Successful Business Model Innovation

“What is the effect of using abductive reasoning in business model innovation on successful business venturing?”

Edmee Florence Elisabeth van der Togt
Delft University of Technology
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Graduation Thesis of Edmee Florence Elisabeth van der Togt

4087216
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Delft University of Technology
MSc. Strategic Product Design
Faculty of Industrial Design Engineering

Supervising Committee

Chair: Prof. Dr. P.G. Badke-Schaub
Mentor: Dr. B. Eisenbart
Product Innovation Management
Industrial Design Engineering, Delft

This graduation thesis is written for the
Delft University of Technology.

Preface.

This report shows the journey I have taken over the last months, starting in February 2017. The idea for this project originated from previous research I did last year regarding the application of design thinking in the field of law. Here, I researched the extent to which design thinking can be applied and is already applied within the field of law, such as a human-centered approach, the tendency to frame and reframe problems and/or an iterative mindset. Within this investigation, I found out that lawyering is currently going through a transitional process, where the focus on solely practising and preaching the law is shifting into a more creative way of lawyering, called creative lawyering. Within this research I examined abductive reasoning and this was something that always triggered me. This interest originates not only from my background as an industrial designer but also from my personal interest in psychology.

Design Thinking is gaining more and more popularity. It is being taught at leading universities around the world and some of the world's leading companies have rapidly incorporated the Design Thinking mindset. When taking a closer look onto the term design thinking it can be seen that it tries to capture the designers' ways of doing, thinking and practitioning. Initiated by Alexander (1964) and Simon (1969) scholars try describing how designers do designing: Alexander sees form as the ultimate object of design, while Simon perceives the designers' work as more abstract, focussing on "what ought to be". Recently, abductive reasoning is gaining more interest which is a key within the process of Design Thinking. Abductive reasoning is defined as: "*Abductive reasoning is logical reasoning that introduces new hypotheses to explain given observations. It generates hypotheses about the form of the proposed design and its mode of operation which explain the desired value.*" (Dong et al., 2016).

There are numerous people to whom I owe my gratitude in making this research process possible and successful. I would like to start with my supervising committee, Petra Badke-Schaub thanks for your flexibility in becoming my chair only a few days before my graduation started. Furthermore, thanks to Boris Eisenbart, who always challenged me and provided me with critical feedback and questions which really improved the content of my research. Even in busy times, you always made time for me and this work and you were positive and very encouraging so I could work further more positive and motivated. Next, I want to thank Barbara, for helping me out with my (terrible) visuals and for teaching me tricks in Indesign and Illustrator. Furthermore, I want to thank Simon for all his patience and help during this whole process, for finding most of the spelling errors and for staying positive. Lastly, I want to thank my dad Tony, for helping me out with recruiting very interesting participants for my interviews. Without you especially, this research wouldnot have been possible, so thanks dad!

The research process has proven itself to be a very dynamic road. Sometimes resulting in 'Eureka' moments and sometimes more challenging for example due to the huge amount of data that I collected. This master thesis report is not only the result of months of really hard work where I explored a vast amount of scientific literature and executed a major amount of interviews. It also is the true end of my "never-ending" academic career and the start of a new step in my life as a trainee at AB Inbev.

Edmée van der Togt
August 2017, Voorburg

Summary.

Years after the peak of the Global Financial Crisis, Europe as a theatre of business remains exposed to considerable pressures from uncertainties in the development of national economies. One key element to sustainable success in corporate venturing is the capacity of enterprises to sense and seize an opportunity to grow value through investment in innovation before market logics have been proven elsewhere. While improving innovative performance in terms of launching novel and commercially successful products and services remains the imperative aim of sustainable business venturing, history has taught us time and again that a substantial product innovation will be picked up and replicated by competitors very quickly, posing stark challenges to companies to repeat the innovation cycle quickly following the launch of a novel product. (Massa & Tucci, 2013; Casprini, 2015). This thesis reports on the underlying premises that BMI is appropriate for fostering sustainable competitive advantage of businesses. Furthermore, the benefits and influences of abductive reasoning on leading managers' decision making and reasoning during the process of BMI to create superior strategies and appendant corporate success are demonstrated in this thesis.

Prior research at the University of Sydney, has shown the potential of novel forms of logical reasoning, in particular abductive reasoning, which is often considered as the kernel of innovative/creative design practice, Design Thinking (or 'designerly ways of thinking' more general), to support decision making in product innovation management (Dong et al., 2015; Mounarath et al., 2011). Cognitive strategies related to abductive reasoning, such as creativity, analogizing, mental simulation as well as well as pre-factual thought (Epstude et al., 2016; Dong et al., 2016; Ball and Christensen, 2009; Gavetti et al., 2005), have further been linked to success of entrepreneurial and intrapreneurial endeavours (Huang & Pearce, 2015).

After extensive literature research (Chapter 2), it was determined that on paper, product innovation processes are very similar to BMI processes. Furthermore, it has been stated by Teece (2007) that a business model itself is a hypothesis about what customers want and how a company should confirm these needs and be paid for them. This suggests that the principles of abductive reasoning and generative sensing may similarly apply to business model innovation. This is to be examined during the empirical research.

This empirical research (Chapter 3 and Chapter 4), employed the semi-structured interview approach in which 15 leading top-managers were interviewed. In BMI visioning and strategizing is key and is therefore predestined to come from higher hierarchical levels in an organization, whereas PI is mainly promoted by individual designers, engineers etc. in a rather bottom-up process. This research specifically aims to find information about the decision process, the (logical) reasoning process of executives within the BMI process. The results presented in this thesis are derived from in-depth conversations with 15 experts on the topic of business model innovation. Within these conversations their approaches and motivations during the business model innovation process were discussed. The research goal was to find out if managers use instances of abductive reasoning during the BMI process and what the effect of this reasoning is on successful business venturing.

The results of the empirical research show that most cases of successful BMI that were heard seem to involve some form of abductive reasoning and/or generative sensing mechanisms. Hence, there is a good likelihood of this being applicable on a broader basis.

Therefore, it is likely that there is a correlation between abductive reasoning and successful business venturing, not only owing to a more future-oriented mindset and the prediction of a future outcome scenario but even more because often it creates a certain timespan and plausible path into this future outcome scenario and/or future end goal or end value. Rather than just future or divergent thinking, it helps managers to create plausible explanations for certain observations and formed hypothesis. In line with these results, the one example in which abductive reasoning was present during the BMI process but did not lead to ultimate success reveals sustentation for the positive effect of abductive reasoning during the BMI process. After all, any support in business venturing can make a difference between success and failure.

Based on the experiences of the interviewed executives, business leaders should make an effort to advance their cognitive capabilities to envision future opportunities by doing extensive market research, investigating trends and understanding customer needs and wants. Managers should be well aware that the use of iteration and reframing during the BMI process is key for a successful outcome. Moreover, managers should use forecasting methods such as creating business cases, examining trends and contextual research for example in other domains and to mentally forecast and simulate plausible paths to predict future outcomes and opportunities. Managers should train themselves into adopting a mindset like this, train themselves in this business model innovation process as it can lead them to grasp opportunities better. This could be done by searching for inspiration and information in other domains, where managers or entrepreneurs might have or might not have prior knowledge (Fiet, 2007; Guenther et al., 2017), to find new opportunities.

Furthermore, to become successful at business model innovation, it is important for managers to use be open to experimenting, questioning the status-quo and easily recognize patterns (Dyer et al.,2008). Especially pattern recognition shows similar cognitive processes to those used in creative thinking (Weisberg, 1999; Welling 2007) and is often linked to counterfactual thinking (Gaglio, 2004).

In conclusion, the results of this present investigation suggest that there is a correlation between abductive reasoning and successful business venturing. Combined with the findings from the present investigation, managers should use creative capabilities such as abductive reasoning and generative sensing during the business model innovation process in order to become successful at both the ideation and the implementation of a new business model. Managers should train themselves into adopting a mindset like this, train themselves in this business model innovation process as it can lead them to grasp opportunities better. However, there is no definite set of capabilities or specific reasoning process which managers should ubiquitously adopt, this research suggests that when applying abductive reasoning logic and using instances of generative sensing during business model innovation, it is highly likely that this will have a positive effect on the final outcome of a business model.

"The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift."

- Albert Einstein

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Chapter 1.

Introduction

Years after the peak of the Global Financial Crisis, Europe as a theatre of business remains exposed to considerable pressures from uncertainties in the development of national economies. From a more global perspective, the United States and China are burgeoning economically. This is still variable in Europe, however. It is therefore more important than ever for European companies to establish sustainable businesses in order to prevail against global competition. European companies would benefit from a boost in the development of new strategies. One key element to sustainable success in corporate venturing is the capacity of enterprises to sense and seize an opportunity to grow value through investment in innovation before market logics have been proven elsewhere.

Prior research at the University of Sydney, of which the supervisor of this work, Boris Eisenbart, was a part, has shown the potential of novel forms of logical reasoning, in particular abductive reasoning, which is often considered as the kernel of innovative/creative design practice, Design Thinking (or 'designerly ways of thinking' more general), to support decision making in product innovation management (Dong et al., 2015; Mounarath et al., 2011). Cognitive strategies related to abductive reasoning, such as creativity, analogizing, mental simulation as well as well as pre-factual thought (Epstude et al., 2016; Dong et al., 2016; Ball and Christensen, 2009; Gavetti et al., 2005), have further been linked to success of entrepreneurial and intrapreneurial endeavours (Huang & Pearce, 2015).

Design Thinking is gaining increasing popularity outside the product and service design environment, particularly in the area of business, strategy and innovation (Simon, 2009). It is being taught at leading universities around the world and some of the world's leading companies have rapidly adopted the Design Thinking mindset.

Closer examination of the term Design Thinking, reveals that it endeavours to capture the designers' ways of doing, thinking and practitioning. Initiated by Alexander (1964) and Simon (1969) scholars endeavour to describe how designers create their designs: Alexander views form as the ultimate object of design, while Simon perceives the designers' work as more abstract, focussing on "what ought to be". Recently, abductive reasoning has been gaining more interest which is a key within the process of Design Thinking. Abductive reasoning is defined as: *"Logical reasoning that introduces new hypotheses to explain given observations. It generates hypotheses about the form of the proposed design and its mode of operation which explain the desired value."* (Dong et al., 2016).

While improving innovative performance in terms of launching novel and commercially successful products and services remains the imperative aim of sustainable business venturing, history has taught us time and again that a substantial product innovation will be picked up and replicated by competitors very quickly, posing stark challenges to companies to repeat the innovation cycle quickly following the launch of a novel product. (Massa & Tucci, 2013; Casprini, 2015). This is a central barrier for maintaining the sought competitive advantage. Extant literature (e.g., Achtenhagen et al., 2013) and initial interviews, from on-going research endeavours of the University of Sydney and Delft University of Technology focussing on the use of Design Thinking and abductive reasoning, inform us that business model innovation (BMI) may lead to more sustainable competitive advantage, is more difficult for others to replicate and may, result in more substantial financial returns (Bucherer et al., 2012; Gambardella & McGahan, 2010; Teece, 2010).

Business model innovation is decisive for a company's long-term success or failure (Chesbrough, 2006; Lindgardt et al., 2009). Today, most organizations focus on short-term innovation; product innovation, which has mostly minor sustainable competitive advantage (Bucherer et al., 2012). Having a clearer long-term approach, for example by innovating the complete business model, can have many more benefits. Products and services can often easily be copied by competitors, while business models are more difficult to follow due to their complexity. However, business model innovation is still poorly understood in comparison to product innovation (Bucherer et al., 2012).

In this project, we want to explore this further and therefore this research will be part of the ongoing research at the TU Delft and the University of Sydney, aiming to link the realms of cognitive capabilities in innovation management, and the related behavioural strategies, as effective means for product innovation with BMI. It is aspired to find a link between abductive reasoning – as the core of Design Thinking - and successful business venturing. A next step will then be to develop means for companies to apply abductive reasoning successfully to create, conceive and seize lucrative ways to advance BMI in companies.

1.1 Research Focus

While the use of abductive reasoning and related approaches have been investigated in the field of product innovation, no research has been conducted into its potential to support BMI. Given its potential in the area of entrepreneurship and intrapreneurship, it is likely that it may well entail extraordinary potential to support innovation management on the levels of strategy and business model creation.

This project aims, on the one hand, to examine the underlying premises that BMI is appropriate for fostering sustainable competitive advantage of businesses more than product innovation can. On the other hand, the goal is to investigate the benefit/influence of abductive reasoning on leading managers' decision making and reasoning during the process of BMI to create superior strategies and appendant corporate success. The project is nested within on-going research at the Delft University of Technology and University of Sydney and cuts across research on Design Thinking to support innovation and innovation management. In support of this endeavour, the given assignment represents a first step scouting the field of BMI and the behavioural and organizational strategies supporting it.

If it is possible to elicit a connection between abductive reasoning applied by senior managers and the creation of business success through BMI, the possible implications for organizational strategy are enormous.

1.2 Knowledge Gap

The motivation for this research originates from prior research at the University of Sydney which showed the potential of novel forms of logical reasoning, particularly abductive reasoning, to support decision making in product innovation management (Dong et al., 2015; Mounarath et al., 2011). Against the backdrop of earlier research, the main contribution of the present investigation is its focus on the role of abductive reasoning in business model innovation. Currently, research has been conducted on the role of abductive reasoning on project acceptance as well as the influence on decision making in general. Furthermore, the role of cognition in business model innovation has been researched. However, no research has been conducted on the role of abductive reasoning in business model innovation.

In doing so, the present study will be the first to deal with this issue. In conclusion, the initial challenge that will be researched during this graduation assignment is:

"What is the effect of using abductive reasoning in business model Innovation on successful business venturing?"

The main research question holds three concepts that require further clarification; abductive reasoning,
business model and business model innovation. Therefore, three sub-research questions were developed to clarify this.

SRQ1. What do managers, such as CEOs, perceive by business model and business model innovation?

SRQ2. How do managers approach business model innovation?

SRQ3. How do managers apply abductive reasoning when engaging in business model innovation?

1.3 Research Approach

This research project will consist of four phases:

A. Literature analysis and exploration of state of the art in BMI;

B. Empirical research exploring the forms of abductive reasoning applied by executives leading successful business through BMI;

C. Distilling essential capabilities and strategies inherent to successful BMI, to

D. Provide concrete recommendations and suggestions on how these may be adopted by other businesses as well.

Part A will cover extant literature on common mechanisms used to launch BMI, to create an understanding of the state of the art. Secondly, it will seek to identify the (magnitude of the) potential of BMI as compared to product innovation. With this literature research, a conceptual framework will be created that will be used as the basis for Part B and C.

The empirical studies (Parts B and C) will utilize a qualitative approach to investigate current practices in industry that favour successful BMI, specifically the forms of abductive reasoning applied. The conducted research will include interviews.

Finally, Part D will entail ideation in relation to appropriating the obtained findings into workable recommendations for creating BMI through suitable application of the mechanism identified in the prior studies.

1.4 Relevance of this research

The object of this research is to provide a new perspective on how the use of abductive reasoning in business model innovation can enhance successful business venturing. This is achieved by combining the insights that are already present on the link between the use of abductive reasoning in the process of product innovation combined with empirical research with experts on the field of business model innovation.

1.4.1 Scientific relevance

The scientific significance of this research will be twofold. Firstly, the link between abductive reasoning and product innovation is already very clear and established. However, no research has been conducted on the effects of using abductive reasoning within the process of business model innovation.

This research will be the first to determine if a link can be established. Secondly, Design Thinking is gaining more and more popularity. This research will contribute to current Design Thinking literature, since abductive reasoning is a very important aspect of Design Thinking.

1.4.2 Managerial relevance

In this research, a literature study will be conducted which will be validated with empirical research. The empirical research has a very explorative and qualitative nature since it will dive into the knowledge and experience of several CEOs and managers during their processes of business model innovation. Therefore, if the link between abductive reasoning and successful business venturing can be established within this research, the impact could be enormous. Accordingly, the results of this research could help managers with becoming more successful in business model innovation.

Chapter 2.

Literature research

This chapter comprises a review of relevant literature pertaining to the definitions of the core principles regarding this thesis; abductive reasoning, business models and business model innovation. Furthermore, it tries to establish some first links between business model innovation and abductive reasoning. This chapter forms the basis for the setup of the empirical research.

2.1 What is abductive reasoning?

Reasoning is the capacity of a person to make sense of things and to establish and verify facts (Walton, 1990). The most basic reasoning patterns that people use during problem solving are: deduction and induction. The basic reasoning process on which both patterns are based can be seen in Figure 1.

In deduction, one knows the 'what' as well as the 'how'. Therefore, the results can safely be predicted (Dorst, 2011). In deductive reasoning, people use existing knowledge in their observations, they do not invent new knowledge. This existing knowledge could for example be given during a project brief or by earlier developed criteria or company principles (Dong et al., 2015). The reasoning process of deduction is shown in Figure 2.

An example of a deductive argument is:

1. If the product is technically feasible (A), it will be accepted(B). (If A, then B)

2. The product seems technically feasible. (A)

3. Therefore, the product will be accepted. (B)

In Induction, one knows the 'what' in the situation and certain 'results' are observed but one does not know how these results were achieved. The creation of working principles, the 'how', can be seen as a creative act (Dorst, 2011). Induction involves creating a general principle based on the observations that are made. Induction does not mean that the premises lead to a certain conclusion but it is reasoning where the premises are viewed as plausible evidence for the truth of the conclusion, whereas the conclusion in deductive logic is certain (Dong et al., 2015). The reasoning process of induction is shown in Figure 3.

An example of an inductive argument is:

1. Every time we have accepted blue products, it was successful.

2. The next time that we will accept a blue product, it will be successful.

As can be seen above, an inductive argument can be seen as a generalization based on previous experiences and observations.

In conclusion, the main difference between inductive and deductive reasoning is: Inductive reasoning is core to the context of discovery, a way in which hypotheses are formed whereas deductive reasoning is more justification of facts (Dorst, 2011). An inductive argument can be affected by the acquisition of new evidence, whereas a deductive argument cannot.

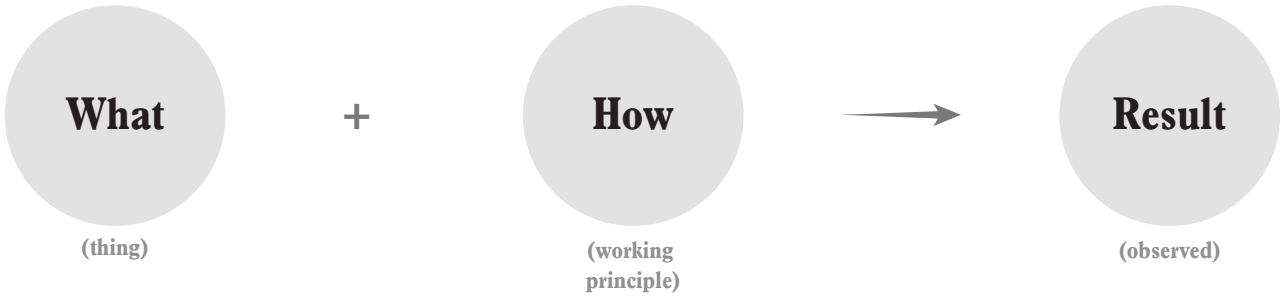


Figure 1, Basic Reasoning process.

