughout the entire new venture creation process. This flexible approach towards the business plan is necessary, because the entrepreneur will constantly uncover new information about, for example, the market, the product, manufacturing, or the external environment. This new information may prove the underlying hypotheses of the initial strategy wrong, which requires adjustments to the strategy and thus the plan:

“The funny thing is that we really only now, after 2.5 years, are at the point where we thought we would get within half a year. So now, through a big detour, we are building what we intended back then. We use a very different technology for it than we thought. We took another route to get there [...]” – Entrepreneur H, 54

Even the mere act of writing assumptions down in a formal business plan can help the entrepreneur in assessing these hypotheses:

“If you write down a business plan you won’t get a story with open endings. When you write it down, you see: here we have a problem. [...] You can have an idea about how much you will ask, but when you write it down then you see there are holes in it.”
– Entrepreneur D, 21

In addition to their main function of guiding the actions of the new firm, formalised plans are therefore an important tool to reflect upon the decisions that have been made in the new venture creation process and the progress that has been made towards reaching the predefined goals.

5.3.2 Realisation

“You have defined your goals, how are you going to get there? [...] than you will work concretely on sub goals, with which you break the large mountain that you want to move into little mountains. And you will first move a part of the mountain with 2 or 3 man and in that fashion you will gradually move the entire mountain on a structural way.” – Entrepreneur B, 55

The exploration stage has resulted in a plan, which is converted into actions during the realisation stage. The realisation category therefore contains theoretic concepts which describe concrete actions aimed at generating resources, the value proposition and the market (in order of appearance in this paragraph):

- Building a network
- Acquiring financial resources
Having a job on the side  
Developing competencies  
Building a larger organisation  
Establishing partnerships  
Developing the actual product  
Co-creation  
Preparing the market

These realisation actions do not follow the explorative activities in a linear sequence. From the roadmaps in paragraph 5.2 we can learn that exploration and realisation activities occur iteratively throughout the entire new venture creation process. For example, the entrepreneur in case D first developed a functioning prototype before he realised the developed technology is not allowed in the intended target market (Exhibit 32). This leads to an adjustment of the original business hypothesis. In this example the entrepreneur moves from the realisation stage back to the exploration stage. These iterations seem to diminish along the new venture creation process, as the entrepreneur uncovers more and more information regarding the problem and its solution and the fit between the two improves. The realisation stage concludes with a market-ready product, which adequately satisfies the needs of the target market, and the organisational structure that supports the production and offering of this value proposition. In the subsequent part of this subparagraph the realisation category will be described more thoroughly based on the theoretic concepts that belong to this category.

**Building a network**

The word frequency count indicated in paragraph 4.2.1 that the social network is an important factor in starting a new venture. This finding is confirmed by analysing the codes from the interview data. Having a relevant network is an important asset that helps to realise the business idea:

> “Just collect good people around you, who can do things and who add things. Who help me with developing that thing, to build it and bring it to the market.” – Entrepreneur A, 59

Entrepreneurs who already have a relevant network in the area of their discovered business opportunity therefore seem to have an edge over entrepreneurs who do not have this network in their baggage, as the initial network can help the entrepreneur in (1) clearly defining the problem that has to be solved, (2) measuring the demand for this solution, (3) acquiring the (in)tangible resources to develop this solution, and (4) meeting potential customers:

> “Actually 2 experiences or backgrounds of me came together. My
Entrepreneurs who do not have this relevant initial network, have to build it during the realisation stage:

“Did a company acquisition to boost turnover and to build a network.”
– Entrepreneur H, 9

Both the YES!Delft incubator and the TU Delft play an important role in the development of this network, as they bring entrepreneurs into contact with the right people:

“Connection with networks. Many potential investors come towards YES!Delft, because it is easy for them to screen a large amount of companies in a short time.” – Entrepreneur G, 61

“And the most important is the contact with the department of Civil Engineering who thought along with the applicability in the market. Helped us with getting off the ground the opportunities for pilot projects and helped thinking along with the sharpening of the product offering.” – Entrepreneur G, 62

**Acquiring financial resources**

Once the decision has been made to proceed with the new venture idea, the start-up needs to acquire the essential resources to realise this idea. Because technology start-ups need investments to develop their technology, most of the interviewed high-tech entrepreneurs start with acquiring financial resources. They apply for subsidies and/or bank loans, they try to convince investors to put money in the new venture, or they rely on the three F’s (Family, Friends, and Fools) to support them with a loan. Lack of these financial resources can seriously hamper the progress of the new venture:

“Once we talked to 30 investors, because we needed money then. [...] Did nothing to our technology. That was a bit of a shortcoming on our part.” – Entrepreneur D, 5

Acquiring financial resources is not something that is done once, but it is a recurring problem, especially when the company does not yet have a large customer-base, which can supply the company with a constant stream of revenues: 
“Other problem is the finances. We solved that by getting loans from business angels, but it is a continuously returning problem.”
– Entrepreneur H, 56

**Having a job on the side**

Even though the findings of the exploration category indicate it is very important to define a clear point of focus, this does not mean that the company cannot do anything outside its core business. As we saw in the previous concept, the acquisition of financial resources is an important activity in the realisation category. A special way in which some cases in the dataset fulfil their financial needs is by having a job on the side:

“… for example there comes an exhibit in the technology museum. These are just fun projects to do. And on the one hand we learn something new by doing these projects [...] According to our focus it is not completely in line with what we are working on. It provides a little money with which we can develop the rest. You have to get your resources somehow to get food on the table and to develop your product.” – Entrepreneur C, 57

This quote demonstrates that these secondary jobs can fulfil multiple purposes. Next to the fact that they bring in extra money, they also provide useful additional experience, which can help building the company’s competencies. The secondary job can even be a way to explore new markets and discover new opportunities. In one of the investigated cases the secondary job proved to satisfy an almost larger need than the initial core business:

“But we did not know at the beginning that we were going to be a consultant. Half of our time we just do consulting.”
– Entrepreneur D, 58

**Developing competencies**

In order to properly perform the actions needed to achieve the envisioned goals, specific knowledge, skills and behaviour, i.e. competencies, are needed. These competencies can be divided in two different categories. First, there are the competencies of the individual entrepreneurs that are based on the entrepreneurs’ personal baggage and which also can be described as human resources:

“We actually did not have three things. We did not have an organisation, like every start-up; we had insufficient knowledge; and we did not have a market.” – Entrepreneur H, 63
These personal competencies form the foundation for the second group of competencies: the company’s competencies. In the case of the previous quote the personal competencies of the entrepreneurs were not sufficient to properly perform the actions required to reach the set goals. The lack of fit between the personal competencies of the entrepreneurs and their ambitions resulted in a poorly performing firm. To improve the competence of the firm and realise the projected business goals, this start-up decided to purchase a bundle of complementary competencies by taking over another start-up company:

“We had too little knowledge and control on the development and we solved that by taking over that other company.”
– Entrepreneur H, 64

This quote demonstrates that new ventures need to develop competencies in order to develop the intended value proposition, which is also demonstrated by the following quote:

“Next to this we have looked at: which expertise do we have ourselves and which expertise is externally available and which special components are we hiring to increase the speed of development. Definitely in the beginning. Now we do that less because we have learned a lot from these experts, just on the technical substantive area.”
– Entrepreneur G, 65

From this quote we can learn that competencies are not only important in the development of the value proposition, but they also determine which partnerships the company has to engage in to complement the own competencies:

“You search for: what can I do? You’re continuously busy with that. What can we do? What are we good at? What do we want to be good at in the future? So where do we need to invest in to be able to do that? And which companies fit with that, so we can offer a complete solution to our customer.”
– Entrepreneur C, 12

Or, in case partnerships cannot be established, which people should be hired to expand the company’s organisation and competencies:

“What I hoped to achieve in the first step was that we could enter the market quickly by partnering with that large company. That did not work then, so then we saw we had to add new knowledge to our company.”
– Entrepreneur A, 66

Based on the quotes related to this theoretic concept of “developing competen-
cies” it can be inferred that this concept is closely linked to the concepts “developing the actual product”, “establishing partnerships” and “building a larger organisation”. Therefore it seems that competencies are an important enabling factor in the realisation of the business plan.

**Building a larger organisation**

One way to expand the competencies of the new venture is by hiring new employees:

“[…] when we noticed: our technology is at a standstill, then we hired someone, friends from university. […] I paid that out of my own pocket. […] We were busy selling and acquiring customers, but the technology was 0. So he continued that.”

– Entrepreneur D, 67

During the realisation stage these employees are often hired at a temporary basis. The entrepreneurs want to have a flexible organisation in order to keep fixed costs low. This leaves the entrepreneur some elbow room when the results turn out worse than expected:

“Consciously arranging things flexible so we can alter the cost of the personnel according to what we realise.” – Entrepreneur G, 68

**Establishing partnerships**

Based on the defined focus and competencies, the new venture often seeks other companies with which it can cooperate to advance their mutual interests:

“Our first business idea was to build our first system in a joint venture with that company: you are good in building those things, we have an invention [...]. If we combine your systems and knowledge about those systems with our plan, than we will be able to take on the market together.” – Entrepreneur A, 16

These partnerships can be established for a variety of reasons of which the following were found in the analysed cases. In most cases (part of) the manufacturing function is outsourced to keep capital and operational costs low and the flexibility of the organisation high. Some of the start-ups engage in partnerships in order to enlarge their product’s availability to the market by making use the partner’s sales channels:

“What we do look at is if we can be active in foreign countries via Dutch companies, the large engineering firms, using it as a sales
channel. But we do not step in ourselves: we deliver it to the Dutch parties who serve the international customers. Well, this is still under construction.” – Entrepreneur G, 69

Or the start-up establishes partnerships to reduce liability:

“We do that, because we are not included in the agreement and especially the liabilities between the installation partner and the [customer]. [...] We rather keep that outside our responsibilities.”
– Entrepreneur G, 70

Or to increase the attractiveness of the value proposition by bundling strengths with another company:

“We now cooperate with a game company. They can do those things very well in 3D.” – Entrepreneur C, 71

However, this reliance on partnerships also includes risks, especially when the (projected) partner company possesses vital competencies for realising the new venture’s value proposition:

“That former partner sees: hey, a large customer with interest, that is nice! And suddenly he changes the game for us. It is the large company that cuddles you to death. [...] and that is why we changed our strategy [...]” – Entrepreneur A, 72

**Developing the actual product**

A very important process within the realisation phase is the development of the actual product. During the formal product development, the product idea, which is based on the discovered opportunities and the determined focus, is realised by means of the collected competencies and resources. This is therefore a resource intensive process in which the idea is developed through several concept generation, selection, and testing cycles into a fully functioning prototype.

“Now we are developing that technologically and only now it really starts to take shape in an understandable product. The technology is nice, but how are you going to sell it clearly to someone?”
– Entrepreneur C, 12

The resulting prototype will undergo extensive testing and evaluation to assess both the performance in the marketplace and the feasibility of larger scale manufacturing, which will often result in adaptations to the prototype. The development of the product therefore represents a learning process within the
larger learning process of designing the entire new venture, which will be described later in this chapter in paragraph 5.3.4:

“The system has been changed thoroughly. Whenever you build a prototype there are of course other things in it than in the first one you produce in series. And in a prototype there are just things you did not know, because you have never before built such a thing.”
– Entrepreneur A, 73

When the prototype has been tested thoroughly, it is prepared for manufacturing. The realisation phase therefore ends with a product that is ready for production.

**Co-creation**

Product development is not a process that is solely conducted within the walls of the new venture. Four out of the five analysed cases utilise the knowledge of their intended customers to optimise the value for both the customers and the new venture:

“Everything is developed together with customers. We try to make as many decisions together with the customers.”
– Entrepreneur H, 10

Co-creation is a product development strategy aimed at creating a win-win situation. Customers get a product that fulfils their needs, creating an optimal user experience. The new venture learns about the concerns in the market, allowing it to create a better product, while at the same preparing the market for the product under development:

“One of these sponsors [...] had been there in the field, doing tests and so. So he had seen it, he understood it and he had a job in which it would fit. And they said: well, we want to try it.”
– Entrepreneur A, 74

Co-creation is therefore an activity that connects product development process to the market development process.

**Preparing the market**

Technology start-ups usually operate in the vanguard of technological innovation: they are the first ones to introduce a specific innovation or invention to the market. Therefore, simultaneously with the development of the product, the market for this new product has to be created:
New ventures have to invest in the preparation of the market to overcome two main start-up related obstacles. In the first place, the start-up is a new and unknown player in the market. The market has to gain confidence in the competencies of this new firm:

“[...] I have lost 2 jobs, because they [the competitor] had more experience and we were seen as too young and too inexperienced by our customer.” – Entrepreneur A, 76

Secondly, the new firm introduces an innovation to the market with which the market is unfamiliar. The market has to be convinced of the added value of this innovation:

“I don’t think a lack of faith in the organisation on itself, when you are a small starting business. Perhaps it is playing a little. But more that people did not exactly understand, and that is also a role of ourselves, how they should use the new insights in the daily practice.” – Entrepreneur G, 77

As it is quite a difficult task for the start-up to convince many customers at once of the added value of its innovation, the new venture should first try to convince the innovators in the market:

“And that was an important one, because it is just a [customer] that already chose to use our system on a real challenge [...] And which afterwards actively started to publish about the insights obtained with the usage of our system. So we had a good ambassador in the market.” – Entrepreneur G, 78

This quote shows that the launching customers can prove to be a very important tool in the dispersion of the innovation, if the new venture satisfies or even exceeds this customer’s expectations. Some of the investigated start-ups are therefore deliberately searching for the best customer to launch their product
to the market:

“We have chosen [that customer] because we thought: if it is on [that customer’s product], then it also moves on to other [products]. [...] Back then we could work with other manufacturers, but I think this was the correct order.” – Entrepreneur D, 79

5.3.3 Exploitation

“When we started it was: bam! We are going to make something from it. You start testing things, you start making things, you just… Full of energy you dive into it. But now you are in a phase, for a long time it is not [my business partner] and I anymore. Then you have your bank, your investors, your shareholders, your customers, your partners, your importer, your supplier. It becomes very fast, very large and everyone in that web has his own interests and ideas. [...] It is our job to earn our own way in that.”
– Entrepreneur J, 80

When the endeavours in the realisation stage have resulted in a market-ready product, an interested market, and the competencies to produce and offer the value proposition, the moment has arrived for the new venture to exploit these developed features to create actual value: the exploitation stage commences. The exploitation category therefore includes concepts that are aimed at creating (the most amount of) value, optimising the core business activity and achieving growth objectives (in order of appearance in this section):

- Tipping point
- Developing the actual product
- Developing competencies
- Building a larger organisation
- Maintaining a unique position in the market
- Marketing
- Earning money

Again, exploitation does not follow realisation in a linear fashion. As the roadmap of case H in paragraph 5.2 shows (Exhibit 36), a new venture sometimes has to move back from the exploitation stage to the realisation or even the exploration stage, when the product launch does not yield the expected revenues. Therefore the three categories exploration, realisation and exploitation represent an iterative process.

This subparagraph will describe the exploitation category according to the
concepts that belong to this classification.

**Tipping point**

In most of the analysed cases, moments can be defined that mark the tipping point for the new venture from realisation activities to exploiting activities. Often this tipping point coincides with the official product launch. This moment is crucial for the future state of the business:

“But the most important moment of all was… actually it was more a period. At some point the assignment […] ended, so the initial finance on the basis of innovation ended and from then on it had to come from the market. We had to sell. We already did that a little before the assignment ended, but not sufficient enough to keep afloat. In the months that were needed to start selling, it was actually each month: are we going to make it?”

– Entrepreneur G, 81

If the new venture has thoroughly understood the needs in the market and developed a product that satisfies these needs, this transition from realisation to exploitation can go quite smooth. However, some of the new ventures have not mapped the needs of their market properly, which results in the scales tipping back, sometimes all the way back to the exploration phase:

“The Ltd. had been established 6 months ago. So the money was finished, the subsidy was finished, the idea could not be sold. What are you going to do?” – Entrepreneur D, 82

In this case the new venture has to go through new explorative and realisation activities in order to reach the next tipping point to exploitation. Therefore a new venture can experience multiple tipping points in its lifetime.

**Developing the actual product**

To make the business efforts more profitable and productive, and the value proposition more valuable for both the new venture and the user, the activities in the exploitation phase are aimed at optimising the elements that have been developed in the realisation stage.

One of these elements is the product. The realisation phase has resulted in a product that is ready for production. During the exploitation phase, changes are made to this product in order to optimise the manufacturing process, decrease the production costs and, as a result, increase the profitability:

“Definitely for the first projects you start, it is a continuous sharpening
of your product, making it more convenient. Not so much coming from the client, but more from ourselves. Things just had to be manufactured more conveniently and quicker etc.”
– Entrepreneur G, 83

**Developing competencies**
Furthermore, the new venture’s competencies become more specialised during the exploitation stage, as the interviewed entrepreneurs are constantly searching for business activities their new venture can excel in. They want to transform the competencies of their organisation in specific core competencies, which can provide a competitive benefit in their market:

“I more and more try to focus in the direction of some important core competences within the company. That we’ll develop these further and that we don’t try to cover everything we are not good at.” – Entrepreneur C, 84

As a result, real core competencies can function as guidelines for the development of a coherent future product portfolio, which means that the company starts new cycles from exploration to exploitation in order to find new opportunities for expansion of the established firm:

“[…] within the concept there are plenty of ideas and plans to develop, at which we clearly focus on the transfer of people. We understand that. We are very good at that.” – Entrepreneur A, 85

**Building a larger organisation**
Every new venture starts from the vision of one entrepreneur or an entrepreneurial team. But as the number of business activities grow, the organisation has to grow with it, which often goes hand in hand with a loss of control of the entrepreneur:

“A company which is first you as a person with your story […] now we are at the point that the company is more than just me. That it becomes an entity outside yourself and that others continue with it and can shape that as well.” – Entrepreneur G, 8

As we saw in the previous category, the realisation stage, employees are first hired on temporary contracts. When the business starts to take off, the entrepreneur can hire employees on a more fixed contract, which increases the fixed costs of the organisation. This puts more pressure on the entrepreneur to make the firm perform well:
“[...] now we are with 15 employees. Now you are responsible for the income of a lot of people and that many people that you cannot make up the deficit when times are difficult.” – Entrepreneur A, 86

The expansion of the organisation also seems to require a more professional approach internally. When the organisation only exists out of the entrepreneurial team, the boundaries between their tasks are fuzzy. When the organisation grows, these tasks need to become more defined in order for the organisation to function optimally:

“But it must become more professional. And then it is sometimes difficult to put the hat on of the boss[...].” – Entrepreneur D, 87

This need for more professionalism is not only restricted to the internal definition of roles, but it also includes how the entire organisation presents itself to the outside world:

“We are trying hard to keep our culture, say, by telling new people about how things went in the past, what our main pillars are, and how we want people to present themselves.” – Entrepreneur A, 88

Maintaining a unique position in the market

In the previous two stages, exploration and realisation, the new venture should already have investigated which competitors target the same market and what they are doing to acquire customers. When the start-up enters the exploitation stage, it has to deal with direct and indirect competitors in reality. In this competitive environment the new venture has to find its own unique position in order to differentiate from competitors and attract customers:

“You make conscious changes to improve your competitiveness. [...] It is a kind of zigzag. You are searching for that unique position you can maintain in the market. That is why it was that troublesome for us, because we did not know the market that well and we did not know the technology that well. Therefore our swings were quite coarse.” – Entrepreneur H, 20

Knowledge is an important differentiating factor for new technology ventures. To exploit this knowledge optimally and maintain a unique position in the market, speed is therefore paramount:

“That is one of our distinctive positions that we have built with it. Just by having a head start, you build that knowledgebase and you can relate new [projects] to it.” – Entrepreneur G, 89
“No, the strategy is already focused on building a solid position in the market, before competition, and in particular if larger parties enter, to have built a solid position. So speed is now very important.” – Entrepreneur G, 90

To ensure that the start-up can keep this head-start in knowledge upon the competition, many of the interviewed new technology ventures protect their intellectual property:

“The technology is based on a patent of the TU Delft. So for your competitive position you have a weapon. [...] You understand, this provides a certain security for the development of your technology and your competitive position.” – Entrepreneur C, 91

**Marketing**

The foundation of the marketing tactics has been laid in the realisation stage, in which the entrepreneur has prepared the market for its value proposition. However, during the exploitation stage the marketing tactics really start taking shape.

In the dataset many instances can be found about marketing. When analysing the content of these data fragments, it seems that the interviewed technology entrepreneurs have some difficulty in defining their marketing story. The entrepreneurs are very enthusiastic about their technology and therefore it is often the focus point in their initial marketing story:

“But it [marketing] is more intrinsically interwoven with the development of the product and how it works than that it is something we force upon our sales people. [...] Now it starts to become the other way around, because we are growing fast.” – Entrepreneur A, 92

Focussing the marketing mix solely on communicating the technological attributes of the developed product is not always paying off:

“Because if you only tell about the technology, you only get doubts about the technology. But if you tell about the advantages, then people will ask themselves internally if that really could provide an advantage. This is also related to the internal mind-set of the customer.” – Entrepreneur C, 93

Furthermore it seems important for a start-up to have a clearly defined focus in the communication to the market. To overcome the entrant barriers that have
been defined in the concept “preparing the market”, the company should have a clear and understandable marketing story, which helps the market to understand the new offer and compare it to existing alternatives. Start-ups that do not yet know themselves what they are offering, can also not communicate this offer to the market:

“A lot needs to be develop, but we also did that towards the outside world and that caused a lot of misunderstanding. Because what are you actually doing? And what will be the benefit?” – Entrepreneur C, 94

“First we always got: hey, what are you? We could not explain ourselves well.” – Entrepreneur H, 95

Earning money

The transition from realisation to exploitation also marks the moment at which the new firm has to make the transition from solely investing in the development of the business to earning money with the developed value proposition:

“You have to focus on how do I make money, because that is the eventual goal of the company.” – Entrepreneur C, 96

This means that the entrepreneur should develop a sound revenue model with which the company will earn more money, than it costs the company to develop the value proposition:

“You invent something and that is nice, but it only works if people want to pay for it. [...] Once you have found the right formula for that, then you should go for it and at the moment that has happened” – Entrepreneur A, 15

When the new venture more and more starts to resemble an established firm, the issue of making revenues does not diminish. It even seems to become more important when the company grows larger than the entrepreneurs who founded the firm and the financial pressure of the built organisation increases. Therefore more revenues have to be made to sustain the business:

“What we squander now in one month, we could live from in our first year. In the first year it was difficult, difficult, but now we have to earn that amount of money every month. The problem increases every time. I think it is now even harder than in the beginning.” – Entrepreneur D, 97
5.3.4 Experiential learning

“We thought it crucial to add an experienced entrepreneur to make some steps forward. You can do it all by yourself, then you can all learn it yourself. That costs you time and that costs you mistakes, while now we make a lot less mistakes.” – Entrepreneur F, 98

The results of the quantitative scan in paragraph 4.2.3 identified learning as a possibly important construct within the new technology venture design process, but the exact role of learning is this process did not become clear from analysing mere word frequencies.

The previous three categories in this paragraph, however, do create insight into how learning happens during the new venture creation process. As we can learn from the previous three subparagraphs, the exploration, realisation and exploitation activities form an iterative process. Actions conducted in the realisation and exploitation stage can lead to alterations to the ideas and plans which have been developed in the exploration stage. In other words: the entrepreneurs learn through reflection on their actions. The entire new venture creation process can therefore be characterised as an experiential learning process. This category comprises the following concepts, which will be described in this subparagraph:

- Baggage of the entrepreneur
- Experimenting and learning
- Reflection

Baggage of the entrepreneur

In paragraph 5.3.1 we saw that the baggage of the entrepreneur influences which opportunities are discovered in the exploitation stage. However, the collected experiences of the entrepreneur do not only affect the discovery of opportunities, but they also affect the process that is followed after this opportunity discovery. Entrepreneurs who start their new venture right out of university usually do not have much experience in running a business:

“At first I found it sometimes very difficult, because, as an entrepreneur, nobody tells you what to do. [...] That’s a big responsibility and that’s not always easy. In the beginning you have not so much experience about how to deal with things. This or that way, what would be the result from this?” – Entrepreneur D, 99

Because these entrepreneurs do not have any previous experience, they have to try various options to assess their result on the company’s performance.
indicates that there is a relationship between the baggage of the entrepreneur and the concept “experimenting and learning” that will be described later in this section. For young entrepreneurs starting a new venture seems to be a constant learning process, which they pass through by trial and error. Starting a business with more baggage, on the other hand, seems to have a positive influence on the start-up process:

“However, I think I have brought along aspects from all my previous roles. [...] And, I’ve questioned myself about it, were all these experiences necessary to bring to company where it is now? They did help.” – Entrepreneur G, 7

More experienced entrepreneurs have a larger library of experiences to which they can compare the design problems that surface during the new venture creation process, which helps them in quickly assessing various design options. This indicates that the baggage of the entrepreneur determines the entrepreneur’s mental model according to which (s)he makes assumptions and decisions about the new business. This confirms the assumption in paragraph 2.6.2 that the mental model of the entrepreneur plays a role in the new venture creation process. Based on the qualitative analyses of the empirical data it seems that the amount of personal baggage is an important enabler of the new venture creation process.

However, these previous experiences, knowledge and skills should be relevant to the area of business the entrepreneur is in. For example, entrepreneur H had several years of work experience before he started his new venture, but not in the market he wanted to enter. From the roadmap of case H (Exhibit 36) and statements made by entrepreneur H, it can be concluded that this entrepreneur took several detours to reach its current business design, due to the lack of relevant baggage in the intended area of business.

Experimenting and learning

In paragraph 2.6.2 the experimentation was presented as a possibly important construct in the new venture creation process. Based on the empirical data it can be concluded that starting a new venture is a constant learning process, which the interviewed entrepreneurs indeed tackle by a pragmatic trial and error approach:

“We have noticed in the beginning that doing a little for 5 markets or doing it really well for 1 market, in that case doing it really well for 1 market yields the highest results. And it also provides a better base for further diversification.” – Entrepreneur G, 18
One entrepreneur uses an analogy with a tree to describe this process:

“I always compare it to a tree. One branch of the tree is the right branch, but you should see all the branches and after a while you know how the tree of your problem looks like. Now this is the tree, but actually I want to achieve this, then this is the best option. But you have already thought everything through.”
– Entrepreneur D, 100

This quote links the concept “experimenting and learning” to the first concept in this category: “baggage of the entrepreneur”. The starting entrepreneur does not yet have a large library of new venture creation experiences to which (s)he can compare the possible design options. By trying several alternatives this experience library can be expanded and future design options can be easier assessed:

“Now when something comes along then I see it is like this and this and that. Pow! Much less time to spend.” – Entrepreneur D, 101

As quote 100 also indicates, experiments do not only expand the experience library of the entrepreneur, but they are also necessary to clearly define the problem the start-up company wants to solve and to find the best possible solution for that problem:

“[…] subsequently we wanted to sell the [...] systems, but that also did not work. And now we are a company that [...] rent[s] systems with people. And that works very well.” – Entrepreneur A, 102

Reflection

An important aspect of the learning process is reflection. A formal plan can be a handy tool in this reflection process:

“According to me you have to look back once in a half year or in the quarter like: hey, have we completed all of our goals or not? And should we alter them?” – Entrepreneur C, 103

“[…] as an entrepreneur you should occasionally look at your scope. What are we doing? Is it going to bring in money? Especially when you’re not getting on the market, then you should make little shifts.”
– Entrepreneur D, 26

Where conceiving a plan is a prospective activity, because it documents which future goals the entrepreneur intends to achieve and how (s)he wants to achieve
them, reflection is a retrospective activity that intends to create insight in the process the entrepreneur has passed through and the decisions that have been taken throughout this process. Based on this assessment, the entrepreneur can decide to make changes to the original plan and new experience is gathered about the design process, which can help the entrepreneur in assessing future design options.

5.3.5 Environment

“If the crisis would not have been there, we would have grown apart at the seams.” – Entrepreneur D, 19

The micro and macro environment in which the new venture operates can be an important enabling or obstructing element in the new venture creation process, which has just been described based on the four process categories that have been formulated in this paragraph. For example, the new venture of entrepreneur D experiences difficulties because of the current economic crisis. The importance of monitoring developments in the environment is reflected by the formulation of this category, which comprises the following two concepts:

- External trends
- Listening to environment

**External trends**

The entrepreneur can take many actions to determine the strategic direction of the new venture. However, the success of the company is not only determined by the entrepreneur’s actions, but it can also be influenced by (unexpected) developments in the micro or macro environment. The entrepreneur should scan these environments to detect political, economic, social, technological, environmental, and legal (PESTEL) opportunities and threats that are relevant to the new venture’s business activities:

“That by chance just the right [technological] development happened. That we could join it.” – Entrepreneur H, 104

**Listening to environment**

Throughout the entire start-up process it seems therefore important that the entrepreneur interacts with people outside the company to keep up to date with developments in the environment and discover the needs that live in the market:

“Talking with parties is free and they can push you in the right direction.” – Entrepreneur G, 23
By talking to many people the entrepreneur gathers more and more information about the actual problem the new venture wants to solve, which helps to define a suitable product and viable business plan. YESIDelft and TU Delft act as an important sounding board in this quest to develop a new technology venture. However, the entrepreneur should keep in mind that (s)he is the one making the decisions. Not all advice and information from external people should immediately be implemented in the plans for the company. Listening to wrong advice can even cause large delays in the new company development process:

“Listen to other people. Not because you have to follow their advice, but because you get to know extra steps, you learn the tree. Oh, that branch I didn’t see before, maybe that’s interesting. If you can’t apply this experience for one project, you can use it for another.” – Entrepreneur D, 105

5.4 The theoretical new venture design elements

Where the previous paragraph gives an elaborate description of the theoretical new technology venture creation process, this paragraph will take a closer look at the outcomes of this process. This will be done according to the questions that have been formulated in paragraph 4.2.3:

- **Which core elements are designed during the new technology venture design process?**
- **Which supporting elements are designed during the new technology venture design process?**

To find answers to these questions, the visualisations of the design changes in paragraph 5.2 (Exhibit 29, 31, 33, 35 and 37) will be analysed together with the insights gained from the previous paragraph.

Based on the visualisations in paragraph 5.2 it can be concluded that the new venture designs of the studied cases consist out of four main categories: competencies, value proposition, market, and the business model (Exhibit 39). The icons on the left represent the competencies with which the value proposition is generated and offered. The arrows and round dark blue icons in the middle represent which elements are exchanged between the new venture and its customer. Therefore it provides an overview of the value proposition being offered. The blue icon on the right-hand side of the visualisations, represents the market. The integrated system of these three components represents the core logic of how the firm creates value. As this category closely resembles the
definition of the business model, which has been formulated in paragraph 2.5.2, the fourth category is called “business model”. The boundary of this model is represented by the dark blue frame. The direction of this frame is based on the blue direction sign in the roadmap on the left to which it refers.

The remainder of this paragraph will describe the four outcome categories in more detail.