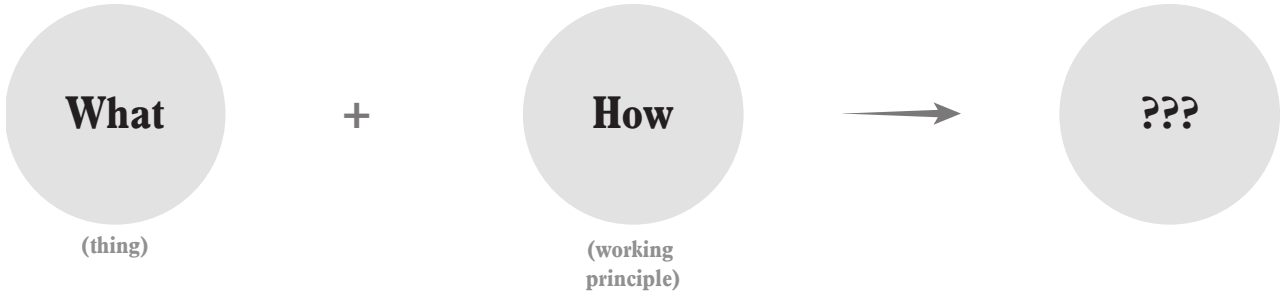


Figure 2, Deductive reasoning logic (Dorst, 2011, p. 132).

Figure 3, Inductive reasoning logic (Dorst, 2011, p. 132).

Lately, as Design Thinking has gathered more and more popularity in other business fields, a different form of reasoning has gained more and more interest, namely; abductive reasoning. The theory of abductive reasoning already started with Peirce in 1932, but has recently gotten people's attention again. In Design Thinking, abductive reasoning is considered as key to find and create new solutions because of the creative cognitive processes, especially divergent thinking (Finke et al., 1992). As Gilhooley et al. (2007) state, cognitive strategies are key to creative and divergent thinking such as using analogies and associations when generating new ideas, this is very similar to abductive reasoning. The largest difference between the abductive reasoning logic and both deductive and inductive reasoning logic is that the end of the equation is not a result but a value that you want to create for others, an aspiration. The basic principle of this reasoning process is shown in Figure 4.

Abductive reasoning is the least accurate way of reasoning and is also called the inference to the best explanation. This way of reasoning is mostly used in situations where there is less empirical evidence available, such as in designing. With this form of reasoning, one chooses the best possible explanation until better evidence is found (Dong et al., 2016). This way of reasoning is used very frequently by designers. Abductive reasoning is the process of forming an explanatory hypothesis of 'what might be'; the desired value creation, as shown in Figure 4 is known, but the product or service that should create this value (the 'what' in Figure 4), and/or even the conditions or working principle under which they may do so (the 'how' in Figure 4) are not known yet.

This process is similar to what we call co-evolution during creative processes (Simon, 1969). Designers do not work with well-defined problems; their process is more explorative during which they do not have a clear idea about the initial problem and or final outcome (Maher et al., 1996). Especially during conceptual design, designers iteratively play around with ideas and concepts in order to gain more understanding about the problem and the problem space Hence, due to this iterative conceptual phase where the designer tries to fully understand the initial problem space and define the final solution space in order to create suitable solutions accordingly, his or her goals will change over time as will the solution space (Maher & Poon, 1996).

There is a distinction between two forms of abductive reasoning, namely abduction-1 and abduction-2. According to Dorst (2011), Abduction-1, see Figure 5, is more associated with conventional problem solving, where one knows the value that he/she needs to accomplish as well as the working principle to solve it. However, the "what" is still missing and needs to be discovered (Dorst, 2011).

Abduction-2, see Figure 6, is a form of logic that designers frequently use. In this case only the end-value is known. Both the what and the how are to be discovered by the designer. This situation is more complex, with more unknown variables, because when starting the problem solving only the end-value is known (Dorst, 2011).

Especially in this specific research, one crucial aspect is missing from this (abductive) reasoning logic as proposed by Dorst (2011), namely context. The second bubble, the 'how' (working principle) always depends on the context that it is in. Especially for this research about Business Model Innovation, the working principle or 'how' always depends on the context of the company, its competitors, the industry or the market. A similar framework is therefore proposed to the one proposed by Dorst (2011), but stressing the importance of the context, in Figure 7.

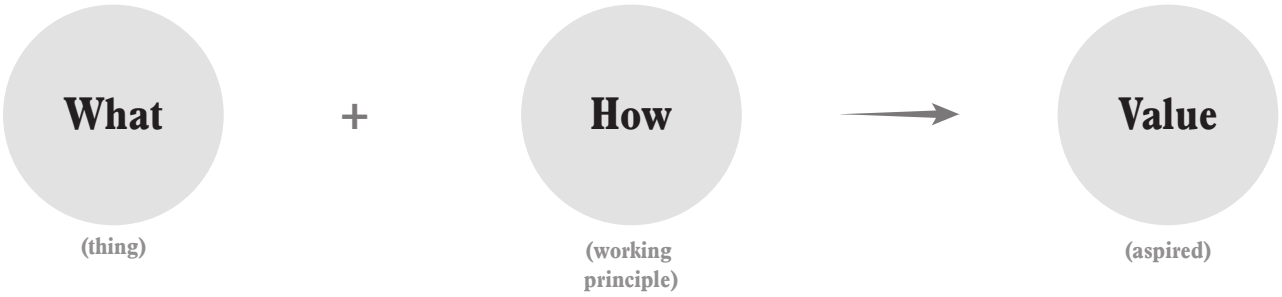


Figure 4, Basic abductive reasoning process (Dorst, 2011, p. 132).

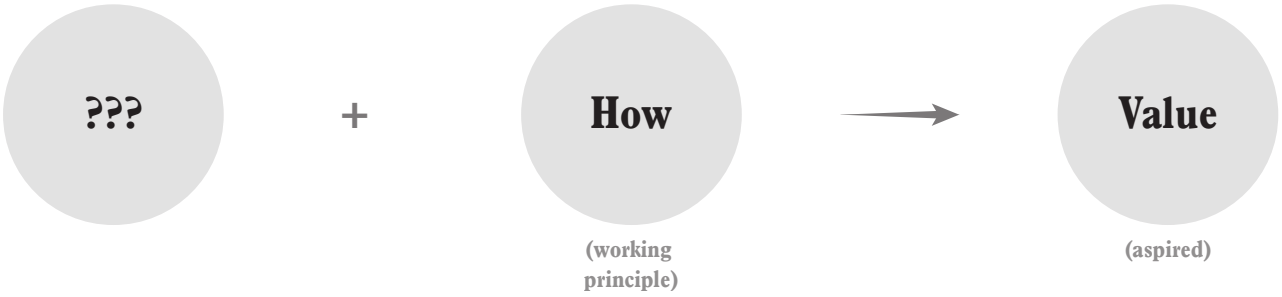


Figure 5, Abduction-1 reasoning logic (Dorst, 2011, p. 132).

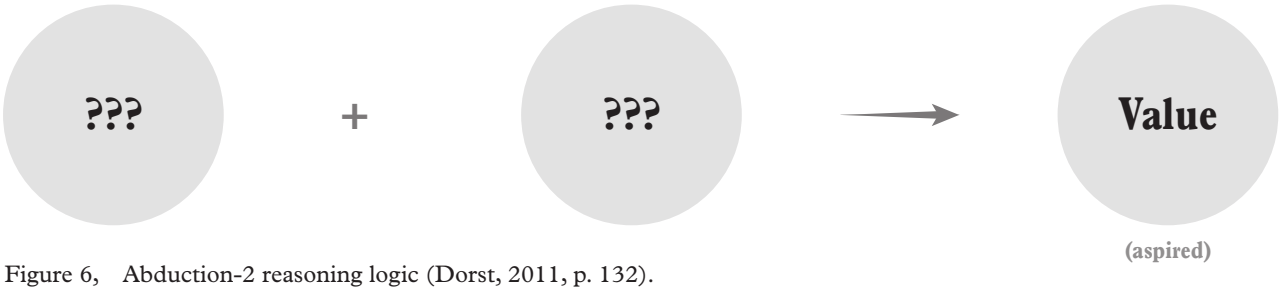


Figure 6, Abduction-2 reasoning logic (Dorst, 2011, p. 132).

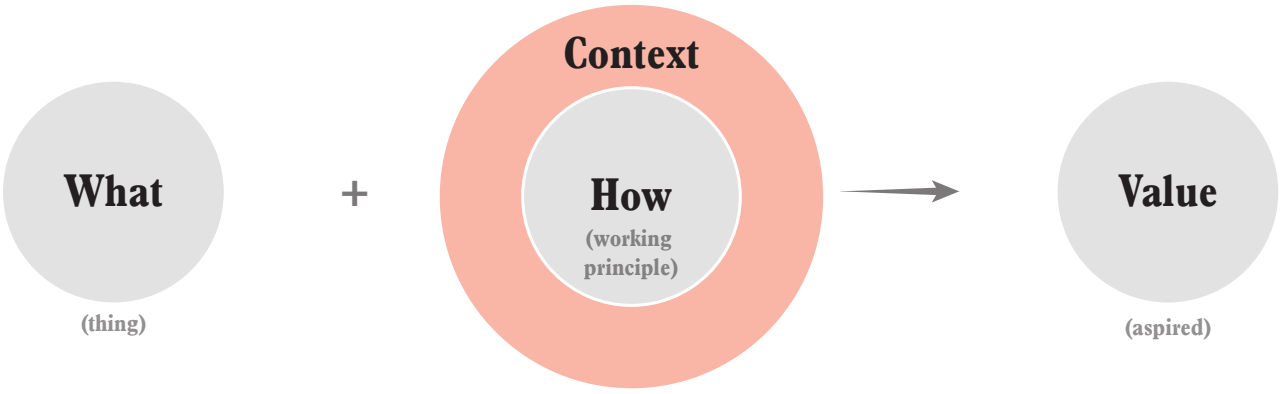


Figure 7, Adapted Abductive reasoning framework including Context.

Dong et al. (2016, p. 71) state: *"Abductive reasoning is logical reasoning that introduces new hypotheses to explain given observations. It generates hypotheses about the form of the proposed design and its mode of operation which explain the desired value*." Epstude et al. (2016, p. 3) research similar forms of reasoning but calls this pre-factuals: *"A conditional (if-then) proposition about an action-outcome linkage that may (or may not) take place in the future…. A pre-factual embraces a causal belief that the action will result in the outcome with a high degree of certainty."*. Mounarath et al. (2011) have also investigated abductive reasoning and its influence on decision making. According to Mounarath et al. (2011, p. 1), abductive reasoning is: *"The process of generating plausible explanatory hypotheses of 'what might be' when people analyse or evaluate a problem*."

Previously, abductive reasoning was mainly investigated and considered during idea generation (Dew, 2007; Kolko, 2010). However, recent studies have shown that abductive reasoning also plays a very significant role in decision making (Dong et al., 2015, Mounarath et al., 2011). More specifically, committees tasked with selecting innovation concepts for funding made more accurate decisions when manipulated into applying a higher rate of abductive reasoning during their selection processes (Dong et al., 2015).

This illustrates that abductive reasoning has important implications for companies that seek to launch more innovative products or services (Talke et al., 2009). This is affirmed by strategy development research; here again, abductive reasoning was found to be essential in successful management of companies. Calabrese and Costa (2015, p. 34) argue that when leaders rely solely on deductive/inductive logic, *"the resulting strategies would potentially be ineffective as regards innovation"*.

When innovating, there are many uncertainties and unpredictabilities since one cannot just simply predict the future. Govindarajan & Trimble (2010) state that organizations that are successful at innovation recognize the importance of discussing assumptions behind evidence. They have conducted a 10-year study in which they proved that successful decisions mostly result from conversations between managers rather than elaborate analysis. Indeed, analysing and discussing the results alone omits all the underlying assumptions. Furthermore, making decisions about future scenarios might be conflicting and inconclusive. This is in line with Kolko's (2010) statement about Design Thinking, namely that understanding and synthesizing ambiguous evidence is key within the reasoning process that designers apply. Stimulating managers to reason abductively has been proven to increase the likelihood of the acceptance of innovative ideas (Dong et al., 2015; Mounarath et al. 2011).

We therefore believe, that abductive reasoning has important implications for companies seeking to launch more innovative products or services (Talke et al., 2009). This is substantiated by research in the domain of strategy development, in which abductive reasoning was found to be essential in successful management of companies (Dunne & Martin, 2006; Leavy, 2010)

One way to effectively apply abductive reasoning in decision making processes is generative sensing. Kroll et al. (2014) extend the aforementioned abduction-2 logic, see Figure 6, with a new interpretation. This new interpretation is a two-step inference in which the first instance establishes a concept from a given function, while in the second step the concept is validated and concluded in a final form or value. They state that each instance of abductive reasoning during the process is only a partial solution to the initial design problem or aspired design value.

Dong et al. (2016) add to this statement by developing the idea of 'Generative sensing'. This research proved the presence of abductive reasoning logic in design evaluation, whereas before it was thought that only deductive reasoning logic was present in design evaluation. Their observation was that the reasoning process during design evaluation of non-complete concepts wat not purely deductive or abductive, rather it was a pattern which combined both ways of reasoning logic (Dong et al., 2016).

This recursive loop was defined as generative sensing: *"A process of creating new hypotheses to explain, resolve, or challenge the evidence in favour of or against a design concept, evidence that was itself generated from an evaluation of the design concept."* (Dong et al., 2016, p. 16). A visualization of this process can be seen in Figure 8.

Rather than finding a way into the problem, generative sensing creates alternative ways to go through or around the problem (Dong et al., 2016).

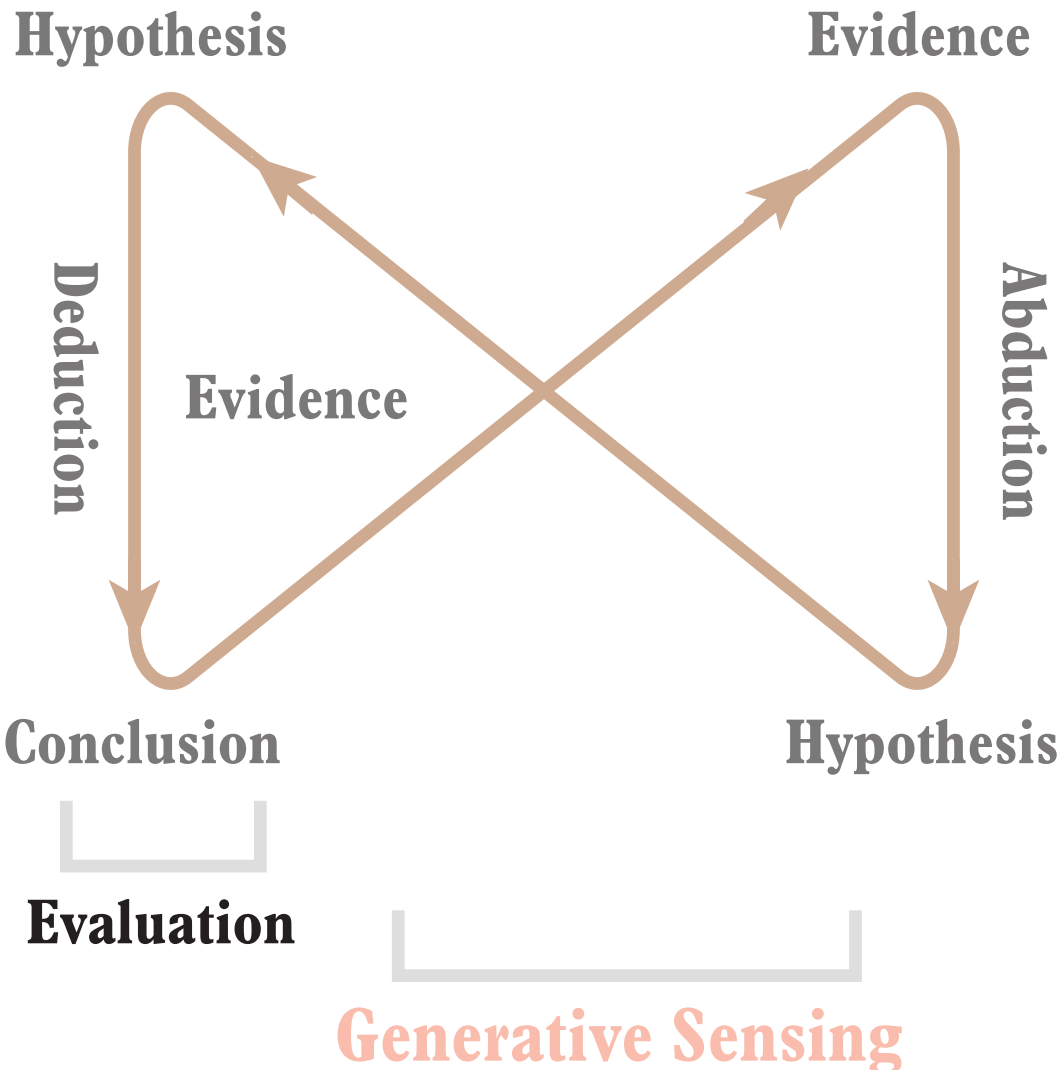


Figure 8, Generative sensing as a pattern of Design Thinking (by Dong et al., 2016, p. 16).

With this model, the abductive reasoning, or so-called abduction, does not necessarily have a form or function as a start- or endpoint. Rather, it is more of a direction of the abduction in either a divergent or convergent path. Generative sensing builds on the evaluation of a design concept and can lead to new knowledge changing one's view of this concept resulting in a certain reframing of the problem itself.
In conclusion, abductive reasoning and generative sensing are essential for both decision making and designing 'new' products and/or services. As, Dong et al. (2016) state, the pattern of generative sensing can help aspiring entrepreneurs and managers to form capabilities to avoid premature commitment to a single answer or single outcome, helping them to diverge into several solutions and outcomes to a 'design problem'.

Furthermore, aiding designers and entrepreneurs to develop skills like generative sensing and abductive reasoning will guide them towards becoming better innovators and developing more out of the box ideas. By using hypotheses to create new possibilities, managers and entrepreneurs might discover new innovations breaking the current status quo.

Since both concepts are proven to be key in product innovation and design evaluation, the question arises what the effect is on both premises during the process of business model innovation. If the link between abductive reasoning and successful BMI in business venturing can be established within this research, the impact could be enormous. Accordingly, the results of this research could help managers become more successful in conducting BMI.

2.2. What is a business model?

There has been no clear definition of business models in the relevant literature to date. As Magretta (2002, p. 8) states: *"Business model and strategy are among the most sloppily used terms in business, they are so stretched that they mean everything and end up meaning nothing."* Therefore, it is important to clearly define what is meant when referring to a business model before the research commences.

Zott, Amit & Massa (2011) have, among many other scholars, already tried to summarize some of the definitions of business models that have been proposed to date. Table 1 below presents an overview of business models that are mostly used within current literature. The definitions are organized in chronological order.

Table 1, Business model definitions.