5.4.1 Market

One of the core elements that is being designed during the new venture creation process, is the market. The market is represented by the customers and end users of the new venture’s value proposition. This outcome category consists of the following theoretical concepts, which are all aimed at creating a market for the firm’s products (the order is based on the results of paragraph 5.3):

- Discovering a market need
- Understanding the market
- Measuring market demand
- Co-creation
- Preparing the market
- Maintaining a unique position in the market
- Marketing
It is decided to name this category “market” instead of using the more distinct terms “customer” or “user”, because the customer does not always coincide with the user:

“So first is goes via the [users], because they want to have these things and if your market has been picking up, we expect [producers] as our large customers. You have to convince that market, because if... We first went to the [producers] as well and they said: there is no demand for it. [...] Therefore we now aim at [users].” – Entrepreneur F, 106

As this example illustrates, it is important for entrepreneurs to know the concerns of both the buyers and the users of their product, because developing a product that satisfies the user’s needs does not always guarantee sales. Consider the example of a fictive new venture that develops a product for surgeons. The entrepreneurs carefully investigate the needs of the surgeons and develop a product that perfectly fits their needs. The surgeons, however, are not the ones buying the product and the procurement department decides the product does not fit their budget. In this case the new venture will not be able to sell their product, because they forgot to explore the needs of the buyer.

In the exploration stage the entrepreneur and its team should therefore explore which players there are in their target market and what their distinct needs are. This results in hypotheses about product-market combinations, which need to be tested to the market in order to measure the potential demand. Often this verification is done through early sales attempts, because:

“At the end of the day money is your right to exist. The fact that someone reduces his bank account and increases your bank account, that is quality. That shows if you do or do not satisfy a certain need.” – Entrepreneur H, 107

Based on this exploration the entrepreneur should decide on a strategy to influence the market’s behaviour. Although the market can be seen as autonomous, the entrepreneur can influence the behaviour of customers and end users by engaging in interactions with the market. In order to build a relationship with potential customers and users, and prepare them for the innovative value proposition, the entrepreneur seeks contact with and tries to sell the product to prominent market stakeholders during the realisation stage. These attempts at preparing the market can result in increased insight into the market’s needs – especially when the entrepreneur engages in a co-creation relationship with its market – which allows the entrepreneur to better satisfy those needs. When
the entrepreneur has successfully created market interest in its value proposition, the exploitation stage can be entered in which the entrepreneur engages in large scale exchanges of value with its target market. In the exploitation stage the new venture will therefore expand its business activities to achieve higher volume production and create tailored marketing tactics in order to acquire a larger market share, which will ensure the survival of the firm. In literature an analogous process can be found, the customer development model, which will be elaborated on in Exhibit 40.

**5.4.2 Value proposition**

The second core element that is designed by the entrepreneur and its team is the value proposition. The value proposition represents the product and/or service that is being developed and the value it can deliver to the market. This category represents the following theoretical concepts (the order is based on the results of paragraph 5.3):

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**Exhibit 40: The customer development model**

*Exhibit 17 in Chapter 2 describes the lean start-up theory. One of the main concepts in this theory is the customer development process. This customer development process has a large resemblance with the market development process that has been found in this study.*

*This customer development process consists of four iterative stages. It starts with customer discovery, which focuses on understanding the problems and needs of customers. Customer validation is aimed at field testing the assumptions of the customer discovery stage by developing a replicable sales model. During the customer creation stage the activities are focused at creating and driving user demand. In the final stage, company building, the focus of the organisation transitions from learning and discovery to optimised execution.*

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*Source: Blank, 2006*
• Technology driven business development
• Co-creation
• Developing the actual product

How is this value proposition developed? Consider again the following quote of entrepreneur A:

“That is the process of thinking up the technology. Subsequently you will test if it is possible. Then you will do scale model tests to prove it really works. Then you build a prototype. And yes, then you want to introduce that to the market, and then develops, say, the business.” – Entrepreneur A, 28

Like entrepreneur A, all the interviewed entrepreneurs more or less follow the same new product development process, in which they transform the product idea, through technical feasibility studies and prototype tests, in a market-ready product (Exhibit 41). During this new product development process, co-creation activities with important stakeholders in the market are often used to bridge the gap between the development of the value proposition and the development of the market. Based on the collected empirical data, it seems that the product and the market are not developed in isolation, but that the entrepreneurs sooner or later try to link both activities in order to achieve a good fit between the developed products and the needs of the users and buyers of these products.

5.4.3 Competencies

The realisation of an envisioned product-market combination requires several resources. According to Wernerfelt (1984) a resource could be anything which represents a strength or weakness for a firm. Therefore resources are the tangible and intangible assets that enable a firm to perform its business activities and achieve a competitive advantage. Amit and Schoemaker (1993) further define the term resources by making a distinction between resources and capabilities. According to them, resources are the tradable and non-specific assets that are

Exhibit 41: The new product development model

Source: Blank, 2006
owned or controlled by the firm. Next to these non-specific resources, there are firm-specific capabilities, which determine the capacity of the firm to transform resources to reach desired goals. Together these resources and capabilities determine the ability of the new venture to perform its business activities properly. In other words: the resources and capabilities determine how competent the organisation is.

To support the development of both the market and the value proposition, the new venture has to develop its competencies through 1) acquiring non-specific resources, like capital, that are needed to enable the business activity, and 2) improving the firm-specific capabilities of the entrepreneur and the organisation to transform these resources into a competitive advantage. The following concepts that have been discovered in the empirical dataset, are related to the development of these competencies (the order is based on the results of paragraph 5.3):

- Baggage of the entrepreneur
- Building a network
- Acquiring financial resources
- Having a job on the side
- Developing competencies
- Building a larger organisation

How are these competencies developed in new technology ventures? It all begins with the baggage of the entrepreneur. As has been indicated in paragraph 5.3.1, entrepreneurs discover opportunities based on their experiences, knowledge, interests and ambitions. In some cases the resources and capabilities of the individual entrepreneur at the start of the new venture creation process will already enable the realisation of the discovered business opportunity. However, in most cases the individual entrepreneur will not possess all the resources and capabilities which are needed to achieve the envisioned business goals. During the realisation stage (s)he will need to acquire financial resources, a network, technological and market knowledge, skilled personnel, production facilities, distribution channels, etc. When all resources and capabilities are in place to manufacture the value proposition and offer it to the target market, the company can start expanding its developed competencies in order to establish a durable competitive advantage in its market. This means that the competencies that have been gathered in the realisation stage, are further developed during the exploitation stage, until they become difficult to imitate for competitors and contribute significantly to the perceived customer benefits of the company’s value proposition. They have been transformed into core competencies (Prahalad & Hamel, 1990). These core competencies can then be used to diversify the business activities to achieve further growth objectives.
5.4.4 Business model

The final category in this paragraph contains all theoretic concepts that are aimed at integrating the previous three design elements (the order is based on the results of paragraph 5.3):

- Vision
- Assuming a business hypothesis
- Determining the focus
- Formalising ideas into plans
- Earning money

When a visual representation is made of the integration between the categories “market”, “value proposition” and “competencies” (Exhibit 42), it can be noticed that the resulting system very much resembles the business model of Osterwalder and Pigneur (2010) that has been visualised in Exhibit 14. The value proposition, together with the competencies that support the development and offering of this value proposition, represent the cost side of the system, while the market represents the income side. Therefore the three design element categories make up the core logic of how the new technology venture intends to create value.

Exhibit 42: The 'grounded' business model
This indicates that the business model provides a good framework to capture the integrated design of a new technology venture at certain points in time during the new venture creation process.

In paragraph 4.2.2 it was assumed that first strategic decisions have to be made regarding the value proposition, the market, and the necessary competencies, before technology-based entrepreneurs start detailing the revenue model. The results of this qualitative analysis seem to confirm this assumption. It is probably due to the nature of technology-based start-ups that the revenue model is the result from decisions regarding the other three categories. Developing technological innovations is often a resource-intensive activity of which the outcome is uncertain. The cost structure of the firm under construction is therefore also indeterminate at the start of the new venture creation process. Only by taking development actions more information can be gathered regarding the costs of producing the value proposition, which will result in a more detailed overview of the revenue model.

From the theoretic concepts in this category it can be learned that the business model can exist at various levels of detail and concretion. In the beginning, the business model will be a general notion of a potential profitable product-market combination, which, as the new venture creation process progresses, becomes more and more concrete. During this process the business model should therefore be perceived as a dynamic system, which changes according to advancing insights. The business model provides a tool to communicate to people in- and outside the new venture the core logic of how the three separate areas of market, value proposition and competencies create an integrated system. This holistic overview can also be used by the entrepreneurs to reflect on how the decisions made about the three separate design elements fit together. In this sense, the business model seems to resemble the definition of a boundary object, which is an object that is shared across different contexts to create a mutual understanding (Carlile, 2002).

5.5 The creation of a new technology venture

This chapter started by asking the following two questions:

- **Which main categories explain how the design of a new technology venture evolves until the new firm matures?**
- **How are these categories related in explaining the evolution of a new technology venture’s design?**
To answer these questions and the questions that have been formulated in paragraph 4.2.3 the categories that have been developed in the previous paragraphs will be deployed as stepping stones.

The previous paragraphs revealed that the creation of a new technology venture is a complex and multifaceted process, which is reflected in Exhibit 43. Based on the categories that were derived from the collected empirical data it can be concluded that this process consists of three main stages: 1) the exploration stage in which the entrepreneur discovers business opportunities and verifies the potential of these opportunities, 2) the realisation stage, in which the entrepreneur develops both the market and the value proposition and acquires all the required resources and capabilities for creating, manufacturing and offering the envisioned value proposition to the target market, and 3) the exploitation stage in which the new firm engages in exchanges with the created market in order to create true value from all prior efforts.

Furthermore, it was found that throughout these stages the entrepreneur is creating an integrated business model, consisting of three main components: 1) the value proposition, 2) the target market, and 3) the competencies that enable the new firm to perform its business activities properly.

This business model is not created in a linear fashion. The category experiential learning indicates that entrepreneurs learn through reflection on their performed actions in the new venture creation process. Through reflection new insights can be gained which confirm or deny prior hypotheses. When a hypothesis turns out to be false, the entrepreneur has to take back some steps in the process and adjust the hypothesis by incorporating the newly gained insights. This means that the entrepreneur has to iterate between the exploration, realisation and exploitation stage until the business hypotheses have been sufficiently verified, resulting in a well-functioning business model:

“At a certain moment you’ll be left with the essence and the strength of your company. And you should go for that.” – Entrepreneur B, 108

This entire process is not happening in isolation. The entrepreneur should always be attentive to developments in the micro and macro environment of the business model, which enable or obstruct the functioning of this system or provide new opportunities to expand the business activities.
Exhibit 43: The ‘grounded’ new technology venture creation process

**EXPLORATION**
- Baggage of the entrepreneur
- Listening to environment
- Assumptions of business hypotheses

**REALISATION**
- Developing competencies
- Building a larger organisation
- Acquiring financial resources
- Building a network
- Having a job on the side

**EXPLOITATION**
- Tipping point
- Co-creation
- Determining the focus
- Formalising ideas into plans
- Measuring market demand
- Understanding the market
- Discovering a market need
- Technology driven business development

**MARKET**
- Earning money
- Developing the actual product
- Preparing the market
- Marketing
- Maintaining unique market position

**ENVIRONMENT**
- External trends

**COMPETENCIES**
- Building a larger organisation
- Developing competencies
- Establishing partnerships
- Having a job on the side

**VALUE PROPOSITION**
- Co-creation
- Vision
- Measuring market demand

**THE ART OF DESIGNING A NEW TECHNOLOGY VENTURE**
CHAPTER 6: NEW VENTURE CREATION – THE SURVIVAL OF THE FITTING

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Throughout this report many insights have been gained about the creation of a new technology venture. This chapter aims to integrate these insights into core categories that determine the evolution of a new technology venture’s design. In order to transcend the descriptive level of the empirical new technology venture creation process, which has been presented at the end of the previous chapter, literature is sought which helps interpreting the events in this process. This led to the formulation of three core insights about the evolution of a new technology venture’s design, which will be presented and discussed in this chapter.
6.1 Integrative steps towards a core theory

The previous chapter concluded by presenting a description of the empirical new venture creation process (Exhibit 43). But what does the description tell us about the essence of creating a new technology venture? What are the entrepreneurs aiming to achieve with their actions? Of course it seems quite obvious that the actions of the entrepreneurs are aimed at creating a well-functioning business model that creates value for the new venture, its target market and all other stakeholders involved. But how is this achieved? This chapter will present links with extant literature to interpret the new venture creation process that has been discovered in the empirical data with the aim to arrive at core categories that explain this process.

6.2 New technology venture creation as the survival of the fitting

Based on the empirical data it can be concluded that a new venture begins in one or both of two ways. The first way is through a technological discovery of the entrepreneur. The second way is by discovering an explicit, tacit or even latent market need. In the innovation literature these processes are known as technology push and market pull (Exhibit 44). When the entrepreneur follows a technology push strategy, this means that an innovation is developed and pushed onto the market without giving much consideration to the market need it should satisfy. The opposite is happening when a market pull strategy is followed. In this case the value proposition is developed based on a discovered need in the market (Martin, 1994).

Even though the technology push strategy has received a lot of critique – Douthwaite (2002) dubbed it the “over-the-wall model” as the company simply develops a new product and tosses it “over the wall” to the market – both strategies have their own merits. For example, many radical innovations, such as electricity, would not have existed, if it were not for scientists who developed new technologies and pushed them onto the market. Therefore neither strategy is better than the other. They simply represent two extremes of a strategic spectrum and most successful innovations are actually conceived based on a combination of these two strategies (Rothwell, 1994).

When analysing the five roadmaps in paragraph 5.2 it can be concluded that most of the analysed new ventures indeed originate from a combination of technological and market factors. The entrepreneurs seem to actively explore
how they can synthesise (often conflicting) considerations regarding the value proposition and the market. Only in case D, technology appears to be the main incentive for starting the business. But even these entrepreneurs came back from their initial technology push strategy when it turned out that the market did not need their value proposition and later in the new venture creation process they actively involved the customer in the development of the new product to prevent this from happening again.

Synthesising technological and market considerations is not only limited to the discovery of a business opportunity, but it is important throughout the entire new venture creation process. Entrepreneur E formulates a nice reflection on this synthesis process:

“Every book you open about entrepreneurship says: launch your company with the minimal product. Then you do that [...] What we noticed was that our product did not really match what our customers wanted [...]” – Entrepreneur E, 109

“And now I get it. Then I thought: how annoying that people don’t need our minimal product. What we did wrong in that is that we didn’t think enough about the diversity of the ecosystem we’re in. Really thinking about: is the problem of my customer exactly the same as the problem of the next customer?” – Entrepreneur E, 110

Exhibit 44: Technology push vs. market pull

Source: Martin, 1994
In order to create sustainable value, the value proposition should appeal to a certain need in the market. In other words: the new venture should offer a solution to a real problem in the market. At the first launch of the product, entrepreneur E did not truly understand the concerns of his targeted customers and users. This incomplete understanding of the problem was also reflected in the offered solution. Therefore his solution was not welcomed with great enthusiasm. In order to improve the fit between problem and solution, entrepreneur E had to re-explore the problem and possible solutions, until they became a good enough fit:

“Just by expanding the product and working harder. Eventually you notice: now we arrived at a point that 90% of all customer requests are solved at once [...]” – Entrepreneur E, 111

Case E provides a good example of what I perceive to be the essence of the new technology venture creation process after analysing all the collected empirical data and what Martin (1994) calls the “survival of the fitting”. The term “fitting” is used instead of the term “fittest”, because the successful creation of a new technology venture depends upon how well the solution that is offered by the new venture fits the demands in the market. This solution does not necessarily have to be the fittest, incorporating the most advanced technologies. Consider the example of the home video format: VHS eventually became the dominant home video format, even though there were better technologies available.

It can be concluded that to ensure its survival, a new venture should aim to develop a solution that closely fits the needs in the market. Hence, the final outcome of the new venture creation process is a business model design, which demonstrates a good fit between the business activities on the one side (which are reflected in the categories “competencies” and “value proposition”) and the market needs on the other side (which are reflected in the category “market”). This conclusion also confirms the assumption of the literature review in paragraph 2.6.2 that fit might be an important concept in the new venture creation process.

6.3 From co-evolution of the problem and solution to rational problem solving

But how do technology entrepreneurs achieve a good fit between the elements of their business model design? How do entrepreneurs tackle this design problem? In order to answer these questions, let’s compare two possible design approaches that can be found in literature.

The first one is rational problem solving, which was introduced to the field of
The stage-gate model of new product development of Cooper (1990) provides a disciplined approach to arrive from a new product idea to a commercialised product. It consists of the following stages and gates:

**Stage 1 Preliminary assessment**
In this inexpensive stage the project’s technical and market feasibility is assessed.

**Gate 2 Second screen**
The project is re-evaluated based on the information obtained in stage 1.

**Stage 2 Business case**
More thorough technical, market and financial feasibility studies are conducted to verify the attractiveness of the project, resulting in a clear business case.

**Gate 3 Decision on business case**
In this final gate before formal product development it is decided if the project is attractive enough to enter the heavy spending stages.

**Stage 3 Development**
The product is developed and tested, marketing and operation plans are developed.

**Gate 4 Post-development review**
The progress of the project is checked and the attractiveness of the project is re-evaluated.

**Stage 4 Validation**
This stage tests the viability of the entire project through evaluation of the product, the production process, customer acceptance, and the revenue model.

**Gate 5 Pre-commercialisation decision**
In this final gate it is decided if the product will be launched or not.

**Stage 5 Commercialisation**
Implementation of the marketing launch plan and the operations plan.
design methodology through the work of Simon (1996). The rational problem solving method assumes that the problem is known to the problem solver and that the solution can be found through logical analysis and a limited scope of problem solving steps (Dorst & Dijkhuis, 1995). The stage-gate model of Cooper (1990) presents a good example of a well-structured problem solving approach for developing and launching new products (Exhibit 45). This model assumes that the problem is known to the company (i.e. that the product will be developed for an established and well-understood market) and that the company only has to go through the steps in the model to arrive at a successful product launch. Progress from the problem towards the solution can therefore be seen as a steadily flowing waterfall through the problem solving steps.

However, in entrepreneurship the problem is not a fixed entity at the start, except in some very rare cases in which an entrepreneur stumbles upon a clear explicit problem which could not be solved earlier because of unsophisticated technologies. An example of this kind of new venture design problem can be found in the case of Senz Umbrellas, one of the most successful TU Delft start-ups, which offers a solution for the universal and explicit need for an unbreakable umbrella.

But most technology-based entrepreneurs are not so lucky to find such an explicit business opportunity. As we have seen in the analysed cases, both the problem and the solution are indeterminate at the start of the new venture creation process (even though the entrepreneurs often think otherwise). In other words: the new venture design problem is similar to a wicked problem (see paragraph

| Exhibit 46: Comparing new venture creation, rational problem solving and reflective practice |
|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| New venture creation                          | Rational problem solving                      | Reflective practice                           |
| Role of actor                                 | Problem solver: information processor         | Designer: constructing his/her reality         |
| Entrepreneur: shaping the future              | in an objective reality                       |                                               |
| Problem                                       | Ill defined, unstructured                     | Essentially unique, indeterminate             |
| Essentially unique, indeterminate             |                                               |                                               |
| Process                                       | Experiential learning                         | Reflection-in-action                           |
| Experiential learning                         | Rational search process                       |                                               |
| Knowledge                                     | Artistry of entrepreneurship: when to apply    | Artistry of design: when to apply which       |
| Artistry of entrepreneurship: when to apply    | which approach/piece of knowledge             | procedure/piece of knowledge                  |
| which approach/piece of knowledge             | Knowledge of procedures and scientific laws    |                                               |

Based on Dorst & Dijkhuis, 1995
In most cases applying a rational problem solving approach at this point in the new venture creation process does not yield the desired results. Consider for example case D (Exhibit 36), whose entrepreneurs did apply a rational problem solving approach after defining a potential business opportunity, only to discover they solved the wrong problem. The rational problem solving approach therefore does not seem to appropriately describe the design approach of technology-based entrepreneurs in the early stages of the new venture creation process (Exhibit 46).

A radically different way of describing their design activity can be found in the “Reflective practice” paradigm of Schön (1983). Schön does not perceive the problem as fixed but as essentially unique and it evolves based on the actions taken by the problem solver, who is actively framing the problem, while solving it. This led to a new perspective on design activity. According to Dorst and Cross (2001) design is not a matter of first defining the problem and then solving it. Inspired by Schön (1983) and the co-evolution model of Maher et al. (1996) (Exhibit 47), they perceive design as an activity in which the formulation of the problem and its possible solutions are defined and refined simultaneously through a constant iteration of analysis, synthesis and evaluation steps between the problem space and the solution space with the aim to find a matching problem-solution pair. Therefore “creative design involves a period of exploration in which problem and solution spaces are evolving and are unstable until (temporarily) fixed by an emergent bridge which identifies a problem-solution pairing.” (Dorst & Cross, 2001, p. 435).

Exhibit 47: The co-evolution model

Source: Maher, Poon & Boulanger, 1996
Now reconsider the findings of the empirical study (Paragraph 6.2). In the exploration and realisation stages of new technology venture creation a similar process seems to be happening as the one described by Dorst and Cross (2001). Technology entrepreneurs create new products that aim to fulfil certain market needs. In order to offer these products to the market, they create a new technology firm. The product, together with the competencies needed to develop, manufacture and offer this product, can therefore been seen as the solution to a problem in the market (Exhibit 48). In paragraph 6.3 it was concluded that entrepreneurs aim to develop a solution which closely fits the needs in the market. To create this fit, entrepreneurs go through an experiential learning process in which the solution and problem are constantly adjusted to fit each other according to the new insights that are gained regarding the problem and its solution by the entrepreneurs’ actions (Exhibit 50). During this process the entrepreneurs develop, based on their vision, several business hypotheses and focussed plans, which capture the core logic of how the problem and solution fit each other at certain points in the process. These hypotheses and plans (i.e. business models) therefore resemble Dorst and Cross’s (2001) emergent bridges between problem and solution space.

At first, in the exploration stage the business model has a tentative character, which becomes more and more fixed, as the entrepreneur moves through the realisation to the exploitation stage. At the moment of product launch the entrepreneur has arrived at a fixed problem-solution pairing: an equilibrium has been reached after a dynamic evolution of both the problem and the solution. At this point in the process two things can happen: 1) the entrepreneur has not...
properly matched the solution with the problem, which results in a failed product launch, and 2) the entrepreneur has properly matched the solution with the problem and the exploitation stage can commence. In the first situation the entrepreneur has to move back to the realisation or even the exploration stage in order to improve the fit between problem and solution. This is a costly procedure, because the development and implementation of a fixed problem-solution pairing has required the commitment of several of the new venture’s scarce resources. In order to arrive at a new problem-solution pairing, part of the developed value has to be destroyed and new resources need to be acquired to realise the new problem-solution pairing.

If the entrepreneur has properly matched the solution with the problem, the exploitation stage can commence, in which the entrepreneur will optimise the problem-solution pair in order to create the most value. Therefore the nature of the new venture creation process changes during the exploitation stage:

“That means that your daily work has become a lot more operational. You have to make sure things run smoothly.” – Entrepreneur H, 112

This effect has also been found by Smulders (2010), while studying the exploration-exploitation transition in established firms. He found that exploration and exploitation form a continuum in which exploration activities change from “free” exploration at the start of the new product development process to “extinctive” exploration in the final stages of the process when the product is prepared for volume production (Exhibit 49).

Exhibit 49: The exploration-exploitation transition

![Exploration-exploitation transition diagram](image)

*Simplification of the model by Smulders, 2010*
This Exhibit shows two co-evolution patterns (of case D and G) that have been discovered in the analysed cases. The co-evolution patterns of case A, C and H can be found in Appendix G.

The pattern of Case D represents a co-evolution process that starts from the solution space. Companies that start from the solution space are mainly technology driven.
The other pattern, the one of Case G, represents the co-evolution process that starts from the problem space. These companies are mainly market driven.
In line with the previous findings, the new venture creation process also starts with free exploration. As time progresses more and more realisation activities will be conducted in which the problem-solution pair will gradually become fixed and most of the wickedness will be taken out of the new venture design problem. Therefore this problem will be known to a large extent when the entrepreneur enters the exploitation stage and the new technology venture’s activities during this stage (product optimisation, production optimisation, marketing optimisation, etc.) resemble more the rational problem solving approach that was described earlier in this paragraph.

However, it should be kept in mind that a wicked problem never becomes “unwicked”. The problem-solution match which is optimised in the exploitation stage only represents a temporarily equilibrium, as both the problem and solution space are constantly changing due to developments in the environment of the firm. Products which cannot be technologically developed today, might become available due to scientific advances tomorrow. And products which are not accepted by the market of today, might become mainstream in the market of the future. When the problem and/or solution space is altered through developments in the micro or macro environment, the current equilibrium gets disturbed and the entrepreneur has to engage in new explorative activities to find a new problem-solution match.

### 6.4 The artistry of the entrepreneur

Now we know that the new technology venture creation process moves from the co-evolution of the problem and the solution, aimed at creating a good problem-solution fit, towards rational problem solving in which this problem-solution fit is optimised with the aim to create the most amount of value for all stakeholders involved. From the empirical data we also know that during this entire process the entrepreneur learns by doing. So what is actually the role of the entrepreneur in the creation of a new technology venture? And how does the entrepreneur influence the evolution of the new venture’s design?

A key challenge within the new venture creation process is to create a fitting problem-solution pair based on an evolving understanding of both the problem and the solution space. At the start of the new venture creation process there is therefore not a clearly defined and fixed venture design problem to be solved. The new venture design problem is *wicked*.

During the new venture creation process the entrepreneur takes actions to structure the problem and solution space in order to discover potential product-
solution matches. In doing so, the entrepreneur actually influences the very nature of the new venture design problem. The new venture design problem is therefore *situational* (Dorst, 2006). Perceiving the new venture design problem as situational, also explains the fact that entrepreneurs presented with the same problem and solution space during the TU Delft course “*Turning Technology into Business*” can come up with completely different business models. And in a sense, the entrepreneurs are actually part of the very business model solution they are creating, since their competencies determine the competencies of the firm they are creating. The entrepreneurs therefore leave an important mark on the created new venture.

Because every new venture design problem is essentially unique, there is not one prescribed way to arrive at a well-functioning business model. How the wicked new venture design problem is tackled, is to a large extent determined by the entrepreneurs who try to solve it. The core task of the entrepreneur lies therefore in what Schön (1983; Dorst & Dijkhuis, 1995) calls “*the artistry of design*”: deciding which actions should be taken when in order to tackle the new venture design problem.

According to the empirical data, the artistry of the entrepreneurs is defined by the baggage they have collected during their lives. This baggage defines how they interpret the world around them and based on this mental model of reality, they explain and anticipate events in the problem and solution space, and they reason which actions they should take to arrive at a well-functioning business model (Badke-Schaub, 2007). Buchanan (1992), who first coined the term “*design thinking*”, offers a similar kind of mental framework to clarify the artistry of designers. According to him “*designers often possess a personal set of placements, developed and tested by experience*” (Buchanan 1992, p. 13), according to which they explore the problem space in order to generate innovative solutions. Placements give therefore context and orientation to thinking which result in new perceptions of the situation which, on their part, result in new creative solutions.

These notions seem to explain the trial and error behaviour that can be witnessed within the collected empirical data. Reconsider the following quotes of entrepreneur D:

> “At first I found it sometimes very difficult, because, as an entrepreneur, nobody tells you what to do. […] That’s a big responsibility and that’s not always easy. In the beginning you have not so much experience about how to deal with things. This or that way, what would be the result from this?” – Entrepreneur D, 99
In the beginning entrepreneur D did not have a large personal set of placements according to which he could assess the situation and make decisions. Through trial and error (Exhibit 50) this entrepreneur got more experience and he expanded his set of placements, resulting in much quicker evaluations of newly surfacing problems. According to Cross (2004) it is this accumulation of experiences that partly distinguishes experts from novices in design. Novice designers use more trial and error approaches to solve the design problem, while experts first evaluate their solutions based on their previous experiences before implementing them (Ahmed et al., 2003). This behaviour can also be witnessed in the studied cases. Entrepreneurs who did not have much work or entrepreneurial experience in their envisioned area of business before starting their own firm, seem to tackle the new venture creation process by trial and error, while the entrepreneurs with more relevant experience seem to be better at making preliminary judgments about various design options, often resulting in a quicker and smoother start-up process. Therefore, the execution of the new technology venture creation process seems to be dependent on the artistry of the entrepreneur who is creating the new firm.

Exhibit 51: The experiential learning cycle

Entrepreneurs learn based on their actions. Kolb calls this the “experiential learning cycle” whereby “knowledge is created through the transformation of experience” (Kolb, 1984, p. 41). This cycle consists of four stages. Learning starts with a concrete experience which leads to reflection. Based on these reflections, abstract concepts are generated about the nature of the situation, which result in new implications for action. These newly gained insights will be actively tested, which forms the basis for new experiences (Kolb et al., 2000).
6.4 Summary of the core categories

Based on the discussion in this chapter, it can be concluded that three core categories are important in explaining the evolution of a new technology venture’s design.

First, the new technology venture creation process can be described as the survival of the fitting: to ensure its survival, the business model of the new technology firm should demonstrate a good fit between the firm’s solution and the problem in the market that this solution intends to solve.

Secondly, the process of creating this problem-solution fit, can be described as the co-evolution of problem and solution. At the start of the new venture creation process, both the problem and solution are indeterminate. More information needs to be gathered to define what the needs in the market are and how the entrepreneur can satisfy them. In order to determine this problem-solution pair, the entrepreneur iterates between the problem and the solution space, as new knowledge about the problem requires adjustments to the solution and vice versa. Through these iterative cycles, the problem-solution pair becomes gradually fixed, until the new product can be launched onto the market and the new venture can start exploiting the discovered business opportunity. During this new venture creation process the nature of the process changes. Where the exploration and realisation stages are focused on creating a good problem-solution fit through co-evolution of the problem and solution, the exploitation stage is aimed at maintaining and optimising this fit through rational problem solving.

Finally, the entrepreneur who executes the new venture creation process has a large influence on the outcomes of this process. As the new venture creation process is not a linear process that flows from the problem to the solution, it depends on the artistry of the entrepreneur which actions are taken when in order to tackle the new venture design problem.
This chapter provides the answer to the main research question that has been posed in chapter 2:

*How does the design of a new technology venture evolve until the firm reaches maturity?*

Paragraph 7.1 will present the grounded theoretical framework, which has been created based on the insights gained from this study. Paragraph 7.2 will assess the “groundedness” of this framework according to the criteria fit, relevance, work and modifiability. This chapter will conclude in paragraph 7.3 by presenting the implications and recommendations for technology-based entrepreneurs, the TU Delft, YES!Delft and future scientific research into the field of entrepreneurship.
Chapter 2 concluded by posing the following central research question for this study:

*How does the design of a new technology venture evolve until the firm reaches maturity?*

This paragraph will present the answer to this main research question according to the model that has been developed based on the insights gained from empirical data (Exhibit 52).

The model in Exhibit 52 represents the business design in the three main stages of the new technology venture creation process: exploration, realisation and exploitation, which form an iterative process. The business design is represented by the three core design elements that have been discovered in chapter 5: the value proposition, market and competencies. Together these components explain the core logic of how the new technology venture intends to create value at certain points in the new venture creation process.