Author(s)	Year	Definition
Timmers	1998	The business model is: *"An architecture of the product, service and information flows, including a description of the various business actors and their roles, a description of the potential benefits for the various business actors, a description of the sources of revenues."*
Amit & Zott	2001	*"Business model is a system of interdependent activities that transcends the focal firm and spans its boundaries."*
Afuah & Tucci	2001	*"The business model is a unifying construct for explaining competitive advantage and firm performance and define it as the method by which a firm builds and uses its resources to offer its customer better value and to make money in doing so."*
Magretta	2002	*"A business model is a story, a verbal description of how an enterprise works.. All new business models are variations on the generic value chain underlying all businesses, including:* *1. All the activities associated with making something.* *2. All the activities associated with selling something."*
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."*
Mitchell & Coles	2003	*"A business model comprises the combined elements of who, what, when, why, where, how and how much."*
Morris, Schindehutte & Allen	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."*It consists of: • Value proposition • Customer • Internal processes/competencies • External positioning • Economic Model • Personal/Investor factors
Downing	2005	*"The business model is a set of expectations about how the business will be successful in its environment."*
Lecoq, Demil & Warnier	2006	Dynamic view of a business model, the RCOV Model that focuses on value creation/capture: • Resources & Competencies (RC) • Internal & External Organization (O) • Value Propositions (V)
Chesbrough	2007	*"The business model defines a series of activities, from procuring raw materials to satisfying the final customer… Secondly, it captures value from a portion of those activities for the firm developing and operating it."*
Teece	2007	*"A business model is a hypothesis about what customers want and how an enterprise can best meet those needs and get paid for doing so."*

Johnson, Christensen & Kagermann	2008	*"Business model is four interlocking elements that taken together create & deliver value:* • *Customer value proposition* • *Profit formula* • *Key resources* • *Key processes"*
Richardson	2008	*"A business model explains how the activities of the firm work together to execute its strategy, this bridging strategy formulation and implementation."*
Patzelt & Knyphausen & Nikol	2008	*"A variable moderating the effect of top-management team composition and organizational performance."*
Santos, Spector & Van der Heyden	2009	*"A firm's business model juxtaposes two systems of relationships: one involves transactional linkages among activities and the other involves governance linkages between the organizational units that perform those activities."*
Teece	2010	*"A business model articulates the logic and provides data and other evidence that demonstrates how a business creates and delivers value to customers. It also outlines the architecture of revenues, costs, and profits associated with the business enterprise delivering that value."*
Casadesus-Masanell & Ricart	2010	*"A business model is a reflection of the firm's realized strategy… They are composed of two different sets of elements:* • *The concrete choices made by management on how the organization must operate* • *The consequences of the choices"*
Osterwalder & Pigneur	2010	*"A business model describes the rationale of how an organization creates, delivers, and captures value."*
Zott, Amit & Massa	2011	*"The business model depicts content, structure and the governance of transactions designed so as to create value through the exploitation of business opportunities."*
George & Bock	2011	*"Business model is the design of organizational structures to enact a commercial opportunity."*
Baden-Fuller & Mangematin	2013	*"A business model is a model, and embedded within it is a set of cause-effect relationships."* It consists of: • Identifying the customers • Customer engagement • Monetization • Value chain linkages
Massa & Tucci	2013	A business model answers: • Who is the customer • What does the customer value • How do we make money in this business • What is the economic logic that explains how we deliver value to the customers at an appropriate cost.

Casprini	2015	*"A business model is the way a company creates and captures value."* It consists of: • Customer Identification • Customer Engagement • Value Chain Linkages • Monetization

Several definitions of business models are displayed in this table, all with a different lens and/or perspective on the definition of a business model. Not only do they differ with regard to how they describe the form of the business model: a hypothesis (Teece, 2007), set of expectations (Downing, 2005), architecture/framework (Timmers, 1998; Osterwalder & Pigneur, 2010; Chesbrough & Rosenbloom, 2002), conceptual model (George & Bock, 2011; Baden-Fuller & Mangematin 2013), verbal story (Magretta, 2002), structural template (Amit & Zott, 2001) or a method (Afuah & Tucci, 2001), there is also a vast difference between the focus of the content of the business models. As Morris et al. (2005) state: an operational focus (Amit & Zott, 2001; Magretta, 2002; Chesbrough, 2007), a strategic focus (Downing, 2005; Patzelt et al., 2008; Casadesus-Masanell & Ricart, 2010; Osterwalder & Pigneur, 2010) and an economic focus (Chesbrough & Rosenbloom, 2002). Unfortunately, Morris et al. (2005) do not mention the option of having a business model that is a combination of two or more focusses, a dual or triple focus, whereas their definition already is one with a triple focus. When examining the literature, a vast amount of definitions have either a dual or triple focus. Dual focus business models either have a combination of economic + strategic (Teece, 2010) or strategic + operational (Amit et al., 2001; Santos et al., 2009; Richardson, 2008; Timmers; 1998). No operational + economic business model definitions were found, only with the presence of the strategic aspect.

The triple focus of business models is a combination of economic, strategic and operational aspects (Afuah & Tucci, 2001; Mitchell & Coles, 2003; Morris et al., 2005; Lecoq et al., 2006; Teece, 2007; Johnson et al., 2008; Baden-Fuller & Mangematin, 2013; Massa & Tucci, 2013; Casprini, 2015).

As demonstrated, most recent business model definitions include the operational, strategic and economic aspect. Therefore, for this research, a definition considering all these aspects will be most suitable. For this research, the definition by Teece (2007, p. 1329) will be used, viz.: "*A business model is a hypothesis about what customers want and how an enterprise can best meet those needs and get paid for doing so.*" The use of the word hypothesis in this definition is interesting, since it could already mean a link to abductive reasoning, in which people create new hypotheses to explain given observations to explain the desired value (Dong et al.,2016).

2.3 What is business model innovation?

Business model innovation is generally associated with an outward facing, creative and exploratory phase (Johnson et al, 2008). When organizations work on BMI, managers focus on identifying and exploiting novel opportunities (Bock et al., 2012). Massa & Tucci (2013) differentiate between two types of business model innovation:

- Business model design; the design of new business models for new organizations.

- Business model reconfiguration; redefining or redesigning existing business models.

This research, mainly focuses on established organizations that seek to innovate. Start-ups already have the opportunity to generate innovative and novel business models from scratch and generate significant outcomes with this. However, established businesses find it much more difficult to innovate, since they are hampered by both their existing structure and their current business model(s) (Dougherty & Hardy, 1996; Chesbrough, 2007). Therefore, their potential to be flexible and change quickly is lower and therefore it is more difficult to start BMI. Hence, this will be the place where the biggest benefit of support through this research is expected.

In consequence, this research will focus on business model reconfiguration, where a business model already exists and is to be redesigned. Business model innovation is crucial to the success of a company, since business models should not be static (Achtenhagen et al., 2013). Business models require appropriate strategies to incorporate them. According to Bock et al. (2012), BMI is a type of organizational innovation in which organizations identify and adapt to novel opportunities. Santos et al. (2009, p. 14) define business model innovation as: *"Business model innovation is a reconfiguration of activities in the existing business model of a firm that is new to the product/service market in which the firm competes."* Lindgardt et al. (2009) complement this by claiming that innovation can be called BMI when two or more principles of the model are to be redesigned to deliver the customer value in a novel way.

Mitchell & Coles (2003) state that business model innovation is of huge importance to companies because it shows that improved business models can regain industry positions and reduce costs in a much faster way than the companies that adhere to their current business model. As Chesbrough (2007) states, there are many difficulties and challenges with business model innovation since there is often no specific person in the organization who is responsible and therefore has the authority and capability to innovate the business model.

Thus, what can be innovated within a business model? Zott & Amit (2007) state that an organization can innovate for example by recombining its resources or harnessing the resources of its partners, suppliers or customers.

Other sources of value creation can be creating something more novel, add complementariness to the current business model, create more efficiency or by creating dominance in a particular technology- or product field (Zott et al., 2011).

In line with the definition of the term business model as being cognitive structures inside the manager's mind, Cavalcante et al. (2011) state that business model innovation is driven by an individual's ability to recognize a need for change as well as the will to implement such a change. Both his/her cognition and actions are therefore involved in the beginning of this process.

Cavalcante et al. (2011) propose three steps of BMI, which can be seen in Figure 9, focussing mainly on business model design:

1. Visualizing what it will look like
2. Planning actions that are needed to take
3. Realizing the vision

The first two phases are in line with both Chesbrough (2010) and Sosna et al. (2010), in which they demonstrate the need for experimenting with business models; the exploration phase with a trial-and-error learning approach.

Doz & Kosonen (2010) propose a framework that companies can use to successfully innovate within their business models, the leadership agenda. This framework can be seen in Table 2 and is based on three pillars: strategic sensitivity, leadership unity & resource fluidity.

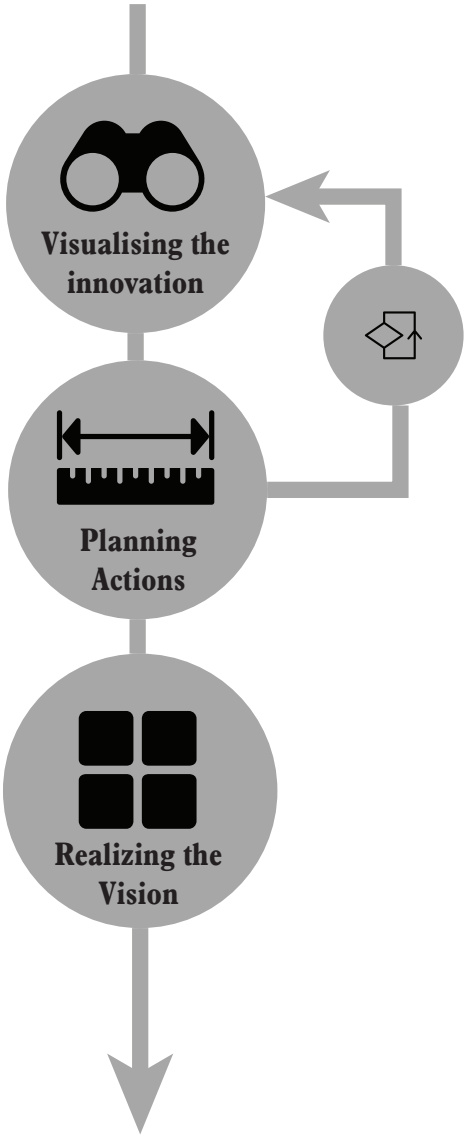


Figure 9, BMI Framework by Cavalcante et al. (2011).

Table 2, Framework for BMI by Doz & Kosonen (2010).

Strategic Sensitivity	
Anticipating	Sharpening foresight: - Explore future usage concepts - Do not over-rely on foresight tools
Experimenting	Gaining insight & Probing. Discovering 'lead locations', innovation hotspots. - Local experiments in-market tests - Strategic and reflective use of corporate venturing
Distancing	Gaining perspective: - Nurture an outside-in perspective through a rich network of personal contacts - Hearing the voice of periphery
Abstracting	Gaining generality: - Restating business model in conceptual terms
Reframing	Seeing the need for business models in conceptual terms: - Engaing in honest, open and rich dialogue around strategic issues
Leadership Unity	
Dialoguing	Surfacing and sharing assumptions, understanding contexts: - Explore underlying assumptions and hypotheses, not just conclusions developing common ground.
Revailing	Making personal motives and aspirations explicit: - Transparency and clarity of motives brings mutual respect and trust and understanding of positions.
Integrating	Building interdependencies: - Define a valuable common agenda that conditions success.
Aligning	Sharing a common interest: - Beyond incentives, give deeper common meanings.
Caring	Provide empathy and compassion: - Provide the personal safety needed to be playful.

Resource Fluidity	
Decoupling	Gaining flexibility: - Organize by customer/segmentation-based value domains.
Modularizing	Assembling and disassembling business systems: - Develop plug and play functionality for business systems and processes.
Dissociating	Separating resource use from resource ownership and negotiating resource access and allocation.
Switching	Using multiple business models: - Having different business model infrastructures in parallel and aligning and switching products between them.
Grafting	Acquiring to transform oneself: - Import a business model from acquired company.

Doz & Kosonen (2010) focus on the entire process of BMI, including the importance of the team that is involved as well as resource management. While all three pillars are of similar importance, this research will focus on strategic sensitivity, as this pillar is highly comparable to product innovation. This is important since the link between abductive reasoning and successful decision making during product innovation has already been established. Thus, if BMI and PI processes are comparable, it is likely that abductive reasoning during BMI will have a positive effect on successful business venturing. A visual representation of the strategic sensitivity phase can be seen in Figure 10.

It is interesting to note that the description of the strategic sensitivity phase already shows some potential for the influence of abductive reasoning and/or generative sensing, especially with the first step. As Doz & Kosonen (2010, p. 372) have mentioned: *"Foresight remains important today, but the unexpected cannot be modelled, and nor can it always be identified by reviewing converging trends and assessing their interdependent systemic impact."*

Hence, the question arises, what might the role of abductive reasoning be within this first step? This is the anticipating step; where it is important to sharpen foresight and explore future usage. This is similar to abduction-2 reasoning, see Figure 6, in which one should look into the future and predict/create a certain aspired value. The next steps of the strategic sensitivity phase will then try to reconstruct a path towards this future usage concept through experimentation, distancing from and abstracting the new idea and concluding with a certain reframing of the initial problem and the concept that is developed for the novel business model. This again shows interesting potential for the presence of generative sensing during this phase in practice, where people create new hypothesis during the anticipating step and try to resolve, explain or challenge this during this 'path' that they create towards a future usage concept where they constantly evaluate and abstract.

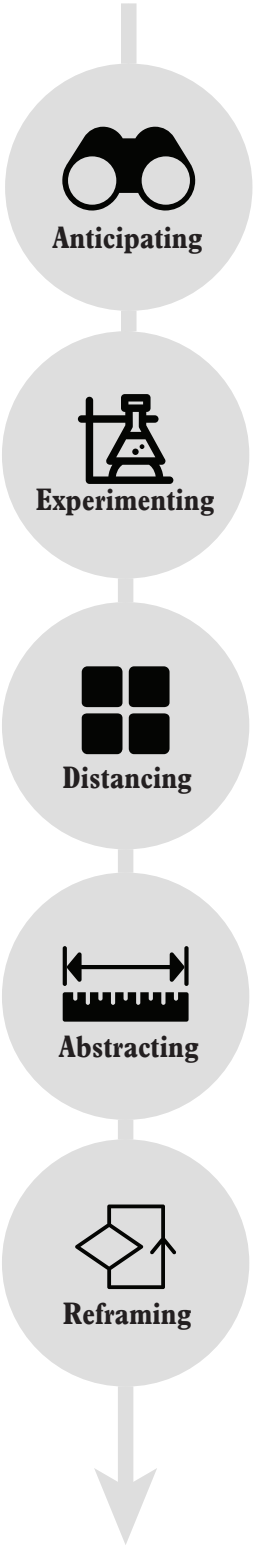


Figure 10, BMI Framework (Strategic Sensitivity) by Doz & Kosonen (2010).

Euchner & Ganguly (2014) propose a different framework for business model innovation, see Figure 11, in which they also stress the importance of iteration. They put forward a six-step process that companies must negotiate in order to create a successful new business model.

1. Demonstrate value creation;

In this phase, the company must articulate the value that they want to deliver to the customers.

2. Generate business model options;

In this phase, multiple options should be crated to deliver the value that was established in phase 1.

3. Identify risks for each option generated;

The next part is a risk-analysis (mostly financial) for the different business model options.

4. Prioritize the risks;

In this phase, the risks will be analysed and prioritized

5. Reduce risk through business experiments;

In phase 5, prototypes/simulated user experience and/or short trials will be used to evaluate the different business models to validate the different models.

6. Organize for incubation;

Finally, the chosen business model should be completely elaborated on and some decisions need to be made about organizing them in parallel to the current business model or creating an independent entity.

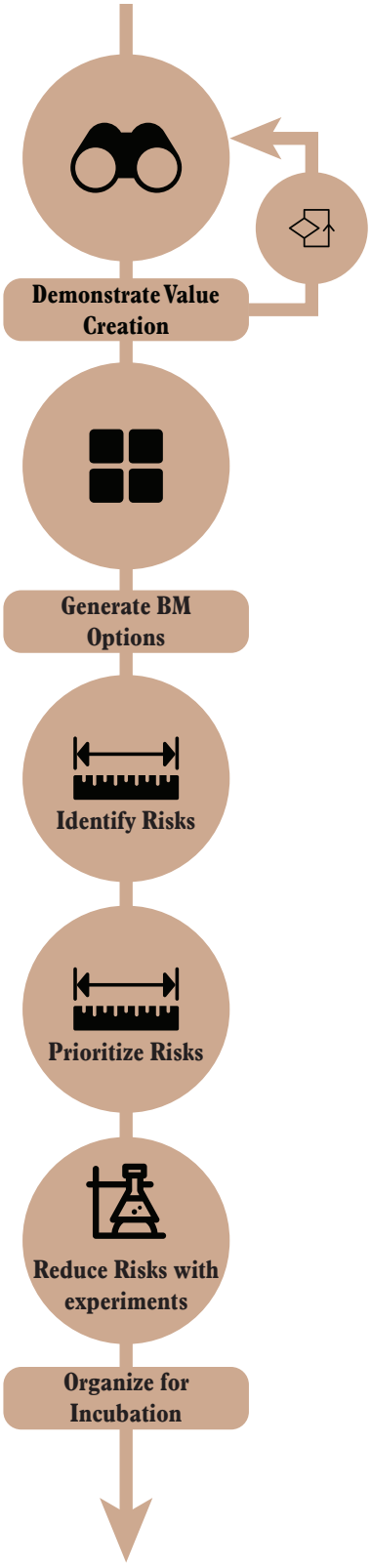


Figure 11, BMI Frameworkby Euchner & Ganguly (2014).

Summarizing, their model focuses on the development of several business model options (concepts) which are examined to identify corresponding risks which are then prioritized. They try to reduce these risks through experimentation after which the most appropriate business model will be implemented.

Trimi & Berbegal-Mirabent (2012) propose a model called customer development, which could work for innovating both business models and products simultaneously. Figure 12 contains a visual representation of the model. It starts with a search phase in which the customers will be discovered first and then will be validated. After this, an execution phase will take place where there will be first customer creation (co-creation) and then company building. All the separate phases are visualized as circles, stressing their iterative character.

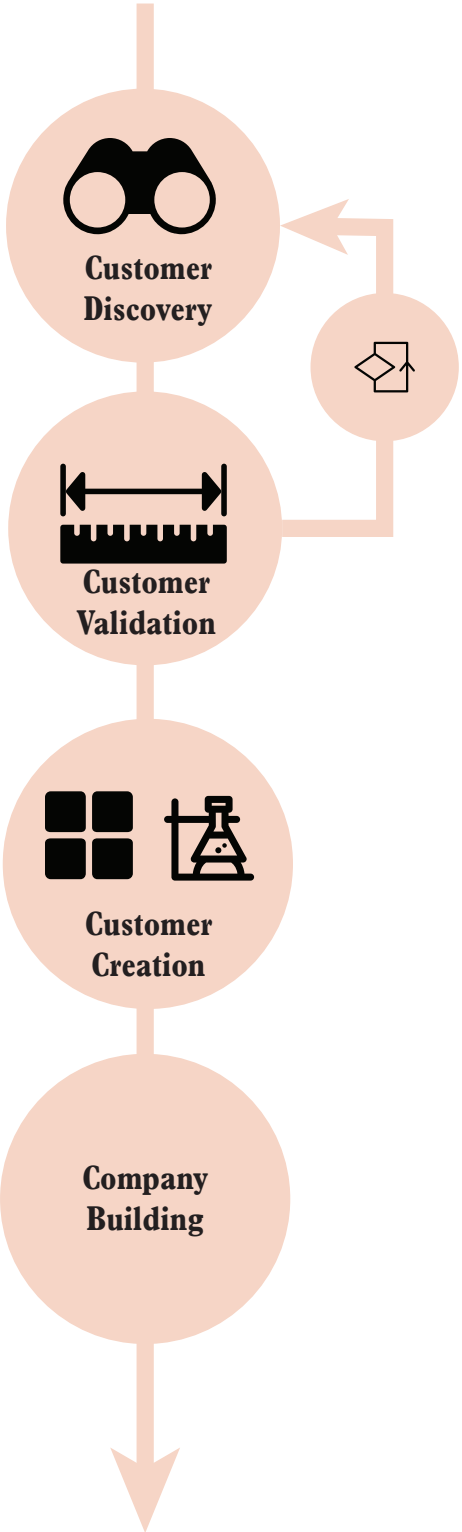


Figure 12, BMI Framework by Trimi & Berbegal-Mirabent (2012).