From the previous chapter, we learned that creating a fit between the separate design elements is the main goal of the new venture creation process. Therefore this core category is put in the centre of the model. We also learned that this fit is achieved through the co-evolution of the problem and the solution. This co-evolution process is represented by the circular pink arrows, which build bridges between the separate design elements. During this process the entrepreneur should always be attentive to the developments in the micro and macro environment of the business under construction, because these developments can provide new opportunities or threats. As the new venture design problem is a wicked problem, which can be tackled in various ways, the model does not prescribe a specific route through the design stages: it is up to the artistry of the individual entrepreneur to find a satisfactory solution to the new venture design problem.

So, based on this model, how does the design of the new technology venture evolve until the new firm reaches maturity?

The entrepreneur starts the new venture creation process by free exploration of potential opportunities in the solution space (the value proposition and
Exhibit 52: Achieving fit through co-evolution of the new technology venture design elements

ENVIRONMENT
Which developments in the environment provide opportunities or pose threats to my business?

COMPETENCIES
Why me? With whom? What are our resources and capabilities?

VALUE PROPOSITION
What do I think the market needs? What do I think the market needs?
Does my solution satisfy the need? How do I develop and produce my solution? At which costs?
Which benefits does my solution offer to the market? At which price? How do I create market acceptance?
Which core competencies provide my competitive advantage?

MARKET
Who are my customers and users? What are their needs?
Who are my direct and indirect competitors?
Which developments in the environment provide opportunities or pose threats to my business?

Who are my direct and indirect competitors?

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competencies), the problem space (the market) or both. At this point many aspects are still uncertain and the definition of the new venture design problem is indeterminate. This ambiguity is represented in the model by the faded colour of the exploration ring. The questions in the exploration ring represent the main focus for the separate design elements in this stage. During the exploration stage the entrepreneur develops a set of hypotheses about a potential problem-solution opportunity, which will be tested to reality in the subsequent stages.

During the realisation stage the problem-solution pair becomes more fixed which is represented by the brighter colour of the realisation ring. The main focus for the design elements in this stage is reflected by the questions in the model. The actions in the realisation stage are focused on realising the discovered problem-solution opportunity, but these actions can also prove the hypotheses, which have been formulated in the exploration stage, wrong: the entrepreneurs learn from the effects of their actions. Therefore there will often be several iterations between the realisation stage and the exploration stage before a satisfactory problem-solution pair has been discovered. These iterations diminish as time progresses and more and more information has been uncovered through
the actions of the entrepreneur that enables defining both the problem and the solution space (Exhibit 53).

When the realisation stage has resulted in a market-ready product, the entrepreneur can start creating actual value from the business opportunity by engaging in value exchanges with the market. At this point in the new venture creation process the problem-solution pair is fixed to a large extent, which is represented by the bright colour of the inner circle of the model. The transition from realisation to exploitation activities should be perceived as a continuous process (Exhibit 53). For example, many of the interviewed entrepreneurs sell their prototype, which is an exploitation activity, and based on the user experiences with this prototype they redevelop their product, which is a realisation activity, before they define the fixed problem-solution pair and officially launch the product to the market.

During the exploitation stage the nature of the new technology venture creation process changes. The exploration and realisation stages are aimed at discovering and creating a good problem-solution pair through the co-evolution of the problem and solution. The exploitation stage is aimed at optimising this problem-solution pair with the aim to create the most amount of value for all stakeholders involved. As the new venture design problem has been defined to a large extent when the exploitation stage is entered, the actions in this stage resemble more rational problem solving.

From the previous description it can be learned that the transition from one stage to the other is an iterative process. The new technology venture creation process starts with free exploration and ends with full exploitation of the discovered business opportunity. In between these extremes, the entrepreneur decides to progress a stage or go back in the process, depending on how closely the solution fits the problem. Therefore, as the new venture becomes more mature, less time is spend at exploring the problem and solution spaces and more time is spend at realising and exploiting the perceived business opportunity, which is reflected in the graph in Exhibit 53.

7.2 Reflection on the “groundedness” of the developed theoretic framework

The previous paragraph presented an integrated theoretical framework that aims to provide a grounded answer to the central research question of this study. This grounded theory is (for now) the destination of an epic explorative journey through the world of technology-based entrepreneurship. Question remains if this co-evolution model provides a credible grounded explanation of how the
The design of a new technology venture evolves until the new firm reaches maturity. Paragraph 3.3.1 provides four evaluative criteria, which will be used in this section to evaluate the developed grounded framework.

**Fit**
The development of grounded framework has been done through constant linking of incidents in the empirical data with the emergent theoretical framework. More than 290 quotes were used to ensure a fit between the theory and the empirical field and the incidents that were discovered in the 5 thoroughly analysed cases have constantly been checked with the empirical data of 5 other cases, which functioned as control group (Appendix H). The developed core categories seem to sufficiently explain the new venture creation process of all analysed cases.

**Relevance**
After gathering all empirical data, an unstructured conversation was held with the coordinator of the YESIDelft incubator (Appendix I) in order to check what she perceived to be the main concerns on the incubator-based start-ups. Because of her function, the incubator coordinator has an overview of the general new venture creation pattern that is happening across the YESIDelft start-ups. Therefore this conversation is used to check the relevance of the developed grounded theory. The conversation confirms that the start-up process can be described as a co-evolution process of problem and solution in order to create a fit between the new venture’s business activities and the market’s needs:

“*What you notice is that it lacks on the area of market research. People are not inclined to walk into the office of a potential customer and ask: what do you want? I think you have this and this problem, but is that right? [...] The companies that do that, you notice the plan improves, because they already have more information.*” – Rachelle, 113

“A start-up is a team of people searching for a profitable business model. So you are searching. You do have an idea, you need a plan, but a plan always changes. That’s why we give a lot of coaching during the first year, because especially during the first year everything starts pulling at that plan and things are going to change and everything appears to be different, so you constantly have to change your strategy. Especially in the first year, then you need to adapt a lot of things.” – Rachelle, 114

According to Rachelle it is important to develop the product together with the market, because this will result in a product that does not need much adaptation...
after launching it onto the market and it will speed up the time-to-market. However, technology-based entrepreneurs are often too invested in their technology. They want to develop a perfectly functioning product and they forget the benefits for the market:

“What a lot of entrepreneur run into is that there are different demands in the market. They are mainly engineers. They are inclined to develop further into infinity and it all has to be perfect and everything has to work precisely, while the customer can do completely without that.” – Rachelle, 115

Achieving fit through the co-evolution of problem and solution seems therefore a relevant core process within the new technology venture creation process. Also the core category which states that the course of this process is determined by the artistry of the entrepreneur seems relevant, because the coordinator thinks that the lack of entrepreneurial experience determines the new venture’s quest for a profitable business model. Therefore starting YES!Delft entrepreneurs are always coupled with experienced YES!Delft graduates, who share their experiences to help the nascent entrepreneurs find their route through the new venture creation process.

**Work**

The developed grounded theory can be used to explain the evolution of the new venture’s design in various situations. It provides a good framework for explaining why certain new technology ventures reach maturity earlier than others. And it works for both technology-driven and market-driven new technology ventures in a range of different industries.

**Modifiability**

During the generation of the grounded framework many alterations have taken place based on new insights that were generated through analysing the data. Like the business model design in new technology ventures, the current grounded framework represents a temporarily fixed result of this Master thesis. When new insights are gained about the empirical area of technology-based entrepreneurship, this framework can be adapted to take advantage of the new insights.

### 7.3 Implications and recommendations

The model which is presented in paragraph 7.1, provides a promising framework for technology-based entrepreneurs, the TU Delft and YES!Delft in fostering and
accelerating the desired outcomes of entrepreneurial activity. Because the model has different implications for the different stakeholders, the implications and recommendations for each of these stakeholders will be summarised in this section.

**Technology-based entrepreneurs**

This study proposes that the creation of a new technology venture is in essence a design problem. Technology-based entrepreneurs should therefore learn from the approaches designers use to solve wicked problems. This approach is radically different from the rational problem solving approach that prevails in engineering practice. Next to developing a technological product, technology-based entrepreneurs must actively frame the need in the market. To do so, the entrepreneurs should build bridges between product development and market development early on in the new venture creation process. An effective strategy to develop the product and gain insight in what the market needs is through co-creation with prominent stakeholders in the targeted market. In order to engage the market in the product development process it is essential that technology-based entrepreneurs develop the competencies to approach the market, for example through expanding their business network, or expand their team in order to acquire the necessary competencies.

The presented model also provides a good tool for entrepreneurs to assess how well the new venture’s solution fits to the perceived problems in the market at certain moments during the new venture creation process. As the model gives insight in the core logic of the new venture for creating value, the model can help entrepreneurs to reflect on their decisions and find areas which have been underdeveloped or overlooked. These insights can also be used to develop a convincing story for communicating the core business to external parties, such as potential customers or investors.

**TU Delft**

Based on the findings of this study it can be concluded that the artistry of the entrepreneur determines how the new venture design problem is tackled. Novice entrepreneurs often tackle the new venture creation process by a trial and error approach, because they do not know which effects their actions will have. Expert entrepreneurs, on the other hand, are more deliberate in their actions. They seem to be better at making mental assessments of various design options before implementing them in practice, because they have a larger library of experiences to compare the new situations to.

Entrepreneurship education at the TU Delft is mainly focused on the very first stage of creating a new technology venture: exploring the problem and solution spaces with the aim to discover promising business opportunities and developing
a sound business plan for realising and exploiting these discovered opportunities. However, the biggest challenges are encountered after writing the business plan, when the entrepreneur is testing the hypotheses in the business plan to reality. And it depends on the accumulated experiences of the entrepreneur how and how fast these challenges are overcome. To reduce the time-to-market of the new technology ventures that are started by student entrepreneurs, the TU Delft should also focus on this accumulation of entrepreneurial experience. A good way to support students in acquiring a larger experience library is through simulation games, as game features trigger a self-motivated iterative learning cycle (Garris et al., 2002). These simulations should be focused on the challenges entrepreneurs encounter when they try to realise their ideas. What do you do when the market does not accept your product? How are you going to convince investors? Are you realising the business idea on your own or are you working together with partners? What if your partner suddenly does not want to work with you anymore? What if your technology is not allowed? What if a competitor beats you to the market? By making students more familiar with these kinds of situations, their library of experiences accumulates, which will help them in quicker assessing design options when they take the leap and actually start their own new venture.

**YES!Delft**

Since its start in 2005, YES!Delft has come a long way. Selection and assessment criteria are becoming more and more strict and the business network is ever increasing. In its daily practice the incubator is already coupling young entrepreneurs to more experienced entrepreneurs. This way the new entrepreneurs can take advantage of the larger experience library of entrepreneurs who have already been through the first stages of new venture creation. In light of the findings of this study, this is a very good approach to foster the artistry of novice entrepreneurs. However, the model that has been developed in this study can provide YES!Delft with a good framework to assess applicants for the incubation program or to assess the progress of their client companies.

**Future research into entrepreneurship**

This study has created many insights in the new technology venture creation process. However, there still remain many more issues to explore. The grounded framework in this study has been developed based on the empirical data of incubator-based technology ventures. This is a very specific research sample, which provokes the question if the findings of this study can be replicated among other types of new ventures or if these findings are specific to the scope of this study.

Furthermore, only few cases in this study actually made the transition to full exploitation. Most of the investigated cases were still exploring the problem
and solution spaces in order to create a good problem-solution fit. Therefore only little can be said about the transition from the co-evolution process in the first stages in the new venture creation process to the rational problem solving process in the exploitation stage. More research into this transition is required to fully understand the dynamics of this process.

Related to the previous issue, it also seems important to investigate how new technology ventures develop further after reaching the exploitation stage. An interesting question for a new study on this topic would therefore be: How do technology ventures continue and expand their business activities after the first crucial start-up years have been survived?

7.4 A final word

Conducting this study and writing this thesis has been a true braintwister. Entrepreneurship is an area incorporating so many different aspects and dimensions that, even after completing this study, I still feel I have only scraped the surface of the complex design problem of new technology venture creation. Therefore the developed theory in this study might not be finished yet. However, I hope that I have been able to provide some new perspectives on technology-based entrepreneurship and I hope this thesis can inspire some nascent entrepreneurs to take that great idea in their head and transform it into their envisioned future reality.
References


Lavrow, M., & Sample, S., 2000. *Business Incubation : Trend or Fad ? Incubating the Start-up Company to the
Venture Capital Stage: Theory and Practice. MBA. University of Ottawa.


References of exhibits


Exhibit 10  Saxe, J.G., 1816-1887


Exhibit 18  

Exhibit 19  

Exhibit 39  

Exhibit 40  
Blank, S.G., 2006. The Four Steps to the Epiphany: Successful Strategies for Products that Win. 2nd ed. Lulu.com

Exhibit 41  
Blank, S.G., 2006. The Four Steps to the Epiphany: Successful Strategies for Products that Win. 2nd ed. Lulu.com

Exhibit 44  

Exhibit 45  

Exhibit 46  

Exhibit 47  

Exhibit 50  

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## Appendix A: Inventory of business model definitions

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition BM</th>
<th>Proposed components</th>
</tr>
</thead>
</table>
| Osterwalder & Pigneur, 2010    | A business model describes the rationale of how an organization creates, delivers, and captures value   | Customer segments  
|                                |                                                                                                        | Value propositions  
|                                |                                                                                                        | Channels  
|                                |                                                                                                        | Customer Relationships  
|                                |                                                                                                        | Revenue streams  
|                                |                                                                                                        | Key resources  
|                                |                                                                                                        | Key activities  
|                                |                                                                                                        | Key partnerships  
|                                |                                                                                                        | Cost structure |
| Osterwalder & Pigneur, 2002    | A business model is nothing else than a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenues streams. | Factors related to offering  
|                                |                                                                                                        | Market factors  
|                                |                                                                                                        | Internal capability factors  
|                                |                                                                                                        | Competitive strategy factors  
|                                |                                                                                                        | Economic factors  
|                                |                                                                                                        | Personal/investor factors  
|                                |                                                                                                        | These factors are applied at three levels: foundation, proprietary and rules |
| Morris et al., 2005            | A business model is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture and economics are addressed to create sustainable competitive advantage in defined markets. |                                                      |
| Zott & Amit, in press          | Business model is the content, structure and governance of transactions designed so as to create value through the exploitation of business opportunities. | Content: what?  
| Zott & Amit, 2001              |                                                                                                        | Structure: how?  
|                                |                                                                                                        | Governance: who?  |
| Chesbrough & Rosenbloom, 2002  | The business model provides a coherent framework that takes technological characteristics and potentials as inputs and converts them through customers and markets into economic outputs. The business model mediates between technology development and economic value creation | Value proposition  
|                                |                                                                                                        | Market segment  
|                                |                                                                                                        | Value chain  
|                                |                                                                                                        | Cost structure and profit potential  
|                                |                                                                                                        | Value network  
<p>|                                |                                                                                                        | Competitive strategy |</p>
<table>
<thead>
<tr>
<th>Author</th>
<th>Definition BM</th>
<th>Proposed components</th>
</tr>
</thead>
</table>
| Magretta, 2002       | A business model is a story that explains how the enterprise works            | Who is the customer?  
Who does the customer value?  
How do we make money in this business?  
What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost? |
| Linder and Cantrell, 2000 | Business model is the organization’s core logic for creating value.            | Sources of revenue (market)  
Value propositions  
Delivery model  
Funding model |
| Seddon & Lewis, 2003 | A business model is an abstract representation of some aspect of a firm’s strategy: it outlines the essential details one needs to know to understand how a firm can successful deliver value to its customers. | |
| Applegate, 2001      | A business model is a description of a complex business that enables study of its structure, the relationships among structural elements, and how it will respond to the real world. | Concept: describes the opportunity  
Capabilities: define resources needed to turn concept into reality  
Value: measures the return to investors and other stakeholders |
| Hedman & Kalling, 2003 | The model integrates firm-internal aspects that transform factors to resources, through activities, in a structure, to products and offerings, to market. | Customers  
Competitors  
Offering  
Activities and organization  
Resources  
Supply of factor and production inputs  
Scope of management |
| Gordijn & Akkermans, 2001 | The business model expresses how value is created, interpreted and exchanged within a multi-party stakeholder network of (extended) enterprises and customers | Actor  
Value object  
Value port  
Value interface (grouping of individual ports)  
Value exchange  
Value offering  
Market segment  
Composite actor (partnership)  
Value activity |
<table>
<thead>
<tr>
<th>Author</th>
<th>Definition BM</th>
<th>Proposed components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demil &amp; Lecocq, 2009</td>
<td>The BM is the way an organization articulates dynamically three main components to generate revenues then profit. These three components, encompassed in the RCOV model are resources and competences (RC) to value, organization (O) of the business within a value network or within the boundary of the firm and the value proposition (V) for the products and services supplied.</td>
<td>Resources and competences Internal and external organization Value proposition Volume and structure of revenues Volume and structure of costs Margin</td>
</tr>
<tr>
<td>Auer &amp; Follack, 2002</td>
<td>A business model is not a description of a complex social system itself with all its actors, relations and processes. Rather, it describes the logic of a 'business system' for creating value that lies behind the actual processes</td>
<td>Value model Resource model Production model Customer relations model Revenue model Capital model Market model</td>
</tr>
<tr>
<td>Petrovic et al., 2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slywotzky &amp; Morrison, 1998</td>
<td>The entire system by which a company delivers utility to its customers and thereby generates sustained value growth for its shareholders</td>
<td>customer selection value capture strategic control scope</td>
</tr>
</tbody>
</table>
Appendix B: Development of the interview guide

The aim of this study is to obtain a deeper insight in the business model dynamics of new technology ventures, especially how the business model is influenced by the entrepreneur and his/her team; the way the entrepreneur discovered the business opportunity; new product development issues; and the environment in which the company operates. The developed interview guide (appendix...) therefore addresses these topics.