In summary, all scholars propose somewhat differing approaches to business model innovation. Cavalcante et al. (2014) have a more strategically oriented approach which is quite broad and does not dive into details in the way that Doz & Kosonen (2010) do. The framework of Doz & Kosonen (2010) covers all different phases of BMI, not only the design phase but also how to implement it, gain acceptance within the team on and manage the resources. Euchner & Ganguly's (2014) framework is very similar to the process of product innovation, but doesnot include anything about involving customers within this process. The model of Trimi & Berbegal-Mirabent (2012) focusses purely on customers and the voice of the consumer is even integrated within the design phase.

In conclusion, it will be interesting to find out in the empirical research how managers effectively approach this process of business model innovation and how this differs from what the literature proposes until now. Moreover, it would be interesting to distil a more generic model of BMI-processes, since there has not been consensus about how to approach BMI to date. Furthermore, it will be interesting to examine whether behaviour in practise resembles the generative sensing reasoning mentioned in Section 2.1.

2.4 Cognition and Business Model Innovation

Some scholars already hypothesize a link between cognition and business model innovation (Aspara et al., 2013; Spieth et al., 2014; Cavalcante et al., 2011). Especially Cavalcante et al. (2011) mention that an individual's cognition and their creative cognition in particular, strongly influences the dynamics of the business model. Processes that are associated with creative cognition include: conceptual combination, analogy & initial problem formulation (Ward, 2004). Especially problem formulation has a huge impact on creativity; the way a problem or task is formulated transforms the outcome of the creative process.

Gavetti & Rivkin (2007) mention a view on strategy which is very much in line with the remark of Doz & Kosonen (2010) about business models being explainable both subjectively and objectively. Namely that one part of strategy takes place in the world of cognition, compromising mental processes that hold particular ideas about the organization and the environment around it. Whereas the other part takes place in the world of action, with mechanisms (similar to the operational variable in BMI that Morris et al. (2005) mentioned) that shape the actual actions of the organization.

What is cognition? Cognition is the mental action or process of acquiring knowledge and understanding through thought, experience and also the senses (Finke et al., 1992). Creative cognition, in particular, generally stresses the idea that creativity plays a large role in overall human cognition. Finke et al. (1992) propose the Geneplore model of creative functioning to explain creative cognition, this can be seen in Figure 13.

The model shows that one starts in a generative phase, where preinventive structures are established. These structures can be used to explore and interpret during the exploratory phase. One can then choose to either focus or expand the current concept. Product constraints (criteria) can be implemented during every stage or time of this process. Within this model Finke et al. (1992) are the first to introduce and stress the importance of iteration (expanding the concept) which is a huge part of Design Thinking theories today.

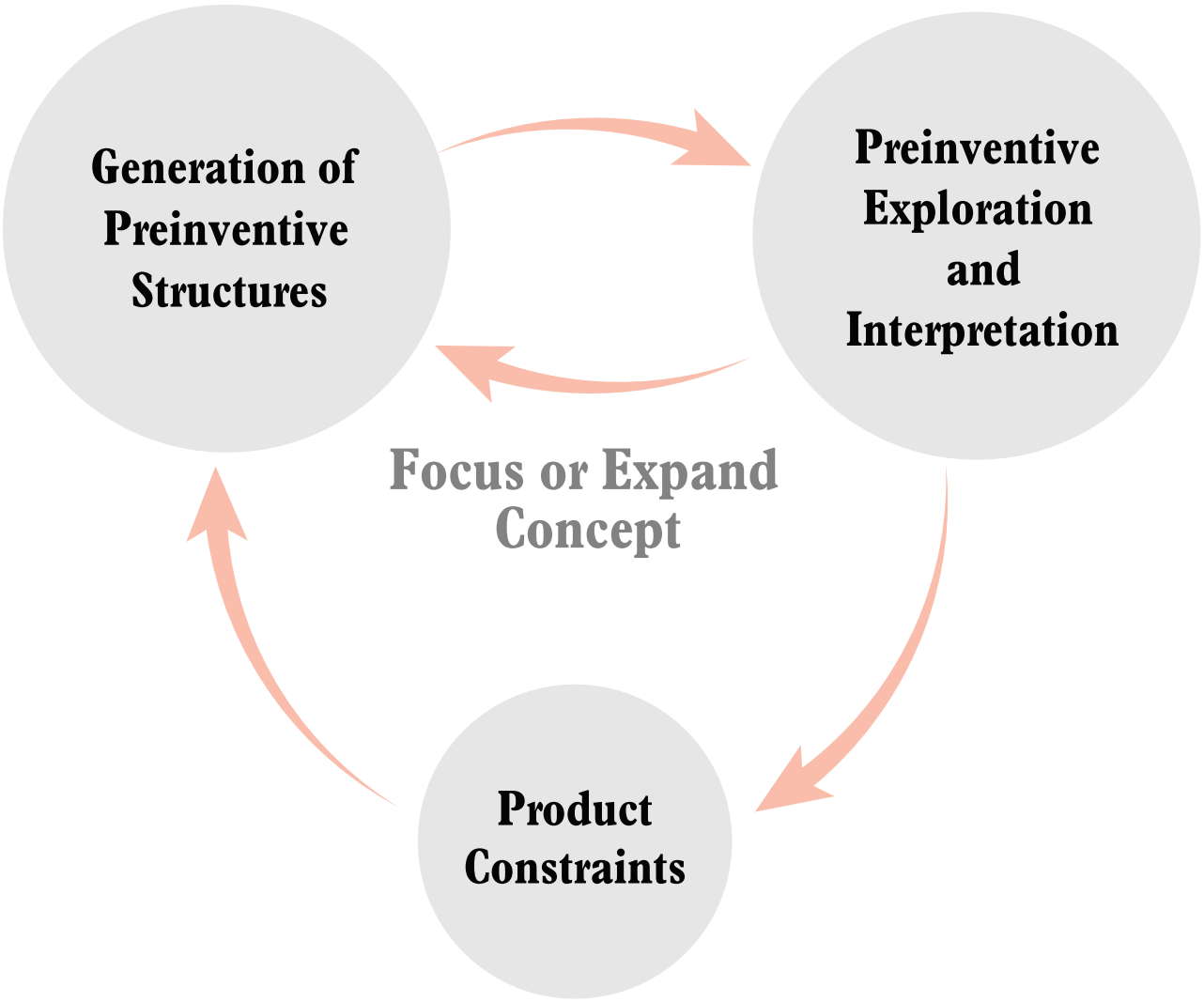


Figure 13, Geneplore model (by Finke et al., 1992, p. 240).

As Nelson & Winter (1982) state, much behaviour in companies is based on semiautomatic rules and routines, such as heuristics. Ward et al. (2000) also propose a psychological model called: the path-of-least-resistance. This model is similar to the proposal of Simon (1969) who states that decision makers develop certain heuristics (or so-called shortcuts) to aid them when making decision in highly uncertain situations. The path-of-least-resistance model is well-known in physics, in which it describes why an object takes a given path. This can be stretched to psychology, and more specifically to cognition, as well. Ward et al. (2000) state that when thinking about anything, people follow the path of least resistance. Unconsciously, one categorizes every situation based on previous experiences. This means one's creativity, is always limited by the information in memory. More specifically, when trying to develop new concepts for a specific domain, all present-knowledge about this domain will bias the final solution. In conclusion, every new idea has its roots in one or more older ideas in one's mind. Therefore, it is very important to be conscious of this and recognize that it limits one's way of thinking. This is also why reframing the problem (changing the problem formulation) can be so important and ground-breaking, as it can transfer the problem from one domain, to another domain. Therefore, making use of another, second, set of prior-domain-specific knowledge. Using metaphors or analogies are examples of how to bridge this domain-specific bias, as this uses and combines different domain knowledge.

The previously mentioned heuristics were critiqued by Twersky and Kahneman (1975). They suggest that heuristics, particularly when used during judgments of specific events, can display several biases. Such biases can differ from perceptual errors and illusions to wishful thinking and intentional distortions. Twersky and Kahneman (1975) state that reliance on these heuristics and the corresponding presence of biases are prevailing attributes of intuitive judgments when uncertain situations occur. Furthermore, Pearl (1984) adds to this by stating that these 'biased heuristics' are not only used by 'untrained' people but also by experts when thinking intuitively. As Calabrese & Costa (2015) state, most leaders are bounded by rationality when making decisions and therefore they are forced to use simplified cognitive patterns. These simplified patterns help them to manage and simplify the over complex decision-making process, however there should still be room to support and permit managers to create innovative and successful ideas. Therefore, using heuristics and/or so called simplified cognitive patterns are not the best means of approaching these uncertain situations but it is probably much more recommendable to use generative sensing and/or abductive reasoning which is described below.

Similar to both the ideas of Simon (1969) and Ward et al. (2000), is a process called generative sensing. Generative sensing is a means of producing hypotheses that could solve issues when evaluating a concept. According to Dong et al. (2016, p. 16): *"Generative sensing is a process of creating new hypotheses to explain, resolve or challenge the evidence in favour of or against a design concept, evidence that was itself generated from an evaluation of the design concept."*. The formulation and evaluating of hypothesis to generate new data is shown as a recursive loop. Dong et al. (2016) state that these (generative) sensing capabilities depend on the impression and consideration of the manager in understanding the complete context. This form of sensing links back to Design Thinking, mentioned above. Designers identify situations in an iterative process going back and forth between observations and hypothesis and different forms of reasoning, rather than a dogmatic linear process from a problem to a solution.

Furthermore, they start each phase of iteration and ideation with a certain reframing of the problem, in whichthey establish their perception and interpretation of the problem statement. Therefore, it will be interesting to examine how these instances of generative sensing are used by managers and how they can overcome the biases and downsides of the other cognitive patterns and heuristics as mentioned above.

Dane & Pratt (2007) state that cognition is involved in intuition, but intuition can also be changed due to affective differences. Research by Huang & Pierce (2015) into intuition and investment adds to this. They report that investors say they use their gut feeling and/or intuition, where most of the times, this reflects their holistic cognitive-affective judgment formed by previous experience. However, in line with Izard (2009), it is difficult to separate affect, cognition and/or intuition into distinct categories.

Abduction-2 especially relies on the mental capabilities that are similar to creative cognition. Cognitive strategies applied by creative people are abstraction of knowledge, semantic relation, analogizing and conceptual combinations (Gilhooly et al., 2007; Ward, 2004). Creativity, and therefore creative cognition, has been successfully linked to an individual's personality and cognitive strategies (Batey & Furnham, 2006; Silvia, 2008).

As demonstrated above, creative cognition is a complicated phenomenon. Only defining the structures and processes that influence idea generation do not allow us to completely understand and interpret creative cognition. Generative sensing could help gradually to generate more data to support our understanding of creative cognition. The study will therefore examine, within empirical research, how generative sensing could support relevant cognitive processes and capabilities during business model innovation.

Furthermore, it will also examine how managers apply generative sensing and/or abductive reasoning and the effect this has on company success.

2.5 From product innovation to business model innovation

Recently, the influence of abductive reasoning on project acceptance has been studied widely. Researchers have found that project acceptance increases when abductive reasoning is used. Dong et al. (2015, p. 56) conclude that: *"Recognizing the different forms of reasoning will help companies to minimize the chance of selecting a bad concept."* This could similarly be applied to the statement of abductive reasoning having a positive influence on decision making in general. Furthermore, Dorst (2011) states that abductive reasoning could be useful for organizations facing open and complex problems. Dong et al. (2015) have proved that using innovative abductive reasoning when screening concepts, may help to boost the rate of concept acceptance and will decrease the negative opportunity cost of letting innovations pass. In conclusion, prior research has shown the potential of abductive reasoning, to support decision making in product innovation management (Dong et al., 2015; Mounarath et al., 2011). The question arises, whether this might also be the case for selecting and/or creating new business models?

As mentioned, in Section 2.3 above, before linking the use of abductive reasoning in product innovation to abductive reasoning in business model innovation, the difference and similarities between business model innovation and product innovation must be established. The framework proposed by Roozenburg & Eekels (1995) will be used, for the comparison with product innovation, see Figure 14.

This process starts with an analysis phase, which leads to the development of criteria, then there is some form of synthesis, leading to a design, which can then be simulated (evaluated), followed by an evaluation leading to a decision which could either result in the final design as well as an iterative stage which will lead back to the analysis phase (Roozenburg & Eekels, 1995).

Business model innovation is decisive for a company's long-term success or failure. Today, most organizations focus on short-term innovation; product innovation, which has mostly minor sustainable competitive advantage. Having a clearer long-term approach, for example by innovating the complete business model, can have many more benefits. Products and services can often easily be copied by competitors, while business models are more difficult to follow due to their complexity. However, business model innovation is still poorly understood compared to product innovation (Bucherer et al., 2012).

Figure 15, contains a visual representation of all three proposed frameworks for business model innovation and compares them to the initial product innovation framework of Roozenburg & Eekels (1995), shown in orange. The same icons are used for similar stages. As can be seen in Figure 14, BMI can be compared to PI in literature, since it follows very similar steps. However, the order of the steps is different. All processes start with an analysis, mostly to define the value that the business model should deliver to the customer. This is followed by starting to experiment (Doz & Kosonen, 2010), validating some of the customer criteria (Trimi & Berbegal-Mirabent, 2012) or generating business model options (Euchner & Ganguly, 2014). Where Trimi & Berbegal-Mirabent (2012) and Euchner & Ganguly (2014) halt the process after a certain experimentation-phase, Doz & Kosonen (2010) still enter the phases of Leadership Unity & Resource Fluidity, which are not shown in this figure.

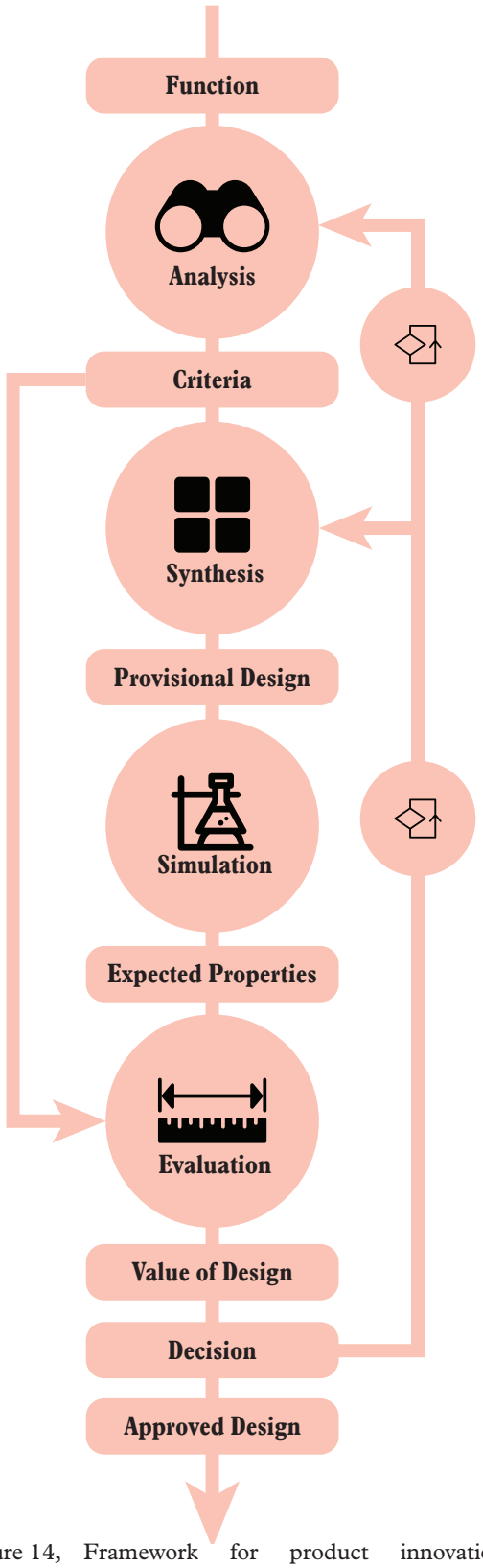


Figure 14, Framework for product innovation by Roozenburg & Eekels (1995, p. 100).