General structure

The interview has a funnel structure; every topic starts with general questions and subsequently the questions become more specific. The reason for this is to make the participants feel more at ease to share personal information. Open-ended questions are asked to evoke extensive and meaningful responses and to avoid leading questions. However, when the situation requires some steering, guidance is given to the participant. It is avoided to mention the term business model, until the term is used by the participant, to prevent that the participant will fixate on this topic and will try to give desirable answers. The interview guide is not used as a static tool, but is adapted based on the interview situation and the analysis of already gathered data, which might indicate new topics for investigation. This means that none of the interviews will be completely the same.

Topics

The introduction questions of the interview guide are general questions in order to achieve a better understanding of the participants’ background and to make the participants feel at ease. Questions 4, 5 and 10 focus on uncovering the individual mental model regarding starting a new venture. A mental model is an internal, simplified working model of the world, which humans develop to cope with new information and to make predictions with little mental effort. By asking participants about their reasons for becoming an entrepreneur, their previous experience, and their first expectations (i.e. predictions) about the future of the company, I aim to deduce their internal mental model.

Initial idea

Following the general questions, I develop questions regarding the initial business idea. Questions 7 and 8 are aimed at exploring how the participants discovered their opportunity. Question 9 aims to discover the elements of the first business idea. This information can be used to assess which elements of the business model are developed first. Question 11 continues by asking how the participants
tried to realize their business ideas and which steps are important in this very first stage of company creation. This section ends with asking about the company’s name, because a name is an important aspect of the company’s external image. By asking about the company’s name, I want to explore if entrepreneurs were already at the start concerned with the competitive environment in which they will function.

**Current situation**

Question 13 and 14 are aimed at discovering in which stage of new venture creation the company is now and what the current business model is. Which elements have been added, changed or deleted in comparison to the situation described by the previous answers? Question 15 has been added to the interview guide later, based on analysis of data gathered by the first interviews. In these conversations it became clear that entrepreneurs are searching for a specific focus for their companies. Based on the literature I called this focus the core competence. By asking about the core competence I want to get to know to which extend the entrepreneurs have focused the activities of the company.

**Development**

Based on the answers to the previous two interview topics, the start and end situation of the new venture creation process have been established. This topic focuses on everything that happened in between. The questions in this section are therefore aimed at discovering which aspects have or have not changed and the reasons for these changes.

**Entrepreneur and team**

This section asks questions about the entrepreneur and the team. Because in a small company the skills and knowhow of one person can have a large effect, I want to know how the team has changed over time. Which knowledge was lacking and has been added to the company? Or which skills were unnecessary and resulted in letting some team members go? Because a start-up also builds a new organization, question 25 asks about how the organizational structure has evolved.

**New product development**

This study evolved from a strategic product designer’s perspective on new product development, which entails that new product development and business activities should be conducted as a coherent whole. In new technology companies, the whole business aspect has not yet been developed, but an idea for a new product/service is being developed into a market-ready product. Therefore it seems logical that the new product development process has an influence on decisions about the design of the complete business. The questions in this section aim to assess this influence.
Product launch
The product launch is a crucial step in new venture creation, as this is the moment the company enters the exchange stage with the market. This is the moment assumptions can be tested in practice. The questions in this section aim to find out how the product was launched and how the exchanges with the market influenced decisions about the business model. Are the initial assumptions right or do these assumptions need to be revised?

Competition and external environment
When the company enters in exchanges with the market, it will also experience the effect of competitors that operate in the same market. Does this lead to altercations between the company and competitors? Do the business assumptions of the company prove to be right? To find answers to these questions, question 37 and 38 are asked. Next to competitors there are also other environmental aspects that can influence the performance of the new venture, for example the current economic crisis. Question 39 aims to assess the influence of those aspects on the company’s design.

University and incubator
The new ventures that are asked to participate in this research all get the support of the YES!Delft business incubator and the TU Delft. The questions in this sections are aimed at uncovering the influence of these supporting organizations. Question 43 is asked to make some practical recommendations to YES!Delft and the TU Delft.

The last five topics ask about interactions with people in and around the new venture. These topics will therefore help to assess the influence of the company’s network. These topics also aim to assess how the entrepreneur engages with this network.

Future
Question 44 and 45 ask about the vision of the entrepreneurs and if they think the current company design is sufficient to reach their envisioned goals. These questions also aim to investigate if the vision of question 10 has changed over time and in which way.

Wrap up
Since the participants have probably gained much experience during the creation of their new venture, I ask them in question 46 to give their most important advice regarding starting a new company. Their answer can also indicate what is most important to them during new venture creation. The interview ends with asking about other aspects they believe are important in the development of their companies to make sure all important issues have been explored.
Appendix C: Interview guide

Introduction
1. Introduction of me and the aim of the interview.
2. What is your educational background?
3. When did you start your company?
4. Why did you become an entrepreneur?
5. What kind of entrepreneurial experience did you have before you started this company? How did this influence the development of your company?
6. What is your function in the company? Has this changed since the start of the company? Why?

Initial idea
7. When did you get your initial business idea?
8. How did you get this idea?
9. What was your initial business idea? Possible aspects for further questions:
   a. Who? (team, target market, partnerships)
   b. What? (value proposition)
   c. How? (marketing, distribution, key activities, resources)
   d. Costs? (revenue model, costs)
10. What did you hope to achieve with this business idea? What were your initial goals?
11. Which actions did you take to realize this idea? How did you decide on these actions?
12. How did you decide on the company name? Has this name changed? Why?

Current situation
13. In which stage of the development process is your company at the moment?
14. How does your current business create value? Possible aspects for further questions:
   a. Who? (team, target market, partnerships)
   b. What? (value proposition)
   c. How? (marketing, distribution, key activities, resources)
   d. Costs? (revenue model, costs)
15. How would you describe the core competence of your company? Has this changed? Why?

Development
16. How and why have certain aspects of your business (not) changed compared to your initial business idea?
17. Which moments have been crucial in the development of your business? Why?
18. Which problems did you encounter during the start-up of your company? Why? How did you solve them?
19. Which aspects of your company’s development went really well? Why?
20. Which aspects did you not anticipate beforehand, but turned out to be really important during the development of your company?
21. Which lessons have you learned during the development of your company? Why?
22. If you had to rank all aspects of your company’s development, which aspects were the most important to you? Why?

**Entrepreneur and team**
23. Did you start the company by yourself or with a team? Why?
24. How has the team changed during time? Have persons been added or gone away? Why?
25. Have functions become clearer? Why?
26. How has this influenced the development of your company?

**New product development**
27. Which resources did you need to realize the development and production of your product?
28. How did you obtain these resources?
29. Which partnerships have you engaged in? Why?
30. Which changes have you made after testing the prototype? Why?

**Product launch**
31. How did you want to position your product?
32. How did you get your first customer?
33. How did the choice for this launching customer impact your company? Why?
34. How did the moment of the first sale influence the development of your company? Why?
35. How did the market react to your product?
36. Which changes have you made after product launch? Why?

**Competition and external environment**
37. Did you experience competition when you entered the market? How did you cope with this competition?
38. Which changes have you made due to competition? Why?
39. Which other environmental aspects had an impact on the development of your company? Why?
University and incubator

40. Which role did the TU Delft play during the start-up of your company?
41. Which role did YES!Delft play during the start-up of your company?
42. How do you think your company would have developed without the support of these organizations? Why?
43. How can the TU Delft and YES!Delft improve their support to starting entrepreneurs? Why?

Future

44. Where do you see your company in five years?
45. Which changes do you expect you should make to achieve these goals? Why?

Wrap up

46. What would be your most important advice to starting entrepreneurs concerning the development of their company?
47. Are there any other aspects which were important for the development of your company, which have not been mentioned already?
48. Is it possible that I get your initial business plan and annual reports?

End of the interview. Word of thanks.
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Appendix E: Original quotes

The quotes that have been used in this report have been translated from Dutch into English. This appendix contains the original Dutch quotes. Each quote is followed by the entrepreneur who said it and a time code, which refers to the location in the original dataset.

1. Het is allemaal heel cool en allemaal heel 2010 en zo, maar voor ons is het gewoon heel duidelijk. We laten iets maken en dan verkopen we het weer en doen we dat op die manier en niet dat we allemaal hele moeilijke constructies gaan afspreken of vage samenwerkingsverbanden van: jullie doen dit voor ons en dan doen wij dit voor jullie. Eigenlijk eenvoudige business modellen die je met je partners afspreekt. (Entrepreneur J, 27:50)

2. Licentie, franchise, hoe dat in elkaar zit dat weten we nog niet, maar de bedoeling is dat het business model schaalbaar is. (Entrepreneur B, 09:26)

3. Zorg dat je de juiste kwaliteiten in huis hebt en als je die mist, dat je die er zo snel mogelijk bij gaat halen. Dan pas komt het echte plan eromheen: hoe ga je er precies je geld mee verdienen? [...] Je business model dat kan daarna ook nog wel gevormd worden. Het belangrijkste vind ik inderdaad het team en dat er überhaupt vraag naar je product is. En of het dan 10 Euro per maand kost of 100 Euro, wat het dan precies is, de exacte inhoud, dat is stap 3 wat mij betreft. (Entrepreneur C, 55:50)

4. De paar piekmomenten die je hebt daar kun je zo lang op teren. Dat is zo geweldig. Als je idee lukt is dat geweldig, maar je hebt er ook veel zorgmomenten over gehad. Dan pas komt het echte plan eromheen: hoe ga je er precies je geld mee verdienen? [...] Je business model dat kan daarna ook nog wel gevormd worden. Het belangrijkste vind ik inderdaad het team en dat er überhaupt vraag naar je product is. En of het dan 10 Euro per maand kost of 100 Euro, wat het dan precies is, de exacte inhoud, dat is stap 3 wat mij betreft. (Entrepreneur C, 55:50)

5. Een keer hebben we 30 investeerders gesproken, want we hadden toen geld nodig. Toen hebben we 3 maand niet anders gedaan dan het businessplan zitten aanpassen, mensen contacteren, presentaties geven. Niks gedaan aan onze technologie. Dat was een beetje een tekortkoming van onszelf. (Entrepreneur D, 62:14)

6. Natuurlijk, in het eerste jaar gaan we gelijk al een hele opstelling verkopen en daarna verkopen we er 5 en dan verkopen we er 20 en over 3 jaar is alles goed, dan is het bedrijf helemaal fantastisch super draaiend. Dat was een heel mooi fantastisch verhaal. (Entrepreneur C, 06:12)

7. Maar ik denk dat ik uit al mijn vorige rollen aspecten heb meegenomen. [...] En, dat heb ik mezelf wel afgevraagd, waren al die ervaringen nodig om nu ook te komen met dit bedrijf waar ik ben? Ze hebben wel geholpen. (Entrepreneur G, 53:17)

8. Een bedrijf wat eerst jezelf als persoon is met je verhaal, wat je probeert uit te dragen, inmiddels zijn we op het punt dat het bedrijf meer is dan ikzelf. Dat het meer een entiteit buiten jezelf wordt en dat anderen daarmee
aan de gang gaan en dat ook prima vorm kunnen geven. (Entrepreneur G, 19:33)

9. Overname gedaan ten behoeve van omzet en het opbouwen van netwerk [...] (Entrepreneur H, 13:54)
10. Alles samen met klanten ontwikkelt. We proberen zoveel mogelijk afwegingen te maken samen met klanten te doen. (Entrepreneur H, 03:11)
11. Pellen, met pellen bedoel ik kleiner maken. [...] Je hebt weinig middelen en dan moet je maar 1 ding doen. (Entrepreneur H, 28:23)
13. Nu zijn we dat technisch aan het uitwerken en nu pas begint dat echt vorm te krijgen in een begrijpelijker product. De technologie is leuk, maar hoe ga je dat duidelijk verkopen naar iemand? (Entrepreneur C, 02:40)
14. Het opzetten van het bedrijf was niet het doel. Het doel was: er is een probleem, daar heb ik een oplossing voor. (Entrepreneur A, 03:01)
15. Je bedenkt iets en dat is leuk, maar het werkt pas als mensen er geld voor over hebben. [...] Op het moment dat je daar een goede formule voor hebt dan moet je daar voor gaan en dat is op dit moment zo. (Entrepreneur A, 13:47)
16. En ons eerste business idee was om in een joint venture met dat bedrijf ons eerste systeem te gaan bouwen: jullie zijn goed in die dingen bouwen, wij hebben een uitvinding [...] Als we nu jullie systemen en kennis over die systemen combineren met ons plan, dan kunnen wij samen die markt aan. (Entrepreneur A, 05:04)
17. Ik ben van wetenschapper, waar je alles in je eentje doet, naar projectmanager, waar je alleen maar faciliteert, nu langzaam aan het doorgroeien naar mijn functie, CEO dus. Waarbij je, als je het goed doet, eigenlijk alleen maar met de visie bezig bent en met het aansturen van managers [...] (Entrepreneur A, 10:51)
18. We hebben gemerkt ergens in de beginfase dat voor 5 markten een beetje te doen of voor 1 markt echt goed, dan levert 1 markt echt goed doen meer op. En ook een betere basis om daarna alsnog te gaan diversifiëren. (Entrepreneur G, 17:57)
19. Als de crisis er niet was geweest dan groeiden we uit onze voegen. (Entrepreneur D, 20:18)
20. Je maak bewust veranderingen om je concurrentiepositie te verbeteren. [...] Het is een soort zigzag, zoeken. Je zoekt naar die unieke positie die zich kan handhaven in de markt. Daarom was het voor ons zo lastig, want we kennen de markt niet goed en we wisten de techniek niet goed. Dus die slingers waren eigenlijk vrij grof. (Entrepreneur H, 17:23)
21. Als je een businessplan opschrijft krijg je geen verhaal met open einden.
Als je het opschrijft zie je: hier zitten we nog een met een probleem. [...] Je kunt een idee hebben over hoeveel je gaat vragen, maar als je het eens opschrijft dan zie je dat er gaten inzitten. (Entrepreneur D, 17:54)

22. Dat advieswerk is ook wel praktisch als je in de ontwikkeling zit, want in de ontwikkeling zitten altijd gaten. Dat je die gaten op kan vullen met advieswerk. (Entrepreneur D, 00:00)

23. Praten met partijen is gratis en kan je wel snel in de goede richting duwen. (Entrepreneur G, 21:55)


26. [... als ondernemer moet ge af en toe uw scope eens bekijken. Waar zijn we nu mee bezig? Gaat het geld opleveren? Zeker als je niet op de markt komt, dan moet je een beetje gaan shiften. (Entrepreneur D, 12:02)

27. We zijn bij ongeveer 10 partijen langsgegaan om te vragen of ze dit als een probleem ervaren en of ze dachten dat als wij dit en dit en dit zouden doen dat ze dan dachten dat ze klant zouden worden. Dat hebben we toen getoetst. Dat was heel positief. (Entrepreneur H, 02:25)

28. Dat is dus dat proces dat je de technologie bedenkt, dat je vervolgens gaat toetsen of dat wel kan, vervolgens schaalmodel proeven gaat doen om te bewijzen dat het daadwerkelijk werkt, dan bouw je een prototype, en ja, dan wil je dat in de markt zetten en dan ontwikkelt zich, zeg maar, de business. (Entrepreneur A, 02:35)

29. Het is niet erop of eronder, maar het is wel... Het komt bij elkaar en er wordt onmiddellijk iets van je verwacht. (Entrepreneur A, 16:44)

30. Nadat we die [doelgroep] gecontacteerd hadden bleek dat die techniek niet mocht. De grijze zone, verkeerde gebied van de grijze zone. Dan sta je daar. (Entrepreneur D, 12:02)

31. maar je moet wel je plannen kunnen afstemmen. Hoe zie jij jezelf binnen 3 jaar, binnen 5 jaar, wat doe je als het mislukt? Iets in de financiën. Gewoon elkaars visie en die bleken niet vanaf de eerste dag overeen te komen. (Entrepreneur D, 03:49)

32. Voor mij was de focus heel belangrijk, om gewoon te weten waar we naartoe gaan. Je hebt een goed idee en je kan 10 leuke dingen doen met dat idee, maar er zijn er maar een paar die winstgevend zijn. En als ondernemer ben je toch iemand die zoekt naar een meerwaarde. Iets waar iemand meer dan normaal voor betaald of iets waar uiteindelijk een positief getal op de
teller overblijft. (Entrepreneur B, 05:26)

33. Het is meer mijn collega, die is autofreak. Ik hou meer van vliegtuigen. Hij is een autofreak, vliegtuigen zeggen hem niet zoveel. Hij zei: kun je niet die technologie uit de vliegtuigbouw toepassen bij wagens? Jij kunt dat bouwen en ik... We gaan dat samen doen. (Entrepreneur D, 03:49)

34. Dus eigenlijk de formeelinhoudelijke achtergrond en ervaring is mooi als dat aanvullend is, en dat was in dit geval zo: een econoom met marketingervaring aan boord gekomen. Ik was een technicus met commerciële ervaring. Dat versterkt elkaar goed. (Entrepreneur G, 51:10)

35. Een derde probleem is klanten, dus voldoende klanten aan je binden. En dat hebben we opgelost nu door, zoals Ken Morse... Hij is er vrij duidelijk in dat je gewoon voor een vertical moet kiezen en dat hebben we ook gedaan. Recent hebben we daar eindelijk voor gekozen. Ik moet zeggen dat meteen een hele opluchting is, want dan weet je iedere dag precies wat je moet doen. (Entrepreneur H, 19:13)

36. Het eerste idee waar we mee begonnen waren was de notie, visie dat als internet zich zo gaat ontwikkelen als het zich ontwikkelde op dat moment dan zou er een grote behoefte komen aan filtering [...] En de tweede notie die we hadden was als je kijkt naar email aan de ene kant en hele grote netwerken aan de andere kant [...] dan komt waarschijnlijk daartussen een heel grote behoefte aan wat wij dan niche communities noemen. [...] En dat waren eigenlijk 2 ideeën die we hadden en die hebben we gematcht. (Entrepreneur H, 01:46)

37. Je hebt ingenieurs die slim zijn, die worden vervelend als ze niets te doen hebben. [...] En dan is het o zo leuk als er iemand op je afkomt met een technische vraag. [...] Korte opdrachtjes, pats, en je krijgt er ook nog geld voor. [...] Misschien moeten we daar iets meer werk in zien te krijgen. Piekens met het bedrijf opvangen, dat er rust in het bedrijf komt. Dus misschien moet je niet altijd wachten tot er mensen naar ons komen, misschien moeten we gewoon eens gaan kijken of we daar kunnen verkopen. (Entrepreneur D, 28:01)

38. Die visie staat eigenlijk in het midden van ons merk. Daaromheen zijn we begonnen met een identiteit creëren. Dus daar zit een stukje logo, slogan en extra artefacts om het goed te kunnen communiceren wat die visie is. Vanuit die visie en die identiteit gaan we het proberen dat zodanig goed te communiceren, zowel extern als intern, en de organisatie daarop aan te passen en het product daarop aan te passen. (Entrepreneur C, 34:50)

39. We hopen over 5 jaar tot de grotere aerodynamische ingenieursbureaus te zijn in Europa. We gaan er gewoon voor. Die visie is niet veranderd op zich. Als je kijkt naar waar we onze omzet uit gingen halen en welke producten we gingen doen: heel veel verandert, maar het gebied waar we inzitten.... Het is niet zo dat we als laarsfabrikant uteindelijk telefoons gaan verkopen. (Entrepreneur D, 12:02)
40. Het allerslimst vind ik nog steeds de visie. Het vermogen om vanuit een visie te ondernemen. Dat vind ik nog steeds... (Entrepreneur H, 22:16) Dat heeft er tot nu toe voor gezorgd dat we overleven. (Entrepreneur H, 00:00)

41. We zijn gestart met het idee dat we door een aantal opdrachten aan specialisten te geven dat we een omgeving konden inrichten die we konden verkopen en op basis daarvan een bedrijf konden bouwen. (Entrepreneur H, 11:45)

42. Om het goed te doen en je daarin ook te onderscheiden en de kans om dat op te volgen met vervolgprojecten erg afhangt van de aandacht die je in het begin aan de markt en aan je eerste klanten kan besteden in het ze meenemen in het gebruik van dit innovatieve product. [...] De markt goed doorgronden, zodat je prijsstellingen goed zitten. (Entrepreneur G, 17:57)

43. En dat is misschien Delfts eigen dat je het heel erg fantastisch vindt hoe die technologie in elkaar zit [...], maar ja, we moeten ook eens kijken wat die klant er nu precies aan heeft. En dan evolueert dat idee tot iets wat je duidelijker kunt communiceren en waar mee het een compact, 1 geheel is, wat je zo kunt geven aan de klant. (Entrepreneur C, 04:24)

44. Daarom is de launching customer ook altijd de zak. Die krijgt nooit wat je dacht dat je kreeg. De kans dat er een perfect map is tussen wat jij met je lange termijn visie wil en wat hij dacht dat hij als eerste zou krijgen. Die kans is er alleen als iemand het helemaal heeft afgepeld. (Entrepreneur H, 30:37)

45. Tuurlijk. Als er geen concurrenten zijn is er ook geen markt. Er zijn een x-aantal bedrijven die je in het vizier houdt. (Entrepreneur C, 43:00)

46. In het begin heb je gewoon mensen nodig die erin geloven en het beste is, wat mij betreft, als een klant erin gelooft, want dat zegt dat er meer mensen zijn die blijkbaar hetzelfde probleem hebben en die het product ook zouden willen kopen. (Entrepreneur C, 09:03)

47. Zolang je niet kiest, kun je alles doen. (Entrepreneur H, 19:13)

48. Je kunt straks, en dan denk ik over 5, 10 jaar, kun je er heel veel andere dingen mee doen, maar we hebben nu bewust gekozen voor 1 aspect daaruit om gewoon duidelijk te kunnen zijn richting de klanten. (Entrepreneur C, 11:08)

49. Toen bleek na een aantal maanden dat dat te ingewikkeld was. Dat het teveel druk op onze organisatie legde en toen hebben we besloten om te stoppen met die ontwikkeling van die service en eerst maar eens gewoon dat maatwerk goed op orde te krijgen om vervolgens dat maatwerk te veranderen weer in een service die er misschien wel anders uitziet dan de oorspronkelijke service. (Entrepreneur H, 13:54)

50. Wat wel grappig is: in dat het turning technology to business vak, waarmee we begonnen, daar staat een bepaald schema afgedrukt. Hoe grappig het ook is, we volgen perfect dat schema. [...] Dat is nog niet zo stom verzonnen destijds. (Entrepreneur D, 12:02)
51. Überhaupt dat ding verkopen, dat was het eerste doel. (Entrepreneur C, 06:12)
52. Binnen een maand tijd of 3 weken tijd – echt een gekkenhuis – hebben wij een business plan in elkaar geschreven. Ik was op zich met het idee al best wel lang bezig, maar met het business verhaal erachter niet. Dus dat hebben we bedacht in 3 weken. (Entrepreneur C, 06:12)
53. Het businessplan… Eigenlijk op het moment dat je het schrijft is het alweer verouderd. [...] Maar je moet iets hebben om over te discussiëren en je hebt iets om je verhaal te vertellen. (Entrepreneur D, 17:54)
54. Het grappige is eigenlijk dat we nu pas, na 2,5 jaar, op het punt zijn waarvan we dachten dat we daar binnen een half jaar zouden gaan komen. Dus nu komen we via een hele grote omweg zijn we nu aan het bouwen wat we toen voor ogen hadden. Daar hebben we een heel andere technologie voor dan we dachten. We hebben een andere route daar naartoe [...] (Entrepreneur H, 09:28)
55. Je hebt je doelen gedefinieerd, hoe ga je daar naartoe raken? [...] dan ga je concreet werken aan subdoelen waarbij je die grote berg die je wilt verplaatsen opbreekt in kleine bergjes. En ga je met 2 of 3 man eerst een deeltje van de berg verplaatsen en zo ga je geleidelijk de hele berg verplaatsen op een structurele manier. (Entrepreneur B, 14:39)
56. Ander probleem is financiën. Dat hebben we opgelost door leningen bij business angels aan te gaan. Maar dat is een voortdurend terugkerend probleem, gewoon voldoende financiën om voort te gaan. (Entrepreneur H, 19:13)
57. [...] bijvoorbeeld in het techniek museum komt er een opstelling. Dat zijn gewoon leuke projecten om te doen. Aan de ene kant leren we er zelf van door een project te draaien erbij. [...] Qua focus klopt het niet helemaal met waar we mee bezig zijn. Het levert een beetje geld op waarmee we de rest weer kunnen ontwikkelen. Je zult toch op een of andere manier aan je resources moeten komen om dezelfde boterham te kunnen eten en om je product uit te kunnen bouwen. (Entrepreneur C, 11:54)
58. Maar we wisten niet in het begin dat we ook een adviesbureau gingen worden. De helft van onze tijd doen we gewoon advieswerk. (Entrepreneur D, 12:02)
59. Gewoon goede mensen om je heen verzamelen die dingen kunnen en die dingen toevoegen. Die mij helpen om met mij dat ding te ontwikkelen, uit te bouwen, naar de markt te brengen. (Entrepreneur A, 08:55)
60. Er kwamen eigenlijk 2 ervaringen of achtergronden van mij samen. Mijn ervaring in de chipindustrie en daarna als consultant wat opdrachten [...] waarin ik onder andere [de klant] tegen het lijf ben gelopen en zij een steeds actievere uiting van de visie en de wens hadden [...] (Entrepreneur G, 06:22)
61. Aansluiting bij netwerken. Er komen toch vrij veel potentiële investeerders
op YES!Delft af, omdat het voor hen makkelijk is om een groot aantal bedrijven te screenen in een korte tijd. (Entrepreneur G, 64:57)

62. En het belangrijkste is denk ik de contacten met de afdeling Civiele Techniek die meedachten in de toepasbaarheid in de markt. Kansen voor pilotprojecten voor ons hebben geholpen van de grond te krijgen en mee hebben gedacht in de verscherping van het productaanbod. (Entrepreneur G, 63:01)

63. We hadden eigenlijk 3 dingen niet. We hadden geen organisatie, zoals iedere start-up; we hadden onvoldoende kennis; en we hadden geen markt. (Entrepreneur H, 12:43)

64. Dat we te weinig kennis en grip hadden op de ontwikkeling en dat hebben we opgelost door die acquisitie te doen. (Entrepreneur H, 19:13)

65. Daarnaast hebben we gekeken: welke expertises hebben we zelf en welke expertises zitten buiten de deur en dan gaan we op onderdelen gericht inhuren om snelheid te maken in de ontwikkeling. Zeker in het begin. We doen dat nu wat minder, want we hebben veel geleerd van die experts, gewoon op technisch inhoudelijk gebied. (Entrepreneur G, 38:08)

66. Wat ik in de eerste stap hoopte te bereiken was dat we snel naar de markt konden door met dat grote bedrijf te partneren. Dat werkte toen niet. Dus toen hebben we gezien dat dus nieuwe kennis toevoegen aan ons bedrijf. (Entrepreneur A, 08:00)

67. […]toen merkten we: onze techniek staat stil. Toen hebben we iemand ingehuurd, studievrienden. […] Dat heb ik gewoon uit mijn eigen zak betaald. […] We waren wel bezig met verkopen en klanten binnenhalen, maar de techniek was 0. Dus die zette dat verder. (Entrepreneur D, 37:05)

68. Bewust zo flexibel ingericht dat wij nu nog met de kosten van het personeel kunnen meebewegen met wat we realiseren. (Entrepreneur G, 57:52)

69. Waar we wel naar kijken is of we via Nederlandse partijen die in actief zijn in het buitenland, de grote ingenieursbureaus, dat als verkoopkanaal te kunnen gebruiken. Maar dan gaan we er zelf niet in, dan leveren wij de Nederlandse partijen en bedienen zij internationale klanten daarmee. Maar goed, dat is nog in opbouw. (Entrepreneur G, 48:37)

70. Dat doen we omdat de overeenkomst tussen die installatiepartner en [de klant] buiten ons om gaat en ook de aansprakelijkheden met name. […] Dat houden we liever buiten onze eigen verantwoordelijkheid. (Entrepreneur G, 34:32)

71. We hebben nu een samenwerking met een gamebedrijf. Die kunnen dat soort dingen meteen goed in 3D. (Entrepreneur C, 31:35)

72. Die toenmalige partner ziet: hé, een grote klant met interesse, dat is leuk! En gaat in eens voor ons het spel veranderen. Het is het grote bedrijf dat jou even doodknuffelt, […] En daarom hebben we onze strategie veranderd […] (Entrepreneur A, 06:17)

73. Het systeem is wel grondig aangepast. Als je een prototype bouwt zitten daar natuurlijk andere dingen in dan de eerste die je seriematig produceert.
En in een prototype zitten gewoon dingen die je niet wist, omdat je nog nooit eerder zo’n ding gebouwd had. (Entrepreneur A, 18:40)