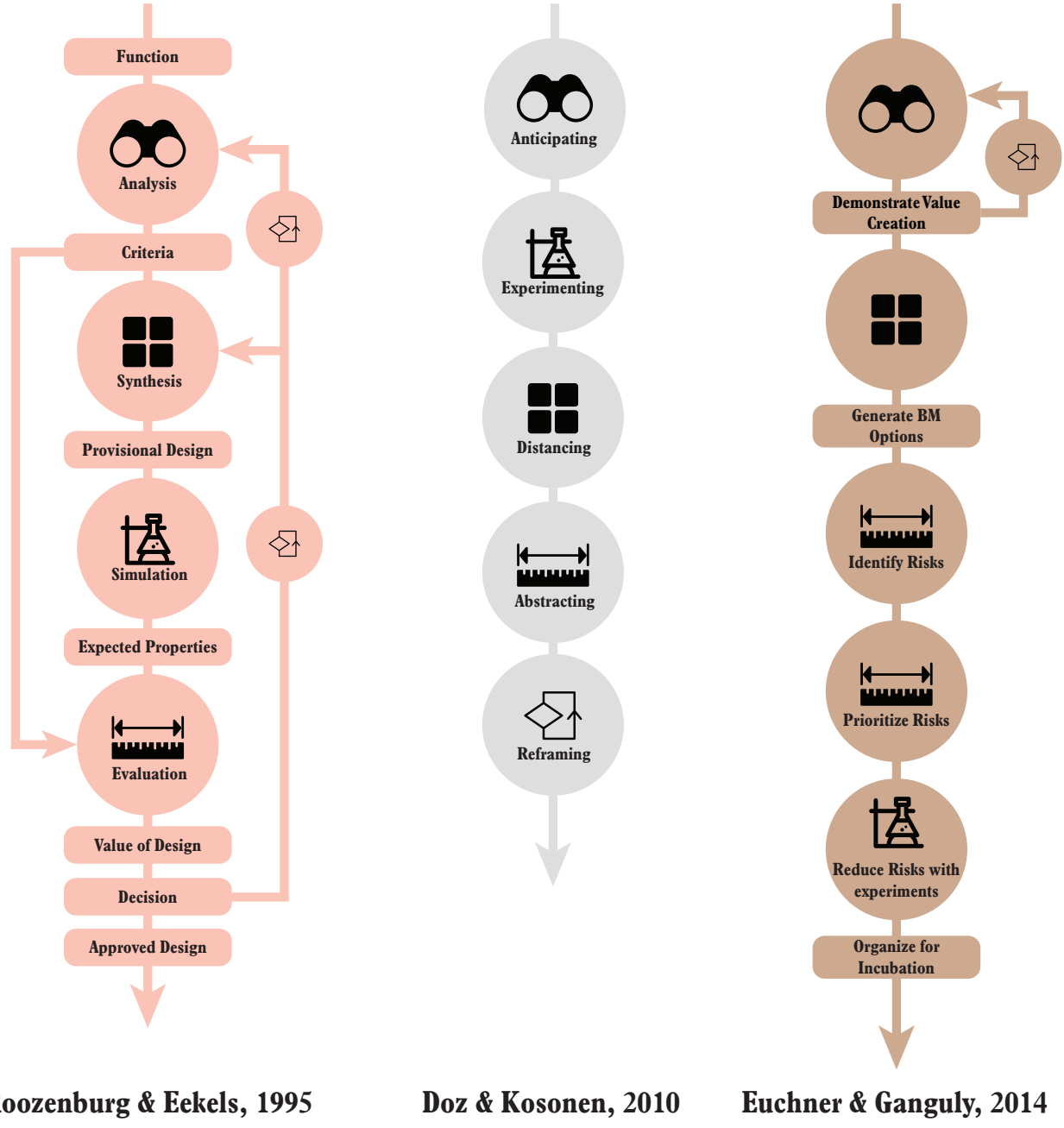
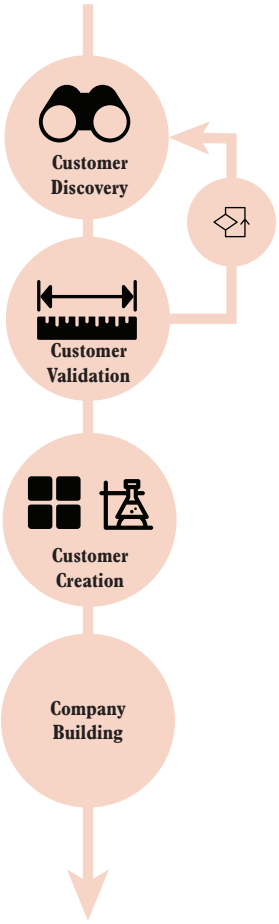
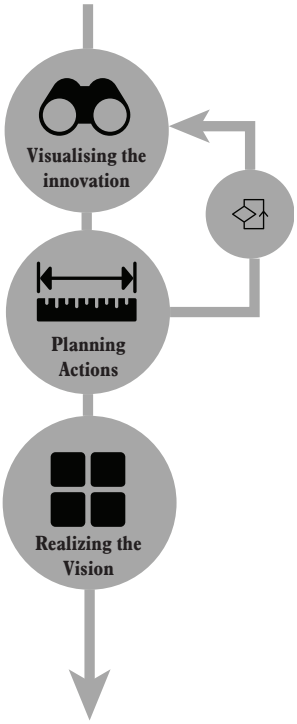


Figure 15, Product innovation versus Business model innovation.





Trimi & Berbegal-Mirabent, 2012

The main difference that can be seen in the process frameworks is the order of the steps that are followed. All processes have a similar analysis phase, synthesis phase experimentation or simulation phase, evaluation of the concept/ model and a final decision in the end. All framework allow room for iteration and reframing, which is key in both the PI and BMI process.

Calvancante et al., 2011

Within their work, Bucherer et al. (2012) define business model innovation as being a process that transforms the core elements of a company and the logic behind it. They propose a framework of both similarities and differences between product and business model innovation which can be found in Table 3.

Table 3, Differences & Similarities between PI & BMI by Bucherer et al. (2012, p. 194).

Topic	Similarities	Differences
Origins of innovations	Distinction between internal and external triggers.	Distinction between opportunities and threats for business model innovations.
Innovation process	- Logical sequence of process steps. - Rather chaotic process at least in early phases. - Normative process models can be used for guidance.-	Detailed process steps
Organizational implementation	- Difficulties for existing organizations to serve the old and new concurrently. -Independent organizational units can resolve this conflict.	New business models are affecting organizations usually in a broader manner and enforce organizational restructuring more often.
Organizational anchoring	- Dedicated organizational unit and responsibilities are required. - Often internal and external resistance, - Concept of sponsors or 'power promoters' and champions or 'specialist promoters' can be helpful	Top management involvement more essential for business model innovations.
Degree of innovativeness	- Distinction between incremental and radical innovations - Market breakthrough	Technology (product innovations) versus Industry (business model innovation) breakthrough

As can be seen in Table 3, Bucherer et al. (2012) find more similarities between business model innovation and product innovation than differences. It is interesting to note the difference they mention about BMI affecting organizations in a broader method and requiring more restructuring. This is in line with the previously mentioned difference between PI & BMI, namely that BMI may lead to more sustainable competitive advantage and is more difficult for others to replicate. Business models are mostly invisible, whereas a product can be bought, analysed and replicated. A business model however is invisible to other companies, competitors can guess several components and perhaps deduct and/or induct large parts of what their competition is doing. However, unless they are spying from an executive position within the company, competitors cannot know how a company has truly arranged their business model. Lastly, an interesting difference between PI & BMI is mentioned by Bucherer et al. (2012) is that with BMI, top management is often more involved. BMI is something that has to come from above, whereas PI can be done by individual designers. BMI is where the executives have a role to play, involving visioning and strategizing. This is in line with the initial idea of only interviewing CEOs and top managers during the empirical research.

In conclusion, it can be stated that according to Bucherer et al. (2012) and the proposed BMI frameworks (Calvancante et al. 2011; Doz & Kosonen, 2010; Euchner & Ganguly, 2014; Trimi & Berbegal-Mirabent, 2012) in comparison to the PI framework of Roozenburg and Eekels (1995) it is notable that there are more similarities between PI and BMI than differences. During the empirical stage, the examinion will focus on what the process of BMI looks like in practice, as this is not very well known up to this point. After the empirical research, it will be easier to pinpoint what these differences and similarities truly are and what the effect of abductive reasoning in BMI will have on successful business venturing.

2.6 Discussion Literature Research

Now that an understanding is created of the underlying processes of abductive reasoning and generative sensing, business models and business model innovation, it is possible to synthesize the theory and to start hypothesizing the relation between abductive reasoning and business model innovation. The explanations of abductive reasoning, business models and business model innovation are listed below as an overview:

Abductive reasoning - *"Abductive reasoning is logical reasoning that introduces new hypotheses to explain given observations. It generates hypotheses about the form of the proposed design and its mode of operation which explain the desired value."* (Dong et al., 2016, p. 71)

Generative sensing - *"A process of creating new hypotheses to explain, resolve, or challenge the evidence in favour of or against a design concept, evidence that was itself generated from an evaluation of the design concept."* (Dong et al., 2016, p. 16)

Business model - *"A business model is a hypothesis about what customers want and how an enterprise can best meet those needs and get paid for doing so."* (Teece, 2007, p. 1329)

Business model innovation (BMI) - *"Business model innovation is a reconfiguration of activities in the existing business model of a firm that is new to the product/service market in which the firm competes."* (Santos et al., 2009, p. 14)

In conclusion from current literature, BMI can be compared to PI since it follows similar steps. However, the order of the steps is different. All processes start with an analysis, mostly to define the value that the business model should deliver to the customer.

Then this is followed by experiments or evaluations (Doz & Kosonen, 2010), validating the customer criteria (Trimi & Berbegal-Mirabent, 2012) or generating business model options (Euchner & Ganguly, 2014). Where Trimi & Berbegal-Mirabent (2012) and Euchner & Ganguly (2014) stop the process after some experimentation, Doz & Kosonen (2010) still enter the phases of Leadership Unity & Resource Fluidity, which are not shown in Figure 9. Since generative sensing has been proven to occur during design evaluation (Dong et al., 2016) it will be interesting to establish a link between generative sensing and business model innovation. For now, the highest potential of presence of generative sensing is seen during the analysis and experimentation phase. Since, after the analysis phase, several concepts will be evaluated in the experimentation phase, this is similar to what Dong et al. (2016) saw during the evaluation of non-complete concepts where managers did not reason purely deductively or abductively but followed a pattern combining both ways of reasoning.

Furthermore, Bucherer et al. (2012) propose an overview of the main differences and similarities between BMI and PI. They mention that BMI affects organizations more broadly and requires more restructuring, which is in line with what Massa & Tucci (2013) and Casprini (2015) state about product innovation being more easy for competitors to replicate. Furthermore, this could be explained by the fact that business models are mostly invisible to outsiders to the organization (such as competitors), whereas a product can be bought, analysed and replicated. Competitors may be able to successfully guess several components and perhaps deduct and/or induct large parts of what their competition is doing internally but unless gaining insight similar to an executive's position within the company, competitors cannot know what a company is truly doing as a business model.

Lastly, an interesting difference between PI & BMI, mentioned by Bucherer et al. (2012), is that top management is often more involved with BMI. BMI is something that has to come from above, whereas PI can be done by individual designers. BMI is where the executives have a role to play, involving visioning and strategizing. This is in line with the initial idea of only interviewing CEOs and top managers during the empirical research.

In conclusion, it is now known that abductive reasoning works for product innovation. On paper, product innovation processes are very similar to BMI processes. Furthermore, it has been stated by Teece (2007) that a business model itself is a hypothesis about what customers want and how a company should confirm these needs and be paid for them. This suggests that the principles of abductive reasoning and generative sensing may similarly apply to business model innovation. This is to be examined during the empirical research.

Therefore, the goal of this research is to discover the presence of the use of abductive reasoning and/or generative sensing by managers during the process of business model innovation. The second goal of this research is to examine whether the use of abductive reasoning and of the patterns pertaining to generative sensing, in the process of business model innovation, will enhance successful business venturing. To reach the research goals, an empirical study is conducted, which is presented in the next chapter. This encompassed semi-structured interviews with executives in senior positions that could provide in-depth insights into the perceptions and processes related to business model creation and BMI.

Chapter 3.

Empirical research

The empirical research will be used to explore the theory from the literature research, as there is no uniform idea about business models and business model innovation. This explorative study will examine what executives are actually doing during the process of business model innovation, how they initiate and motivate BMI and how they successfully implement new business models. The goal of the empirical study is to explore the logical reasoning process of these experts regarding business model innovation. As this relates to their personal experiences, it leads to the assumption that qualitative interviews would be the most appropriate.

According to Patton (2002), there are three types of different interview formats, namely:

- open-ended interviews
- structured interviews
- semi-structured interviews

This research, employs the semi-structured interview approach. Compared to both structured and open-ended interviews, there is an extensive interview guide present with semi-structured interviews, which ensures that all participants are asked the interview questions in a similar way. This structure enables comparison across cases which is necessary during the analysis phase (DiCicco-Bloom & Crabtree, 2006). Furthermore, a semi-structured interview still allows for deviation, is more flexible than structured interviews and therefore allows for elaboration on detail and exploration of conflicting outcomes (Hill et al., 2005, Hill et al., 1997). The use of open-ended and exploratory questions leads to gathering a deeper understanding of both the interviewee's experience and his/her logical reasoning process.

The empirical research phase consists of five different phases:

1. Preparation of interview questions
2. Recruitment of participants
3. Data collection
4. Data analysis
5. Data synthesis

3.1 Preparation of the Interview Questions

Preparation of interview questions included the set-up for the interview guide as well as a more in-depth definition of the target group. The final version of the interview guide is presented in Appendix A.

When creating an interview guide, it is important to examine validity in qualitative research. Indeed, qualitative research views validity is viewed differently from quantitative research. Ravitch and Mittenfeller (2015, p. 186) state that: *"Validity, in qualitative research, refers to the ways that researchers can affirm that their findings are faithful to participant's experiences"*. According to Ravitch and Mittenfeller (2015) the following criteria will assure more validity in qualitative research:

- Credibility; the ability of the researcher to examine all ramifications and explain these in a structured way.
- Transferability; how qualitative research can be transferred to other contexts.
- Dependability; the stability of the data.
- Confirmability; qualitative version of objectivity in quantitative research.

For creating the interview guide, the researcher has employed the method as proposed by Ghauri and Grønhaug (2005).

Firstly, based on the formulated research questions, see Section 1.2, the specific type of information that would be required was determined. Subsequently, a set of questions was formulated in an initial interview guide for the semi-structured interviews, which were deemed suitable to elicit the specific information being sought. For this, an already present interview guide from closely related, previous research on product innovation management was used as inspiration. The resulting draft was then reviewed by two experienced researchers and adjusted on the basis of the feedback obtained, in an iterative manner. Both researchers are experienced in the field of Design Research in general, more specifically, and have experience with the topic of both abductive reasoning and generative sensing. This draft interview guide was evaluated in an elaborate pilot study to examine both the formulation and intelligibility of the interview questions. The interview guide was then subsequently refined.

A list of the most important interview questions is presented below:

When you think about a business model, what does it mean to you?

Can you tell me about the recent BMI you have been going through, something that you already know how successful it has been in terms of the resulting financial performance?

> What was the trigger for starting this process?
> What were your main drivers/ motivations?
> Could you describe the process that started from that point?

To what extent did you explore more distant goals or less immediate goals?

> (Probe: Immediate goals: We had a client/shareholder in mind and wanted to satisfy their concrete demand…
> Less immediate goals: We thought the experience would help us with this other project we had started already… or we wanted to see how far we could get with this business model at all…)

How did you use any kind of forecasting techniques and/or metrics to evaluate the opportunity from this BMI?

Looking back on the process itself, how do you reflect now on the process that you have followed?

> Reflecting purely on the outcome of the BMI, what do you think about the new/adapted BM?
> How is it more successful than the previous one?

How do you think your expertise has influenced the BMI process within your company?

> What do you think that the role of intuition is/was within this process?

3.2 Recruitment of participants

To ensure the quality of the outcome of the interviews, several participant criteria were developed. As Bucherer et al. (2012) state, BMI typically requires substantial involvement of top management executives. In BMI visioning and strategizing is key and is therefore predestined to come from higher hierarchical levels in an organization, whereas PI is mainly promoted by individual designers, engineers etc. in a rather bottom-up process. This research specifically aims to find information about the decision process, the (logical) reasoning process of executives within the BMI process.

As these more radical decisions are made by top-management and boards of companies, this research aims to find individuals who assume(d) higher managing functions in the BMI process, wanting to comprehend the entire business model innovation process and how this process was planned, perceived and eventually orchestrated. Only then will the researcher be able to answer the research question: *"What is the effect of abductive reasoning in business model innovation on successful business venturing?"*. Furthermore, as this research does not focus on one specific area of industry, it aims to gain insights from a wide variety of areas and professional and business-related contexts.

Subsequently, all participants were screened on several criteria before scheduling the interviews. These criteria comprise:

- The position: The participant should have a higher management position.

- The content: The participants should have recently (up to five years ago) been involved in the process of undergoing a business model innovation in a company.

- The variety: Participants should be working in different fields and industries.

The participants were recruited via purposive and convenience sampling (Marshall, 1996). In total, 16 participants were recruited for this qualitative study. All participants were working in various industries, as the goal is to gain broad insights into the BMI process across industries, this included managers from government (n=1) as well as managers and directors from semi-government companies (n=2). Some participants were consultants (n=3) and the rest of the participants were all from various commercial companies (n=10). Among the participants was for example a board member of one of the largest banks in the entire industry sector.

Furthermore, one consultant who was interviewed was working for one of the largest management consulting firms on the planet. Another participant was a board member at one of the world's largest telephone and internet companies.

Table 4 presents an overview of the participants' background. Company size was determined by the following criteria:

Micro - fewer than 10 employees.

Small - 10 to 49 employees.

Medium - 50 to 249 employees.

Large - 250 or more employees.

The level of seniority in BMI was determined by the number of times they have been involved in a process of business model innovation, determined by the following criteria:

Low – involved in BMI fewer than 3 times.

Medium – involved in BMI between 4 and 10 times.

High – involved in BMI between 10 and 50 times.

Very High – involved in BMI more than 50 times.

The level of seniority in the company was determined by the function and the presence of a higher manager above the participants during the BMI. Very high means that there was no higher manager above the participant during the BMI and high gives the indication that there was a higher manager above the participant during the BMI.

Table 4, Participants for qualitative interviews.

Nr.	Function during BMI	Educational Background	Years of Professional Experience	Seniority in BMI	Seniority in Company (during BMI)	Company Type	Company Size
1	Board member	Business Administration	20+	High	High	Television, internet and telephone	Large
2	CEO	Physics + MBA	20+	Very High	Very HIgh	Industrial	Small
3	CEO	Law	30+	Mediuum	Very HIgh	Oil & gas	Micro
4	Head of Innovation	Strategic Management	10+	Very High	High	Banking	Large
5	Consultant (independent)	Electrical Engineering	10+	Very High	High	Funeral industry	Medium
6	CEO	Mathematics, Computer Science	20+	Very High	High	Business process management consultancy	Small
7	Board Member	Law	30+	Very High	Very High	Banking	Large
8	CEO	Royal Navy	40+	Medium	Very High	Robotics for aircrafts	Micro
9	Head of Innovation	Mechenical Engineering + MBA	20+	High	High	Semi government	Large
10	CEO	Applied Economic Sciences	10+	High	Very High	Event organizing	Small
11	Director	Administrative Science	30+	Very High	Very High	Government ministry	Large
12	General Manager	Chemistry	20+	Medium	Very High	Casino	Large
13	Chairman of the Board	Dutch Law and Administration	20+	High	Very High	Semi government	Large
14	CEO	Mathematics	20+	High	Very High	Software	Medium
15	Consultant	Law	30+	Very High	High	Software	Medium

All participants were Dutch, male and between 35 and 75 years of age. As Table 4 shows, in most of the cases (n=9) the participants had the highest level of seniority within the company and therefore had no manager/boss above them. Other participants (n=6) assumed higher management positions within their companies with only one or two managerial levels above them, respectively. In one case, the participant only had low seniority within the company and was therefore excluded from the analysis. The remaining sample of 15 interviewees is considered very well suited for this exploratory research.

3.3 Data collection

All interviews were voluntary, all participants were informed about their right to withdraw their consent at any time without reason and without any consequences. Furthermore, it was stressed that all interviews were strictly confidential and all information would be anonymized and used for scientific purposes only. Lastly, the participants were introduced to the topic of the research, namely to capture the complete idea of business model innovation and its processes underlying it.

The interviews started by asking the participants to define the term business model and to define business model innovation in general. After which they were asked to introduce a recent business model innovation that they have undertaken during the last five years, the example should already have an outcome in financial terms. The rest of the questions advanced this example. This question; was not designed to focus on a specific business model innovation, looking for something very close to generative sensing or abductive reasoning. The managers were simply asked for a recent and typical example of the BMI process for them. Hence, prior bias was avoided, ensuring that the data was not skewed towards the outcome that the researchers wanted to obtain.

The second part of the interview focused on reconstructing the reasoning process, questions about the introduction of the new business model, the first ideas relating to the change, explaining the process and the steps within the process and the exploration of less immediate and/or more distant goals as well as the use of metrics to forecast.

The third part of the interview focused on reflection, it elaborated on looking back at the process and the success of the model. Furthermore, it elaborated on the role of intuition and expertise in the process of business model innovation.

Lastly, the participants were asked to briefly sketch their careers to date and roughly estimate the number of times they were involved in business model innovations.

Section 3.1, lists the most important questions that were asked directly to the participants. Furthermore, the full interview guide is presented in Appendix A.

All interviewees were native Dutch speakers; therefore all 15 interviews were conducted in Dutch. The aim was to conduct all interviews face-to-face, however some participants were abroad during the interview and therefore some of the interviews were conducted over the telephone. A total of 12 interviews were conducted individually and face-to-face. One interview was conducted face-to-face with one main interviewee and another person present who commented on several questions and was partly involved in the interview. Three interviews were conducted over the telephone. Audio recordings were made of all the interviews, and the interviewer also took notes of the most important statements. The majority of the interviews lasted between 45 and 90 minutes.

3.4 Data Analysis

The analysis phase of this research started with listening to all the voice recordings and complementing the notes taken during the research. All voice recordings were then transcribed. The answers from all 15 participants were collated in an Excel sheet with regard to the questions they answered. The recommendations by Miles and Huberman (1994) and Blessing and Chakrabarti (2009) were used to analyze the collected data. This led to iterative coding cycles by the main researcher to develop several themes and recurring patterns and/or opinions within the data to answer the research questions. The codes were formed based on the researcher's interpretation of the analyzed answers.

Within the data analysis, the researcher has striven for theoretical validity, which is to explain both the appearances that were encountered and explaining the relationships between them (Ravitsch & Mittenfeller, 2015). Furthermore, the researcher was very focussed on being evaluative valid as well, embodying both the abilities to report and comprehend the acquired data, being neither judging nor appraising (Ravitsch & Mittenfeller, 2015). The researcher has therefore used the triangulation method to enlarge the validity of the research, both theoretical triangulation and investigator triangulation (Ravitsch & Mittenfeller, 2015) were applied. Investigator triangulation was applied by having a first set of transcripts coded by a more experienced researcher in the field of design research (who had no prior involvement in conducting the interviews) and then comparing them to the results of the initial researcher to check consistency and accuracy. The cases of misalignment were discussed and consensus was reached. Once the triangulation was successful, the coding of the remaining transcripts was finalized with the agreed codes and themes.

This is a very pragmatic method that is used to ensure more reliability.

While examining the data, the researcher used the methods described by Birks and Mills (2015). The first step of the data analysis was the initial coding. Starting with one interview and proceeding with the rest while carrying out constant comparative analysis. The list of the intermediate codes is presented in Appendix B. To answer the main research question: *"What is the effect of using abductive reasoning in business model innovation on successful business venturing?"*. First the criteria for abductive reasoning should be determined which will be used to quantify the use of abductive reasoning by the participants. The main abduction criteria in this research are based on the definition of abductive reasoning by Dong et al. (2016, p. 71): "*Abductive reasoning is logical reasoning that introduces new hypotheses to explain given observations. It generates hypotheses about the form of the proposed design and its mode of operation which explain the desired value.*" The criteria for abduction in this research are:

- A certain observation is required (of situations such as client behaviour, trends, competitor reactions, contextual changes)
- This observation triggers the formation of a hypothesis about a future outcome (which can be either true or false)
- The participants should have an idea that this will result in a plausible plan from which they can benefit.

While using the coded transcripts, the data analysis phase that followed comprised five steps. The first step was to examine how these experts define both a business model and business model innovation to create an understanding on how the expert in practice define this. Second, an overview of all the BMI processes was sketched and compared between cases.

The third step concerned a deep analysis of all the tools, methods, techniques and goals that these experts used within the BMI process. The next step was to establish whether the participants used instances of abductive reasoning and/or generative sensing in their BMI-processes. The final step comprised the expert's view on when a business model is successful and their view on the success of the business model innovation that their company had gone through.

Chapter 4.

Results

This section presents the findings of the empirical research. They include, a definition of business models and business model innovations, the BMI process by managers, the role of intuition during this process, forecasting techniques, their main motivation and drivers during the process, the use of direct and/or indirect goals and the presence of abductive reasoning and/or generative sensing within this process.

4.1 Findings

Section 4.1 consists of the answers to several interview questions such as what is the definition of a business model and what is the definition of business model innovation. Furthermore, it explores the BMI process itself, as executed by the participants and the methods they use within this process of business model innovation. Lastly, the use of distant and less immediate goals is explored and this section ends with an overview of the importance of intuition and forecasting techniques during the BMI process.

4.1.1 Definition of the term Business Model

As literature shows, see Section 2.2, various views exist on how to define the term business model. This is confirmed by the results of the empirical research. The complete overview of the participants' quotes of definitions of the term business model or what a business model should entail is presented in Appendix C.

All participants define a business model differently. This differs from a focus on both profit and customers (participant 1): *"Ways in which you structure your business to serve customers. And this should be done in a final profitable way and a way you can make many customers a customer."*, to a focus on value-creation definition (participant 5): *"A business model is nothing more than value creation, Yes, creating value for the chain, the industry you work in."*, to a more profit-oriented focus (participant 15): *"The way you can make a profit by offering a product or service or something."*. Table 5 presents an overview of definition parts of the term business model. As this research aims to comprehend the overall and widely excepted definition of the term business model, the definition parts that were only mentioned once are excluded from this table.

Table 5, Overview of definition parts for the term BM by participants.

Definition Part	Number of Participants who mentioned this	Participants who mentioned this
Company Structure	12	1, 2 ,4 , 7, 3, 6, 9, 10, 11, 13, 14, 15.
Income/Revenues	10	1, 3, 4, 7, 8, 9, 10, 12, 14, 15.
Stakeholders	7	1, 3, 4, 7, 8, 9, 12.
Value proposition	6	2, 4, 5, 11, 12, 13.
Costs	5	1, 4, 8, 10, 14.
Process/Procedures	5	4, 6, 10, 11, 13.
Components	3	7,8,11

In conclusion, 80% of the participants mentions that a business model embodies the structure of a company, which might be in the form of a structure itself but does necessarily not have to be so. Next, 67% mentions that the income or revenue stream should be defined within the business model. Furthermore, 47% of the participants mention the importance of the stakeholders within this model. Another 40% of the participants mentions that the business model is about the value proposition of the company.

What does this mean for the research? Looking back to Teece's definition (2007, p. 1329): "*A business model is a hypothesis about what customers want and how an enterprise can best meet those needs and get paid for doing so.*" This definition mentions the importance of including customer needs and how a company should meet those needs and formulate this into a business model. This is similar to what the participants mention stating that a business model should consist of the company structure and stakeholders and a value proposition which might be for the company itself, its customers or other stakeholders. Next, the last part of the definition of the term business model by Teece (2007) is in line with what most participants have mentioned, i.e. that a business model should include something about income/ revenue. This reveals a large overlap between an earnings model and a business model. However, as one of the participants (participant 3) mentions, the largest difference between a purely earnings model and a business model is the involvement of a customer. However, 8 participants (participants 2, 6, 8, 10, 11, 13, 14, 15) do not mention anything about the involvement of a customer or their importance within the business model.

Moreover, participant 11 who works as a director for government tells us that he does not even work with a 'business model' but rather refers to it as the achievement of goals, a possible reason to explain this is that government is not a commercial company, one of the largest differences between him and the other participants. When examining the backgrounds of the participants who did not mention the importance of the customer within a business model, these range from physics and computer science to business administration. Examining Table 4 and Table 5 again, the participants who did mention the importance of a customer (participants 1, 3, 4, 5, 7, 9, 12) have similar backgrounds to those who that did not mention the importance of involvement of customers. Therefore, no connection or link could be found to answer why these participants would or would not refer to this importance of involving customers. Furthermore, the industries for which they work are all very different, from a more industrial field to government and software companies. Again, these backgrounds are similar to those of the participants who did mention the importance of customer involvement within a business model, and so therefore no link was found as to why these participants would or would not refer to this. From the participants' perspective, no clear link can be established at this point between abductive reasoning and the definition of the term business model as the participants' definitions do not allow us to make this link yet. As mentioned before in Section 2.2, Teece's definition (2007) does allow us to make this link. Within this definition, the word 'hypothesis' might already mean a link to abductive reasoning, here people create new hypotheses to explain given observations.

4.1.2 Definition of Business Model Innovation

As mentioned before, it is very difficult to define business models in general. It is therefore even more difficult to define business model innovation. Some participants gave a definition about what they think is crucial in business model innovation, whereas others gave a more generic view about what they think the core of BMI is. Appendix D presents an overview of the answers given by participants to the question how they would define business model innovation are presented.

The largest part of participants, 6 out of 15 (participants 1, 4, 6, 7, 10, 11), mention that business model innovation is a reconfiguration of components: "…*But maybe it is more important that you think about it too, well, if we get that Canvas, that can be filled in. On essential parts. So, do not just serve other target groups with the same product, but maybe you might have a very different product, maybe a service, etc. So, fundamental changes in your currently existing model.*" and *"A reconfiguration, you can take things away, you can add things, you can shuffle it and organize it differently.*"

Another 6 out of 15 participants (participants 1, 3, 4, 11, 13, 16) mention that business model innovation is mainly about a change in the Revenue Model and/or Profitability of the company. This is illustrated in the following quote which is about reconfiguration of the model to become more profitable: *"So, a business model innovation is then needed to review the model, to see what we can do with the quality or competencies or unique features we have, how can we use it differently. Or what should we develop to become profitable again. Or, if it is not a financial outcome, how can we achieve our goals?".*

Furthermore, the next quote illustrates the influence of investments in business model innovation and the effects of this on the business model and profitability: *"Business model innovation, which means that I have to think even more clearly about the investments, I need to ultimately win profit. Profit can be financial gain but can also be qualitative contribution to a better anything.*" Both quotes stress not only the financial part of making profit but that this might also be a qualitative contribution to a better world or to a certain shared value.

There is an interesting contradiction between the participants' statements. One participant mentions that BMI should always be about radical innovation, otherwise it is not innovation, another participant stated that innovation is never radical and always entails creating new combinations of existing things. One of them (participant 6) mentions: *"Business model innovation, looking back at the business model, you could say it is about improving or improving radical, that is the definition of the word innovation.*" Which is in line with the statement of another participant (participant 9): *"Yes, that is inherent, because I always assume that, but that is when I focus on myself, that I feel very strongly that we should always be radically innovative."* Whereas another participant (participant 7) states: "*Innovation is almost never fundamentally something new… most of the times it is more about creating new combinations.*"When examining the industries of those participants, their backgrounds are quite different, participant 6 works in consultancy focusing on business process management and participant 9 works in a company that develops robotics for aircrafts, whereas participant 7 states that innovation is never radical works in banking.

The difference here might be explained by the fact that the banking industry is quite old-fashioned and especially within well-established and well-known larger banks, there has been little room for innovation in contrast to newer start-ups that are coming up with newer technologies, whereas a consultant in business process technology can combine his cross-industry knowledge to change processes in certain industries with input from another industry, therefore creating 'radical' innovations within industries.

Participants already talk about "what to do" rather than "what BMI is". For example, several participants mention that one should think about the business model before creating something more innovative. Furthermore, thinking about the BM before it should be implemented and before one starts to develop a product or service is crucial to the success of a BMI. *"Before I start, So I have an idea, I'm doing something fun, but when it comes to business model innovation, it is about something that is not yet there, because otherwise it is not innovation. So, I know before I go ahead, before I put it on the market and create a business model, I should think about yes, but what are my chances, can this be successful?"* This quote also stresses the importance of forecasting in business model innovation, which will be further addressed in Section 3.5.6.

Other participants mention the importance of starting with an elaborate analysis of what is already present in the market and what is the context of the field that you are working in. There seems to be a certain readiness to do BMI rather than to explore the underlying concepts and mechanisms at a more abstract level. The main concept that they sketch of how to approach this is:

- Start with defining User Needs

- Look at the context

- Define and implement Trends

- Change revenue model

- Reconfigure the business model you currently have (shuffling components).

A generic overview of how managers apply and approach BMI is presented in Chapter 7 of this thesis.

4.1.3 Process of Business Model Innovation

Appendix E presents a full overview of all BMI processes discussed by the participants, including visuals of the process. The following pages present and explain two BMI processes that were followed by two participants.

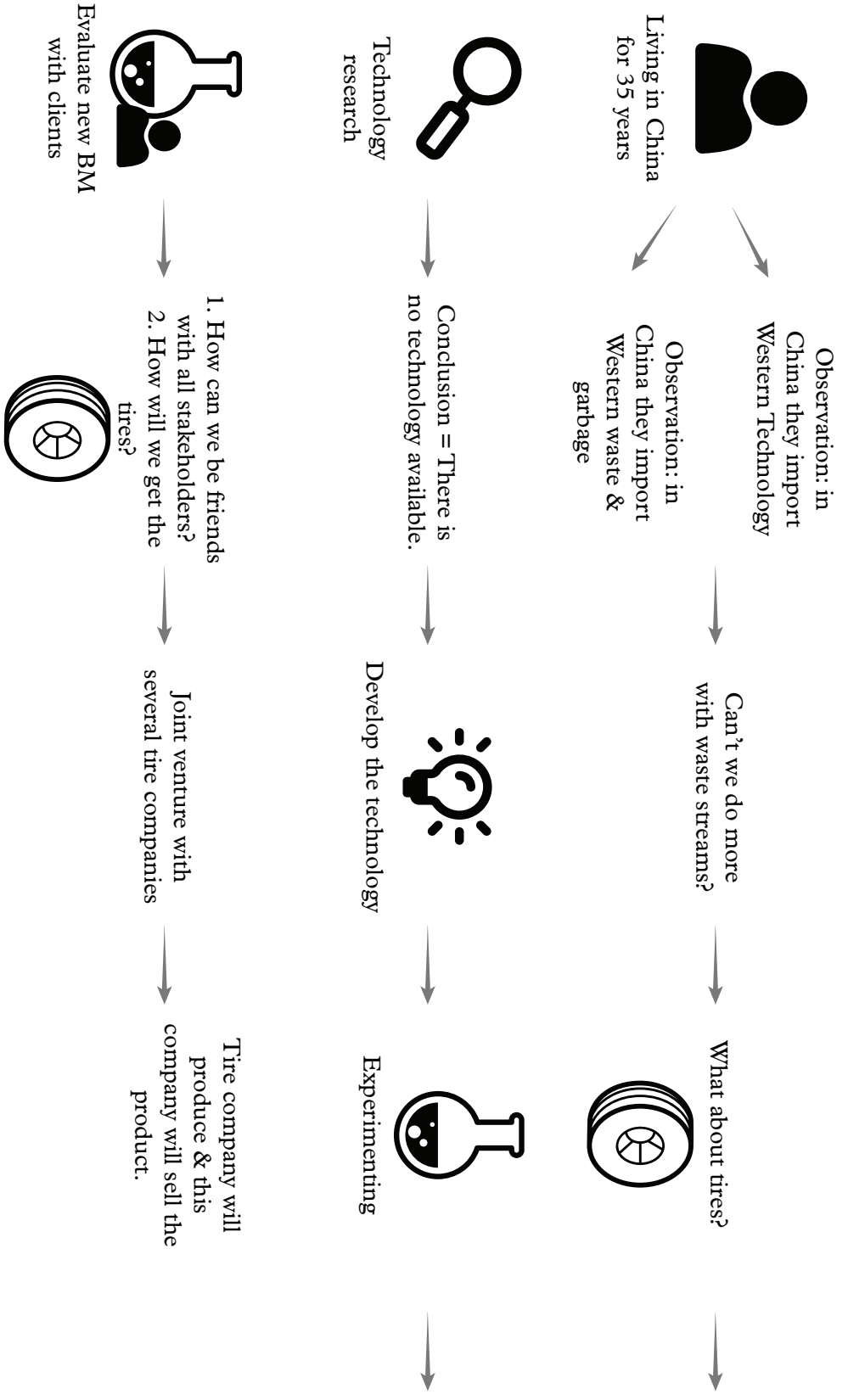


Figure 16, BMI process of participant 2 about tires.

Figure 17, BMI process about development biogas by participant 3.

Figure 16 shows the process of implementing a new way of producing a product from the material of tires. The idea was initiated by the participant on the basis of an observation made while living in China for 35 years. On the one hand, he observed that the Chinese were importing Western Technology. On the other, he observed that China was buying up Western waste and garbage. He therefore had the idea to do something more with waste streams in Europe. This is illustrated by the following quote: *"It originated because I lived in China for 35 years and did two things in China. One is the import of Western technology, of the modern technology they needed there. And the second thing they did was importing waste from Europe and America. So, the waste was transported to China and used for raw materials and other applications. When I returned to the Netherlands for twenty-five years, I wondered if we could do any more with those waste streams that are now being shipped to China. And then I got on tires."* He started to research this and concluded that it would be interesting to do something with tires. He researched the technology to try to create a certain product from the tires but concluded that no technology was available for this. He then developed the technology himself and evaluated this in a laboratory and it was found to be successful. He later created a business model which he evaluated with potential clients. He then intended to implement this while remaining friends with all stakeholders already in the market as well as procuring the tires in a sustainable way. To that end, he created a joint venture with several tire companies, under which they will produce the product from the tires and the participant's company will market it for them.

Figure 17 represents the process of implementing a portable solution for creating biogas in the form of a company. The idea was initiated by the participant because of an observation about his nephew's activities at a camper company: transforming electricity.

Furthermore, there was a second observation coming from the participant's research for a municipality about biogas and his knowledge about the Second World War in which certain people would have had gas engines behind their cars to propel them. This gave him the idea and he came up with the hypothesis of developing a new portable solution to convert biogas into gas that can be used in the regular gas system. After introducing this to several partners and experiments, it was found to be feasible and was developed further. What is interesting in this particular process is that it was quite adventurous and new; as the participant frequently mentioned, they had to develop new technology and solutions which could be subsequently sold to third parties: "*What we did in that regard makes us part of our business model because what we did was very new. And you had to think about many things on your way. And at the outset, you made it easier to make what you wanted to do. So, there were solutions to your own problem, but it often came up with solutions that were sellable and marketable by themselves again.*" When asked about his main motivation during the process, the participant replied: *"Discomfort and adventure, going where no one dares to go. Solving problems."* The solution was not proven to be successful on several occasions, but the participant's belief that it was going to work was so strong that the idea had already been sold to clients before they actually knew that it would definitely work: "*Well, in three factories we used technologies that was never used before, this was a huge risk yeah, we did not know it for sure. But you definitely need to have the idea that it is going to work, otherwise you would not do it, but if you knew everything for sure, you would not be an entrepreneurial innovation anymore.*"

Of the 15 participants, 10 (67%) started their process of business model innovation with a certain reframing or scoping of the problem definition and/or project brief. Such as: *"Because what is the question that they ask you? That is your first challenge?*

The question they ask you is often not the problem that needs to be solved. You first have to help them defining the problem."