74. Een van die sponsors […] was met ons […] mee naar buiten geweest, wezen testen en doen. Dus die had het gezien en die snapte het en die had een klus waar dit inpaste. En zij zeiden: nou wij willen dat wel een keer proberen. (Entrepreneur A, 18:10)

75. En ik denk dat je naast productontwikkeling ook een stuk marktontwikkeling moet doen. Klanten moet meenemen in het verhaal. (Entrepreneur G, 26:20)

76. […] ik heb 2 klussen verloren, omdat zij meer ervaring hadden en dat wij als te jong en te onervaren werden gezien door onze klant. (Entrepreneur A, 35:43)

77. Ik denk niet een gebrek aan vertrouwen in de organisatie op zich, dat je een klein startend bedrijf bent. Speelt ook misschien wel iets mee. Maar meer dat men nog niet scherp genoeg had, en dat is ook een rol van ons, hoe men het in de dagelijkse praktijk de nieuwe inzichten zou gebruiken. (Entrepreneur G, 27:53)

78. En dat is wel een belangrijke geweest, want het is gewoon een [klant] dat er al voor gekozen heeft om al ons systeem in te zetten op een daadwerkelijke uitdaging die ze hadden […] En die daarna ook actief is gaan publiceren over de inzichten die ze vergaard hadden met ons systeem. Dus we hadden echt een goede ambassadeur op de markt voor ons. (Entrepreneur G, 59:43)

79. We hebben [die klant] gekozen, omdat we dachten: als het op [die klant zijn product] zit dan gaat het ook doorstromen naar andere [producten] […] We konden destijds ook met andere fabrikanten aan de slag, maar dit was denk ik de goede volgorde. (Entrepreneur D, 48:01)

80. Toen we begonnen was het: bam, we gaan er iets van maken. Je gaat dingen testen, je gaat klussen, je gaat gewoon… vol energie duik je erin. Maar nu ben je op een fase, het is allang niet meer [mijn compagnon] en ik. Dan heb je ook nog je bank, je investeerders, je aandeelhouders, je klanten, je partners, je importeur, je leverancier. Het wordt heel snel heel groot en ieder in dat web heeft zijn eigen belangen en ideeën. […] Onze taak om daar onze eigen weg in te verdienen. (Entrepreneur J, 18:58)

81. Maar het belangrijkste moment van allemaal was… dat is meer een periode geweest. Op een gegeven moment was die opdracht […] dus die initiële financiering op innovatiebasis, dat liep af en toen moest het verder gewoon uit de markt komen. We moesten gaan verkopen. Dat deden we ook al een beetje voor de afloop, maar nog niet voldoende om het hoofd boven water te houden. De maanden die het gekost heeft om aan het verkopen te gaan, dat was eigenlijk per maand bekijken: reden we het nog? (Entrepreneur G, 23:05)

82. De B.V. was iets van 6 maanden opgericht. Dus het geld was op, de subsidie was op, het idee kon niet verkocht worden. Wat ga je dan doen? (Entre-
83. Zeker met die eerste projecten begin je... is het continu een verscherping van je product, wat handiger. Niet zozeer vanuit de klant ingegeven, maar meer vanuit onszelf. Dingen moesten gewoon handiger gemaakt kunnen worden en sneller etc. (Entrepreneur G, 25:35)

84. Ik probeer me steeds meer te focussen richting bepaalde belangrijke kerncompetenties binnen het bedrijf. Dat we die verder gaan uit ontwikkelen en alles wat we nu niet zo goed kunnen nu ook niet proberen er nog ergens bij te doen. (Entrepreneur C, 31:04)

85. [...] binnen het concept zitten nog voldoende ideeën en plannen om uit te werken, waarbij we wel heel duidelijk focussen op het overzetten van mensen. Dat snappen we. Dat kunnen wij heel goed. (Entrepreneur A, 40:13)

86. [...] nu zijn we met 15 man. Je bent nu verantwoordelijk voor het inkomen van een heleboel mensen en van zoveel mensen dat je het zelf niet meer kan bijleggen als het even minder gaat. (Entrepreneur A, 09:52)

87. Maar het moet gaan professionaliseren. En dan is het soms moeilijk om de pet op te zetten van: ik ben hier de baas [...] (Entrepreneur D, 33:37)

88. We zijn nu heel hard bezig met onze cultuur te behouden zeg maar, door nieuwe mensen te vertellen hoe het vroeger ging, wat onze belangrijkste pijlers zijn en hoe we willen dat mensen zich presenteren. (Entrepreneur A, 20:06)

89. Dat is 1 van onze onderscheidende posities die we daarmee opbouwen. Juist door een voorsprong te hebben, bouw je die ervaringsdatabase op en kan je ook nieuwe [projecten] daaraan relateren. (Entrepreneur G, 37:13)

90. Nee, de strategie is er al op gericht om een stevige positie in de markt op te bouwen, voordat concurrenten, en met name als grotere partijen gaan instappen, om dan toch al een gedegen positie opgebouwd te hebben. Dus snelheid is nu heel belangrijk. (Entrepreneur G, 44:49)

91. De technologie is ook gebaseerd op een patent van de TU Delft. Dus qua concurrentiepositie heb je een wapen. [...] Je begrijpt, dat geeft enige zekerheid voor je technologieontwikkeling en je concurrentiepositie. (Entrepreneur C, 44:40)

92. Maar dat [marketing] is meer intrinsiek verweven met de ontwikkeling van het product en hoe het werkt dan dat het iets is wat we opleggen aan je sales mensen. [...] Het begint nu wel andersom te worden, want we zijn hard aan het groeien. (Entrepreneur A, 20:06)

93. Want als je dus alleen maar vertelt over de technologie, dan krijg je dus ook alleen maar twijfels over de technologie. Maar als je vertelt over de voordelen, dan gaan mensen zich intern afvragen of dat daadwerkelijk een voordeel zou kunnen bieden. Dat heeft ook met de mind-set van de klant intern te maken. (Entrepreneur C, 42:23)

94. Er moet nog een hoop ontwikkeld worden, maar dat deden we richting de buitenwereld ook en dat zorgt in die zin voor een hoop onbegrip. Want
waar ben je nou mee bezig? En wat heeft het voor voordeel? (Entrepreneur C, 19:00)

95. Eerst kregen we altijd: hé, wat zijn jullie nou? We konden ons niet goed duiden. (Entrepreneur H, 12:09)

96. Je moet je gaan focussen op hoe ga ik geld binnenhalen, want dat is uiteindelijk het doel van je bedrijf. (Entrepreneur C, 20:41)

97. Wat we er nu in een maand doorbranden, daarmee konden we in ons eerste jaar rondkomen. In het eerste jaar was dat moeilijk, moeilijk, maar nu moeten we dat iedere maand binnen zien te krijgen. Het probleem wordt telkens groter. Ik denk dat het nu zelfs moeilijker is dan vroeger. (Entrepreneur D, 21:21)


99. In het begin vond ik dat soms heel lastig, want als ondernemer vertelt niemand jou wat je moet doen [...] Dat is wel een verantwoordelijkheid die je hebt en dat is niet altijd even makkelijk. In het begin heb je nog niet zo veel ervaring hoe je met dingen om moet gaan, dit of dat, zus of zo, wat zou daar het gevolg van zijn? (Entrepreneur D, 29:44)

100. Ik vergelijk het altijd met een boom. Een tak van de boom is de juiste tak, maar je moet al die takken bekijken en na een tijdje weet je hoe de boom van je probleem eruit ziet. Nu is dit de boom, maar ik wil eigenlijk dat bereiken, dan is dat de beste optie, maar je hebt alles al een keer doordacht. (Entrepreneur D, 29:44)

101. Hoe ouder je wordt... Nu als zoiets langskomt dan zie ik: het is zus en zus en zo. Poef! Veel minder tijd aan te besteden. (Entrepreneur D, 29:44)

102. [...] daarna wilden we de [...] systemen verkopen, maar dat lukte ook niet en nu zijn we een bedrijf dat [...] door systemen te verhuren met mensen erbij. En dat lukt heel goed. (Entrepreneur A, 11:45)

103. Volgens mij moet je dat eens in het half jaar of eens in het kwartaal gewoon eens even terugkijken van: hé, hebben we het nou gehaald onze doelen of niet? En moeten we het niet gewoon aanpassen? (Entrepreneur C, 07:25)

104. Dat we bij toeval precies de juiste [technologische] ontwikkeling [...] gebeurde. Dat wij konden aanhaken. (Entrepreneur H, 17:28)

105. Luister naar andere mensen. Niet omdat je het moet opvolgen, maar je leert weer extra stappen kennen, je leert de boom te maken. O, die tak had ik nog niet gezien, misschien is dat interessant. De ervaring is als het niet voor het ene project ten toepassing komt dan wel voor het andere. (Entrepreneur D, 62:14)

106. Dus eerst gaat het via de [gebruikers], want die willen die dingen hebben en als je markt is aangetrokken verwachten we als onze grote klanten
[producenten]. Je moet die markt overtuigen, want als... We gingen ook eerst naar de [producenten] en zij zeiden: daar is geen vraag naar. [...] Dus richten we ons nu op [gebruikers]. (Entrepreneur F, 12:23)

107. Want geld is je bestaansrecht uiteindelijk. Het feit dat iemand deze bankrekening minder laat worden en jouw bankrekening hoger laat worden, dat is kwaliteit uiteindelijk. Daar zit het in of je wel of niet aan een behoefte voldoet of niet. (Entrepreneur H, 28:23)

108. Op een gegeven moment hou je de essentie over en de kracht van je bedrijf. En daar moet je voor gaan. (Entrepreneur B, 51:50)

109. Ieder boek dat je openslaat over ondernemen daar staat: lanceer je bedrijf met het minimale product. Dat doe je dan [...] Wat wij merkten was dat ons product niet zo heel goed aansloot op wat onze klanten wilden [...] (Entrepreneur E, 17:03)

110. En nu snap ik dat ook. Toen dacht ik: wat vervelend dat mensen ons minimale product niet nodig hebben. Wat we daar verkeerd in gedaan hebben is dat we niet genoeg nagedacht hebben over de diversiteit van ons ecosysteem waar we in zitten. Echt heel goed nadenken over: is het probleem dat mijn klant heeft precies hetzelfde als het probleem wat de volgende klant moet hebben? (Entrepreneur E, 17:45)

111. Gewoon door het product uit te breiden en harder te werken. Uiteindelijk dan merk je: nou, nu zitten we op een punt dat 90% van de klantvragen worden in 1 keer opgelost [...] (Entrepreneur E, 19:00)

112. En dat betekent dat je gewoon dagelijks werkzaamheden een stuk operationeler zijn geworden. Je moet ervoor zorgen dat de zaken goed draaien. (Entrepreneur G, 19:33)

113. Wat je merkt is dat vooral op het gebied van het marktonderzoek het nog redelijk ontbreekt. Mensen zijn niet geneigd om bij een potentiële klant het kantoor binnen te lopen en te vragen: wat wil je nou eigenlijk? Ik denk dat jullie dit en dit probleem hebben, maar klopt dat eigenlijk wel? [...] De bedrijven die dat doen dan merk je dat het plan er beter van wordt, want men heeft al veel meer informatie. (Rachelle, 11:02)

114. Een start-up is een team van mensen dat op zoek is naar een rendabel business model. Je bent dus op zoek. Je hebt wel een idee, je moet een plan hebben, maar een plan verandert altijd. Daarom geven in het eerste jaar heel veel coaching, omdat vooral in het eerste jaar alles aan dat plan gaat trekken en dingen gaan veranderen en alles blijkt anders te zijn, dus je moet je strategie steeds aanpassen. Vooral in het eerste jaar, dan moet je heel veel aanpassen. (Rachelle, 30:58)

115. Waar veel starters tegenaan lopen is dat er toch andere eisen in de markt zijn. Het zijn vooral techneuten. Zij hebben de neiging om te gaan doorontwikkelen tot in het oneindige en het moet allemaal perfect en alles moet precies werken, terwijl een klant daar helemaal niet op zit te wachten. (Rachelle, 36:01)
Appendix F: Evolution of the entrepreneurial role

The expansion of the organization is also reflected in the everyday work of the entrepreneur, which changes with the development stages of the company:

“I have slowly been growing from scientist, where you do everything by yourself, to project manager, where you only facilitate, into my function, CEO, in which, when you do it right, you are actually only busy with the vision and the managing of managers…” (Entrepreneur A, 10:51)

Where in the beginning the entrepreneurs make their hands dirty to realize their vision, in later stages other employees will do this work and the entrepreneur will have to manage these operational processes:

“That means that your daily work has become a lot more operational. You have to make sure things run smoothly.” (Entrepreneur G, 19:33)

Not every entrepreneur seems pleased with this evolution of the entrepreneurial role:

“Every day an entrepreneur is needed. We are not yet in the phase that the company can stabilize and that we can put other people on management. I think that you as entrepreneur will be obsolete then. When you are an entrepreneur you want to build, grow.” (Entrepreneur D, 21:21)

And in some cases this change of role is a reason for a founder to leave the company:

“I’ve established it with another guy and he has left operationally. [...] And it turned out that he was a strong visionary, but added too little value operationally and now we are in a very practical phase.” (Entrepreneur H, 17:28)
Appendix G: Observed co-evolution patterns

This appendix presents the co-evolution patterns that were found in Case A, C and H.

Exhibit a: Co-evolution pattern of Case A

Solution space

Problem space

Fitness

Evolution
Exhibit b: Co-evolution pattern of Case C

Exhibit c: Co-evolution pattern of Case H
Appendix H: Overview of the control cases

Next to the five cases that have been chosen to develop the theoretic concepts and categories, five control cases were used to constantly check how well or poor the developed theoretical framework fitted the empirical area of research. This appendix gives an overview of the design changes in these cases.

Exhibit d: Design changes Case B

Case B is an example of a company that has trouble finding a good problem-solution pair. Their first products were nice-to-haves, but no need-to-haves. Due to the economic crisis that started in 2008, they could not sell their first products to their intended market, as the budgets were slashed in this market. At the moment of the interview this company was still exploring new applications for their developed technology.

BM1: Sales model

Case B: Invention

<table>
<thead>
<tr>
<th>BM1: Sales model</th>
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<tbody>
<tr>
<td><strong>Invention</strong></td>
</tr>
<tr>
<td><strong>B2B niche market</strong></td>
</tr>
<tr>
<td><strong>Technological product</strong></td>
</tr>
<tr>
<td><strong>Customer buys product</strong></td>
</tr>
</tbody>
</table>

BM 2: Pilot projects in 5 different markets

R&D and marketing organisation

Customer buys product

Technological product (version 2 to 6)

5 new B2B markets

BM 3: Outsource production, focus on one target market

R&D and marketing organisation

Partner company

Co-creation

Technological product

Customer buys product

Professional organisations

APPENDICES

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The co-evolution pattern of Case E is presented here, because this case gives a good example of a lean start-up. The pattern clearly shows that the developed solution is constantly checked to the problem in the market in order to arrive at the best problem-solution fit.
Case F is a new technology venture which has made serious progress in the new venture creation process after adding an experienced entrepreneur to the team. This case is also a good example of the co-evolution between problem and solution, because from the start the market has been involved in creating the product. Therefore this new venture could understand the dynamics in this market early on in the process and they could adjust their strategy based on these insights.
Case I is again an example of a company that is searching for a good problem-solution fit. At the start the entrepreneur was deliberately searching for a market for the developed technology. Currently the product is further developed with partners in this market.
Case J made a detour by first launching its product to a different market than the one they currently get most their revenues from. However, this detour was necessary to develop a good product-market fit, as the entrepreneurs learned a lot from their first endeavours.
Appendix I: Dataset

No CD-ROM here?

You can request the dataset by contacting the researcher:
wietske.koers@gmail.com