Seventy-three% (11 out of 15 participants) investigated their customer problems or needs. This was done in several ways, for example by conducting interviews or talking to focus groups: "*You look at customers in the market. You do interviews and focus groups or something else.*" In this case the participant already had an idea about what he was going to develop, in other cases participants have a more experimental mindset and first look at customer needs before starting the ideation of a new business model: "*And then we start with a very broad process, looking at which problems are customers facing. But if you only focus on customer problems, you are only looking at their current problems. Sometimes you also have to look at latent needs.*" However, four participants did not explore customer needs but took a different approach. The reasons for this differ from: working purely from a technology push, so therefore no consumer needs were explored. Another participant focusses mainly on Business Process Management within companies and here again, no consumer needs or problems were explored. Furthermore, two participants work within government and semi-government environments, and they too did not explore consumer needs and/or problems.

When focussing on trends, 80% of the participants researched or examined these, such as societal and/or technical trends. Three out of fifteen participants did not examine trends within their process of business model innovation. This was because they were setting trends at the time and were developing something completely new: "*I do not think so, no. We were setting the trend at that time.*"

Of the participants, 73% undertook market research before developing a new business model, in which they examined different competitors and the context within which their new model was going to work: "*Yeah, we have researched the market of crowd funders and other platforms, we looked at event planners and local initiatives and saw what we did. Well, it is very important to realize in which playing field you are.*"

Of the participants, 40% (6 out of 15) created a list of requirements or product backlog to start developing their business model innovation or to structure their BMI process. "*Yeah, we work with SCRUM technology. We all do. And all online tools that are available, so that we write down everything we do, we write what we want. So, all our requirements are documented and everyone can write requirements in there.*"

Of the participants, 67% of the participants mention that they had some kind of iteration within their BMI process and some even stress the importance of iteration within this process. "*So, if you see how it was formed, it is amazing. Only, if you see how important all those iterative steps were to get there, then you see how it goes.*"

Of the participants, 60% keep in mind their strategy or iterate on their strategy when doing BMI. Here they take account of the strategy of the company and how this still fits the innovation they are going through. "*Yeah it starts with the fact that we have strategic themes within our company, discussed with the board and other people.*" Or, in some cases, how the strategy should be changed and therefore they formulate a business model innovation accordingly. "*Yeah, and then I thought, what is our vision, what is our strategy. How can we add value to our customers? And then I came to the conclusion, I think a lot of people would get that, of this new Innovation to become more like a news organization.*"

In another example, the participant mentions the importance of the strategy, but is in such an insecure situation that they currently do not have clear strategic guidance and/or plans: *"Yeah, with regards to competitors, markets, legislation, you organize your strategy. So that is why we do not have any strategy plans. Because we never know for sure. Yeah."*

Of the participants, 40% mention the importance of building to and/or aligning the business model innovation to their current vision. This is very similar to the findings of the strategic fit/alignment mentioned above. In this case, 27% of the participants do not mention anything about either mission/vision or strategy.

As seen from processes shown in Appendix E, all of the participants' processes are very different. However, 73% of the participants mention a certain kind of trial-and-error as being key within the BMI process. *"So, then we did, often those coal filters are done double, often you have two filters next to each other. Then we started to see if we could use different coals in series next to each other, so that you could see what you use per molecule, we evaluated and tweaked this until we came to a conclusion."* Four participants do not mention this at all, including the participant who focused mainly on Business Process management. The product was too technically specific and expensive for two of the other participants that no trial-and-error was possible. The other participant who did not mention trial-and-error was working for government.

Of the participants, 46% mentioned specifically that they evaluated the new business model with either a user or in a certain context before implementing. One participant simply started with the new business model without proving that the technology was working. *"Well, we used this technology in three factories that had not been proven to work yet. The technology was never used before. Yeah that is a huge risk, we did not know it for sure. You need to have some kind of idea that it will work, otherwise you will not do it. But if you knew everything for sure, you would not be an entrepreneurial innovation anymore."*

In conclusion, what was learned about how companies approach BMI and what does the process they follow look like during BMI? As shown in Figure 18, the majority of the participants stress the importance of reframing and/or a certain kind of problem scoping before the process or project is to start. This can be linked to what Ward et al. (2000) call: 'the path of least resistance', i.e. that an individual's creativity is always limited by the information in their memory. However, this problem can be overcome with reframing the problem, as it can transfer the problem from one domain to another. Making use of another second set of prior-domain-specific knowledge. In some other cases, it means adjusting the initial question from the customer or client into something more specific that describes where the problem really lies.

Next, the majority of participants (67%) mention that iteration did occur within their BMI process. This is very much in line with what the literature tells us about both PI and BMI, see Section 2.5, within all processes from PI and BMI iteration is key. As literature illustrates, iteration is key during the process of Design Thinking, in which designers identify situations in an iterative process going back and forth between observations and hypotheses and different forms of reasoning; which is an essential aspect of generative sensing.

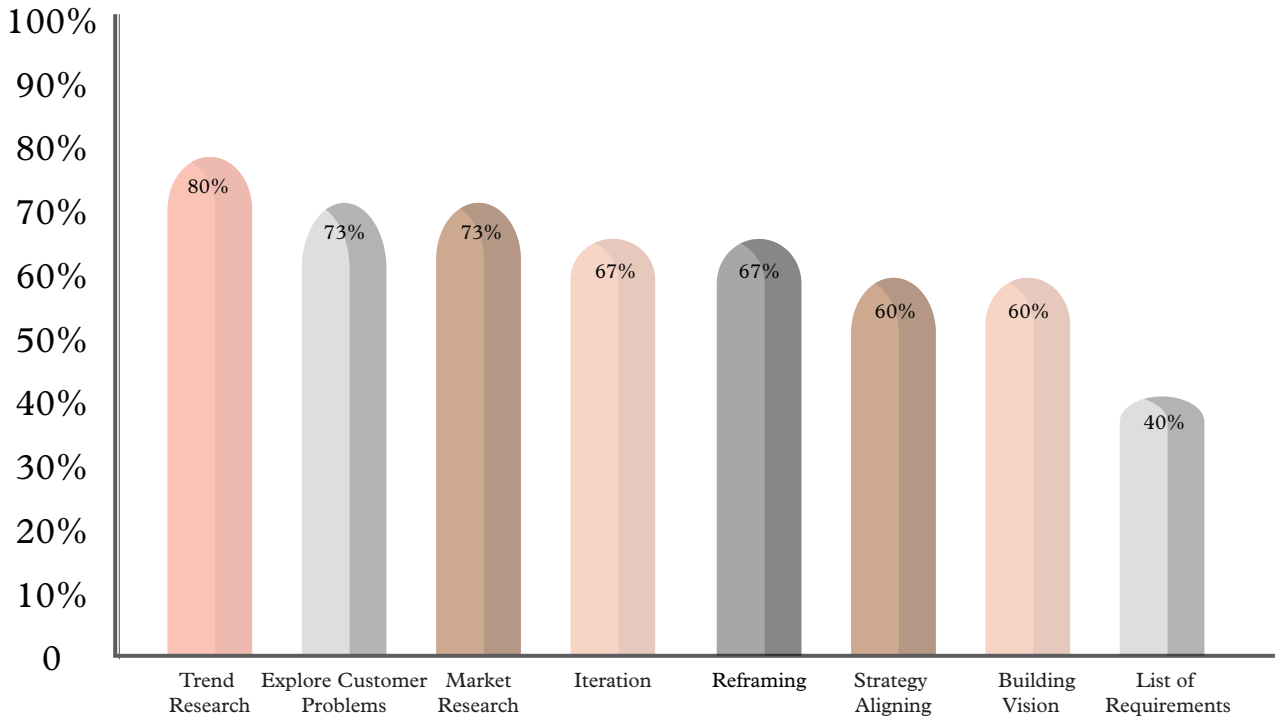


Figure 18, Overview of methods used by participants during BMI process.

4.1.4 Drivers and Motivation

When discussing the most important drivers and or motivation during the process of business model innovation. 40% of the participants mentioned that radical innovation is important for them, more specifically, doing something that competitors cannot or will not do and therefore creating something that is radically innovative. *"So that is before I start, so I have an idea, I see something nice, this is very abstract, when it is about innovation, then it is about something that is not there yet, because otherwise it is not innovation, so that is before I start with developing it."* Furthermore, 33% of the participants said that customer satisfaction is the most important for them. *"Look, banks are always companies that want profitability. So, where we try to make it more interesting for a larger group of people is to evaluate the client experience and satisfaction."*

The importance of economic value and/or profitability was mentioned in 27% of the cases. *"Money, yeah you are now at a government company, so there is a huge difference between us and real business-life. But that is also why I like the government so much."* The most important drivers are presented in Table 6. Again for this table, as this research is looking for an overview of how the majority of managers approach BMI, all drivers that were mentioned only once are excluded from this table.

Table 6, Drivers and Motivation during the BMI process.

Driver	Number of Participants who mentioned this	Participants who mentioned this
Radical innovation	6	1, 3, 8, 10, 12, 14.
Customer satisfaction	4	6, 7, 10, 11.
Profitability	4	1, 7, 8, 15.
Societal impact	3	2, 4, 15.
Shared value	3	2, 4, 6.
Success in general	3	3, 12, 14.
Sustainable advantage	2	2, 4.

Two of the drivers and motivation can be linked back to the definition of a business model by Teece (2007) that is used in this research. These drivers include: customer satisfaction and profitability. However, several other drivers do not link back to the definition but go one step further, such as: radical innovation, societal impact, shared value, success in general and sustainable advantage. In general, these drivers can be divided into two themes, one of which is more about societal impact and creating value for a society (societal impact and shared value) and while the other is more about distinction from competitors and being competitive (radical innovation, success in general and sustainable advantage). This is interesting as it is in line with what scholars tell us about the difference between PI and BMI, namely that BMI will lead to more sustainable competitive advantage and is more difficult for competitors to replicate (Bucherer et al., 2012). In conclusion, the advantage of BMI leading to more sustainable competitive advantage is a huge driver and important motivation for executives during the BMI process.

4.1.5 Distant Goals

Section 3.1 listed some of the questions that were asked of the participants during the interview. One of these questions was: *"To what extent did you explore more distant goals or less immediate goals?"* An example of an immediate goal that was given as a probe by the interviewer was: *"We had a client/shareholder in mind and wanted to satisfy their concrete demand."* An example of a less immediate goal or distant goal that was given as a probe by the interviewer was: *"We thought the experience would help us with this other project we had started already. or we wanted to see how far we could get with this business model at all."* This question was important to ask as distant or indirect goals are often related to abduction since the outcome is not pre-defined.

When asked about direct versus indirect goals it was clear that most participants, 47%, use a combination of both direct and indirect goals. A difference was observed between participants who are sometimes forced to work with direct goals because of their industry but prefer to work more indirectly, such as: *"Not with the ministry of [name withheld], it is very direct, they find it annoying to. So, they have to describe it completely.*

But on both sides, we find that annoying too, because sometimes after four years you discover that it should be something else and then you have to break the contract open and get delays." Whereas others have a mor direct end goal but do not know how to get there: "*Yes, If I had given the instruction you would have explained me for half a year why it would not work. And if I had pushed it, I also do not know what the road to the final model was. That road does not exist yet. If you reach the final model you will know and you will want something new. I do not know the road either, there are a lot of unknowns.*" Of the participants, 27% use clearly more direct goals and another 27% of the participants use very indirect goals. One of the participants gave the following question when asked in what way he had more direct or indirect goals: "*Yeah, the indirect goal was to gain more attention for the brand, that is what the brand manager from [name withheld] asked us to implement a new concept that would give brand [name withheld] more attention and clients.*"

Interestingly, indirect or distant goals already reveal the potential for a link to abductive reasoning, as indirect goals are often more future oriented than direct goals and require more completion by the participant and/or his team. As mentioned by Doz and Kosonen (2010), the first important step within business model innovation is anticipation, in which managers predict and explore future usages in order to create future-oriented goals. For example, in the quote of one of the participants, it was learned that his indirect goal was to gain more attention for a brand. However, there is no single way of achieving this end-goal or end value, and so it will be highly plausible that the participant will start creating several concepts/ hypotheses in order to try to reach this end value.

Additionally, as mentioned before, there is huge potential for generative sensing within this anticipating phase, in which the participants create hypotheses about a certain end-value they want to achieve and try to resolve, explain or challenge this during the 'path' that they create towards this end goal subsequently. Specifically, with the presence of exploring and or probing before the development of actual hypotheses. As can be read in the participant's quote about obtaining brand attention, the participant will likely create several hypotheses (in a more specific form, these might be concepts) about how to reach this end value. It is highly plausible that these hypotheses will later be evaluated and explored, therefore embodying potential for the use of generative sensing. In conclusion, this section does not prove the existence and presence of abductive reasoning and/or generative sensing within the BMI process but is an important step within the interview to establish whether there is room for abductive reasoning within the BMI process. In this section about direct and indirect goals this research has not proved the use of abductive reasoning and generative sensing itself, but the use of indirect goals embodies potential for the presence of both.

4.1.6 Intuition and Forecasting Techniques

Forecasting techniques are methods that are used to make future predictions, based, for example, on past or present data and trend analysis. Within forecasting, risk and uncertainty are central, normally managers use forecasting techniques to predict the degree of uncertainty attached to a specific choice or investment. As Evans (2003) claims, creating future visions can help managers to take a leap of faith into the future. Future forecasts can help managers generate long-term policies, strategies, plans and therefore business models.

However, within this study the value of this future research is less about the accuracy of the forecasts but rather maintaining an open mind to consider new possibilities, which might prove the potential for abductive reasoning within the BMI process. There is a vast number of forecasting techniques available, differing from a more statistical and data-driven approach to even creative thinking-based forecasting (Malhotra et al., 2014). Creative thinking-based forecasting especially has potential for abductive reasoning as it is a method focusing more and freedom of thought and creativity including scenario writing. This method of creative based forecasting works especially well in situations in which parameters are not yet clearly defined, such as when designing for business model innovation.

When discussing different forecasting techniques on which business model innovation was founded, most participants use forecasting techniques. Namely, as mentioned before, 73% of the participants used market research to examine the market in which they were or would be operating with the business model. Another 60% of these used this market research to make projections about the future market, so they used the market research itself as a forecasting technique for future outcomes. For example, such market research can be used to assess and later forecast the sales and profitability of a new BM within its own or different market(s). Participants describe the key fact within market research as first to accurately analyze the market and describe this, and later make forecasts and try to find solutions for the observations made during the research, this might be in the form of abductive reasoning: *"And putting a lot of time and emphasis to communicate internally about what the markets are and what we see as a change in customer behaviour. So, do not come with solutions right away internally, but just really describe the problem that we see coming."* Furthermore, this quote stresses the importance of a good problem definition which was already mentioned in Section 3.5.3.

Of the 15 participants, 8 mention that they have used a business case to make a prognosis of the success of the innovation. The projections were correct or where exceeded in four of those cases: "*What you could say is that our forecasts were too conservative because we knew that if we hit large numbers there would be competitors that would follow or introduce alternative methods… But none of that happened."* In two of these cases the Business Case forecasts were wrong: *"No the forecasts were very wrong, everything takes much longer than expected."* Four of the participants mentioned a certain projecting forecasting technique, in which they looked at the current state and project this behaviour and how this would change in the future, with the help of either technological forecasts and projections, to be processes or projecting current customer behaviour: *"But of course, you want to take a closer look because you want to make yourself future-proof. So, we have also forecasted in the way of looking at young people's behaviour and projected this into the future. And said, okay, this generation actually wants to go to the office, but at a certain point no one wants to go to an office anymore, because this generation no longer wants it."* Two other participants were very clear about the fact that they do not use any forecasting methods: *"No we did not do that, we are, we cannot afford that at that time, also with the size of the company, it was just a very large gut feeling."*

As mentioned earlier in Section 2.4, intuition plays a huge role within the decision-making process of most managers as executives often rely on intuition (Huang & Pierce, 2015). This quote by one of the executives corroborates this. As exhibited in the previously mentioned statements, during BMI managers use a combination of data and insights from their analysis and combine this with their intuition or 'gut feeling' to shape their business strategy and/or business model.

This is perfectly illustrated by the following quote, in which the executive links market research and intuition when discussing the importance of intuition in the BMI process: *"Do you want to hear a percentage, because I do not dare to tell you that. But it is much bigger than we think and that is why we try to reduce this feeling by doing as much market research and other research as possible."* In conclusion, this manager shows that intuition plays a huge role within managers' day to day work, but it can sometimes be scary or difficult to fully rely on this. Therefore, they require research and data analysis to reduce risks and gain more certainty.

Fourteen of the 15 participants, 93%, mention the importance of intuition in the process of business model innovation. However, there is a difference in how they explain that it plays a role. Six out of the 15 participants mention the importance of intuition in general such as: *"It is very important yeah, high, but it is also a weakness, it does not have to mean that you will be more successful if you only work with intuition."* Four participants mention the importance of intuition within forming a team or when forming relationships with other people *"It depends on what you understand, I focus on trust, trust is very important. For me, for the steering group it is important that you have people with the right qualities in the group. Intuition leads you to establish this. That is something you sometimes cannot substantiate. Intuition and trust are very close to each other, and that is the answer to your question, it plays a large role."*

Two participants stress the importance of intuition in how you can translate customer needs into something concrete: "*Yeah it is large. Because how well are you able to listen to your customer? Do you feel what the real conversation is about? Do you also dare, how big is your belief in it? These are questions that play a role."*
Lastly, two participants mention the role of intuition in entering a field that is interesting, and focus more on the role of intuition in ideation: *"So, really, intuition can really play a role, because if you can calculate everything, everyone will come to the same conclusion. So, you can never differentiate, maybe you'll get there faster, but everyone will get to the same conclusion."*

In conclusion, if everything were calculable and or researchable, all competitors will follow a certain direction and will easily adopt a new business model. This is in line with what scholars tell us about the difference of product innovation and business model innovation, namely that BMI will lead to more sustainable competitive advantage and is more difficult for others to replicate (Bucherer et al., 2012). In practice, it has been learned that executives themselves mention that this is due to the more intuitive, hunch-based nature of the start of ideation of a new BM within BMI. Within this process there are many risks and uncertainties and the use of a variety of forecasting techniques will help them to feel more secure to make decisions within this process, whether they prove to be successful and accurate in the end or not.

Again, these results confirm the use of generative sensing within the BMI process, as the evaluation of a new idea consists of deductive analysis of existing evidence and abductive reasoning explaining the conclusions for example with the use of intuition and forecasting techniques. This is in line with what the participants describe about the BMI process starting with a hunch or gut feeling, this is very likely a prediction or assumption about the future or a future outcome in the form of a hypothesis. These hypotheses are later evaluated and validated by doing extensive research to create evidence to come to a certain conclusion. When this coincides with a recursive process, it is called generative sensing (Dong et al., 2016).

4.2 Generative sensing and Abductive Reasoning and its influence on successful business venturing.

This section elaborates on the use of abductive reasoning and the presence of generative sensing during the BMI process. Furthermore, the second part of this Section explores the influence of using instances of abductive reasoning and generative sensing on managers' successful business venturing.

In 12 out of the 15 cases, a form of abductive reasoning was found during the process of business model innovation. This means that 80% of the participants used abductive reasoning during the process of business model innovation. An overview of all instances of abduction including explanations is presented in Appendix F. Two examples are shown below. These correspond to the business model innovation processes shown in section 4.1.3.

Participant 2:
Here the instance of abduction starts with two observations by the participant, one is what he observed in China, Western technology is often imported: *"One is the import of western technology."* and his other observation was of European and American waste and garbage being shipped to China: *"And the second thing they did was importing waste from Europe and America. So, the waste was transported to China and used for raw materials and other applications."* After making both observations he came up with the idea that Europe should do something with this itself and his hypothesis that followed was that this should start by doing something with old tires: *"When I returned to the Netherlands after twenty-five years, I wondered if we could do more with those waste streams that are now being shipped to China. And then I got to tires."*

In this example, the participant not only creates the hypothesis but construes a plausible explanation why this hypothesis might work, because of his two prior observations.

Participant 3:
Here the instance of abduction is shown by the participant's hypothesis to create a portable solution to create biogas from a certain base product. His hypothesis stems from three reasons; the observation of his nephew at the camper company, the observation from the research for the municipality on biogas, which is similar to context and market research, and his historical knowledge of cars during the Second World War. The combination of those different ideas and/or concept led him to be sustainably competitive, this differs from other competitors because: *"So it was already suitable, the notion already exists, only everyone was trying to adjust the engine in the bus to adjust the bad gas. How can you adjust that? And my innovation was, knowing about all these different kinds of technologies, to combine them in one spot and create a portable solution to create biogas."*.

These situations show explicit examples of abduction, in which participants guess a new plausible explanation of a solution for a specific observation (Dong et al., 2015; Mounarath et al., 2011). Both examples show that the participant expands mentally and project into a future outcome scenario, as mentioned before in connection with forecasting in Section 3.5.6. As explained in Section 2.1, abductive reasoning is more than simple divergent thinking as the hypothesis or hypothesized scenarios also have to be feasible within a certain time span as well as entail a certain idea about the feasibility of a possible business venture. This requires more than just future or divergent thinking, rather it already entails a plausible explanation for the initially formed hypothesis, linking back to the initial observations. This is concordant with abductive-2 reasoning logic as described by Dorst (2011), see Section 2.1.

One participant, who was a consultant in Business Process Management, mainly discussed linear processes, which were more structured than creative ones. In this case, no instance of abduction was found.

Another participant who did not reason abductively during the BMI process, is working for government. Again in this case, the processes he described were very linear and work via a fixed format. When talking about abductive reasoning and the purpose of the research at the end of the interview, informally but recorded, he mentioned that he understands the idea of abductive reasoning and always strives to implement this as follows: *"In every project I manage, I try to start with conversations about what our goals are and what we want to become. Then later we can start to fill in how to achieve this."*

The last participant who did not reason abductively during the process of business model innovation, is the director of a semi-government company. In this case his example of business model innovation did not reveal any instances of abduction. However, as in the previous example, during the informal talk about the research purpose after the interview, he mentioned this: *"Yeah, that is logical, how much better you think about the results before starting, almost always this makes your results better in the end. Or when you formulate it differently, what we sometimes see is, why aren't the results just? Because we did not formulate the assignment. We were not clear from the beginning about what it was about."*

As mentioned earlier, there are many rules that companies should follow to maintain competitiveness. To stay ahead of competition, companies must rely on dynamic capabilities such as sensing processes, especially during the evaluating of strategic options.

One of these sensing processes is generative sensing, which can allow companies to leverage relevant information to identify a problematic situation and then refine the problem formulation iteratively, as mentioned; framing or reframing (Dong et al., 2016). The main difference between abductive reasoning and generative sensing is that instance of abduction may only be a partial solution towards reaching the end-goal or end-problem, depending on the complexity of the final problem or the number of sub-problems that should be solved along the way. Since abductive reasoning is unlikely to be purely divergent or convergent but rather could be both (Dong et al., 2016). When being more divergent, it might mean creating several hypotheses about the new form of business model, being more convergent might be after the choice has been made for a certain BM to explain in which use context or which new forms might be explored.

4.2.1 Successful business venturing

In the final stage of the interviews, the participants had to answer the question what their definition of a successful business model was. It is expected that these variables link closely to the previously described drivers and motivations of the participants in Section 4.1.4, as it is highly likely that a manager's motivation during the BMI process will be to create a successful BM. Therefore, it is expected that the drivers mentioned in Section 4.1.4 link closely to their description of what a successful BM is. In Section 4.1.4 the majority of the participants mentioned that their drivers were innovating radically, gaining customer satisfaction and generating sufficient profit. Table 7 below presents the answers given by the participants to describe the variables that define a successful business model.

Table 7, Variables to define the success of a business model.

Variable	Number of Participants who mentioned this	Participants who mentioned this
Profitability (money)	10	1, 2, 4, 6, 7, 8, 10, 12, 13, 14.
Customer satisfaction	10	1, 2, 3, 5, 6, 7, 8, 9, 13, 14.
Stakeholder satisfaction	4	6, 7, 8, 13.
Achieving goals	2	5, 15.
Achieving assumption	2	8, 12.
Radical innovation	2	3, 6.
Scalability	2	4, 10.

The majority of participants mentions that both profitability and customer satisfaction are key criteria to determine whether a business model is successful or not. This is similar to what was explained in Section 4.1.4. A smaller number of participants mention the importance of stakeholder acceptance, which is broader than purely customer satisfaction. Stakeholder satisfaction can also mean satisfaction of employees and/or suppliers or other stakeholders who are involved such as other board members. The three mostly frequently mentioned variables are shown in the following quote: *"Two variables, customer satisfaction, no three, customer satisfaction, employee satisfaction, client growth and profitability."* Furthermore, the stakeholder satisfaction variable includes the perception of stakeholders about the content and/or quality of the new business model. Of the participants, 27% mention that the success of a business model for them is when they achieve their pre-determined goals (n=2) or when they have proven that their forecasts were accurate (n=2): *"[Describes a vast number of forecasts] Yeah, so it is important to see if this portfolio is going to work. So, how many people are really coming to our website and stick with the games that we offer them. So, both how many and how close are we, do we think, to the real estimation of the [name] target group… So how close do you get to this prediction, that is the most valuable variable."* Furthermore, another 2 participants mention that a business model is successful when it comprises radical innovation, this links back to what was examined in Section 4.1.4 in which the drivers and motivation of managers during the BMI process are discussed, here radical innovation was mentioned more frequently than when describing it as a variable to measure the success of a business model. Lastly, two participants specifically mention that scalability is an important variable in defining whether a business model is a successful one, as this will probably lead to higher profits in the end: "*Is it scalable? Because, yeah, I can offer it in a very specialized way and only to one person, but if it is not scalable it will stop there.*"

In conclusion, these variables of success for a business model link closely back to Teece's definition of business models (2007, p. 1329) used during this research: *"A business model is a hypothesis about what customers want and how an enterprise can best meet those needs and get paid for doing so."* In Section 3.5.1 it was learned that the participants' view of the term business model differed from this definition.

However, when asked about their variables to measure a successful business model, this suggests a vast overlap between Teece's definition of a business model (2007) and the variables of a successful business model defined by the participants. Namely, the profitability variable links to the last part of Teece's definition (2007, p. 1329): "*… and get paid for doing so.*" The customer and stakeholder satisfaction variable links to the middle part of Teece's definition (2007, p. 1329): "*… about what customers want and how an enterprise can best meet those needs…*" Since this shows the potential to (ultimately) gain stakeholder satisfaction. Lastly, the achieving goals and/or assumptions variable shows that before the model was made it was based on certain predictions and/or hypotheses, linking to the first part of Teece's definition (2007, p. 1329): "*A business model is a hypothesis…*". Unfortunately, the two-times mentioned importance of scalability and radical innovation cannot be directly linked to Teece's definition (2007). However, this might be linked to the definition indirectly, as it is highly likely that a scalable business model will allow for more sales leading to more profitability which was already explained and linked to Teece's definition of business models (2007). Furthermore, radical innovation has large possibilities to increase profitability since there are no other companies or competitors offering similar services and/or products. The ways in which the participants determine whether a business model is successful or not definitely links to Teece's definition (2007) that was used to describe the term business model. Whereas in Section 3.5.1 a link could not be established between Teece's business model definition (2007) and the definition of a business model as stated by the participants. However, this link can indeed be found when delving deeper into their knowledge and experience with business models and their success.

When examining all backgrounds and seniority of the participants, they all have medium to very high experience with business model innovation. More specifically, 7 of the 15 participants have very extensive experience with business model innovation, i.e. that they have been involved in BMI on more than 50 occasions. Another 5 of the 15 participants have been involved in BMI between 10 and 50 times. Lastly, 4 of the participants have been involved in BMI between 4 and 10 times. More information about the participants is presented in Table 4 in Section 3.2. When examining their success, it is important to mention that all participants have good positions in various organizations of various sizes. In this case, only the participants that used instances of abductive reasoning were examined, since the research is about the effect of using abductive reasoning in business model innovation on successful business venturing.

The participants were asked to evaluate themselves when determining their success. This might be a limitation because the managers themselves may view the outcome more positively than the 'cold numbers' might. Nevertheless, all participants were very open and honest when things or situations did not succeed. Therefore, there is a good chance that the participants were indeed telling the truth about the success and hence it should be a sufficient criterion for our assessment. The data analysis shows that 67% of the examples, 8 out of 12, clearly resulted in success, all of them were either adopted by competitors or the business model is still in use and successful.

In two more cases, 17%, business model innovation is currently considered as a success but has not been operating long enough to confirm that the model is a success. In another example, the specific instance of business model innovation that was named had not been successful, although this individual had been successful in many other examples that he mentioned.

One of the participants who reasoned abductively, went bankrupt after a few years. This was the only example in this research, in which the explicit use of abductive reasoning could not be related to some kind of success following the implementation of BMI. It is notable that it represents only 5% of the total sample. However, in this case, the participant still viewed the process and set-up of the BMI as a huge success, as some minor inventions and (sometimes risky) experiments that he and his partner conducted during this process provided a basis for more knowledge throughout the entire industry: *"Oh yeah that incident was later spoken about on all congresses around the world, it was in around 2012, yeah everyone was talking about the danger of [mentions a specific chemical substance] and now there are all kinds of rules according the use of [mentions a specific chemical substance]."* He mentioned this specific example of BMI because he had most fun during this process owing to the adventurous and explorative mindset required for the BMI process. The participant mentioned that the main reason for the failure of their BM was that they should have involved parties with more capital in an earlier stage, this was his idea but he and his partner disagreed on this: *"No, that was all right, but I did not agree with my partner. My partner wanted to remain a majority shareholder and keep control, what was more in his biorhythm, that is the way he thinks. While I am much more, I think about growth, we need capital because the car has to drive, so the tank must be full."* Here, the participant mentions a key part of abductive reasoning that was already mentioned before: think about the future and make predictions and forecasts for the future. The scenario that the participant sketches is that he is much more future oriented than his partner and already anticipated the problem, where his partner was much more present oriented and did not want to focus on future possibilities, leading to their final bankruptcy.

This statement implies that the use of abductive reasoning and having a more future-oriented mindset can prevent these biases and lead to more successful business venturing. The use of abductive reasoning during the BMI process cannot guarantee success, but because of this more future-oriented mindset that might prevent such bias, it increases the likelihood of not failing.

In conclusion, most cases of successful BMI that were heard seem to involve some form of abductive reasoning and/or generative sensing mechanisms. Hence, there is a good likelihood of this being applicable on a broader basis. Therefore, it is likely that there is a correlation between abductive reasoning and successful business venturing, not only owing to a more future-oriented mindset and the prediction of a future outcome scenario but even more because often it creates a certain timespan and plausible path into this future outcome scenario and/or future end goal or end value. Rather than just future or divergent thinking, it helps managers to create plausible explanations for certain observations and formed hypothesis. In line with these results, the one example in which abductive reasoning was present during the BMI process but did not lead to ultimate success reveals sustentation for the positive effect of abductive reasoning during the BMI process. After all, any support in business venturing can make a difference between success and failure.

Chapter 5.

Discussion of Empirical Research

5.1 Discussion of Empirical Research

The results suggest a correlation between abductive reasoning and successful business venturing. In most of the reasoning processes of the participants (n=12), clear instances of abductive reasoning could be found within the conception and process of implementing business model innovation. The few participants for whom no instances of abductive reasoning were observed (n=3), were either working for a (semi) government agency (n=2) or as a consultant focusing more generally on business process management (n=1). In all cases, as described in their BMI process, see Appendix E, there is less emphasis on creativity within the organization and even more no future-oriented mindset is particularly necessary. This could be a plausible explanation of why no instances of abductive reasoning were to be found.

As mentioned earlier, most participants adopt a different approach to BMI but there are still vast similarities between these processes. Figure 19 represents a generic model of how to approach BMI is shown in the form of a flowchart. It is based on the empirical research and shows how executives (successfully) approach BMI. The process shows the presence of both generative sensing as well as abductive reasoning in general. Before a process starts, most managers had either a specific demand from a client or a certain observation or idea that they wanted to develop further. After a certain reframing or probing their analysis phase starts by researching the user's needs, the market/context and competitors and examining future trends. All this input combined is the starting point for developing new ideas and/or concepts. The previously described process is very similar to the process of abductive reasoning since it shows the process of creating hypotheses, entailing a certain feasibility of a possible business venture.

Furthermore, the next step, which entails the new ideas and concepts to be evaluated iteratively, shows large similarities with generative sensing. In line with the statements of Roozenburg & Eekels (1995) about the importance of iteration in the design process, designers identify situations in an iterative process going back and forth between observations and hypotheses and different forms of reasoning: so-called generative sensing.

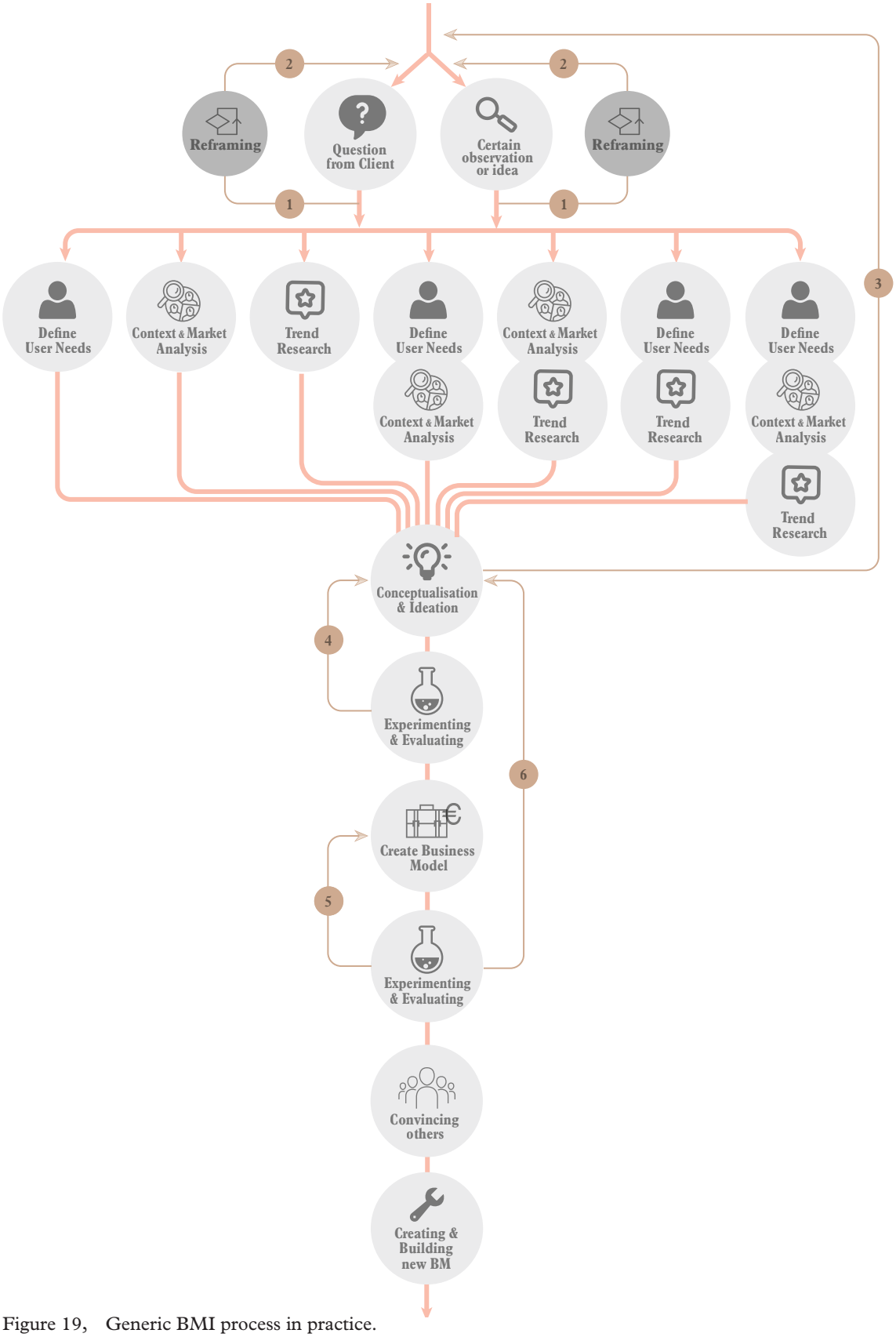


Figure 19, Generic BMI process in practice.

The pink arrows in the flowchart are the basic steps that can be taken during this process and the brown arrows show the vast opportunity for iteration during this process. Since the flowchart shows a rather linear and dogmatic process, it is important to note that the process is not a dogmatic one. The iteration steps shown in the figure are optional and depend on the situation and context of the entire process. However, the opportunity for iteration is very important during the BMI process, as the vast majority of participants specifically mentioned the importance of iteration during this process.

The process can start either with a direct question from a client or with a certain observation that initiates a first idea. After a possible reframing or probing of this question/ idea (Arrow 1 and Arrow 2), an analysis phase will start in which user needs are research, the context and the market are examined along with current trends. It is important to mention here that not all participants used all three methods, so here again, this analysis phase is a rather modular one in which the most suitable research methods may be mixed and matched.

After the analysis phase, an initial idea can be expressed in the form of a concept. However, in some cases, it is determined after the analysis phase that the initial idea or question was not framed correctly or does not offer suitable possibilities for the company. This is shown in the flowchart by Arrow 3, which links back to the first step which defines an initial observation or question from a client and the entire process starts again. If the analysis phase has been proven to be successful, this can lead to the creation of an idea or concept which will be evaluated. The evaluation can be positive, i.e. creation of a certain business case may commence. If the evaluations do not prove successful, the initial idea can be revised, as shown by Arrow 4.

The creation of a business case or prototype for the new business model in another form, will also be evaluated.

This follows the same procedure as the step described before, when the evaluations do not prove successful the initial business case or other prototype of the new business model will be revised again, as indicated by Arrow 5. In some cases, this evaluation proves that the new business model is not feasible at all and should be adjusted entirely. This iteration step is indicated by Arrow 6 in Figure 19.

When the evaluation of the business case proves successful, this will be used to convince others. Other people do not necessarily have to be in higher management, but convincing other colleagues is also key in this phase, as they will probably have a more operational role later in the process. When everyone or most people have been convinced, the building of the new model and its implications will start.

This process is very similar to that of Roozenburg & Eekels (1995), who describe the PI process, as indicated in Figure 14. The largest difference here is that a concept or idea often already exists before the analysis phase or before the synthesis phase starts. Furthermore, the simulation and evaluation phase are combined in the BMI process and now form a 'constant loop' that can be repeated time and again to arrive at the right business model. Whereas this specific phase is rather linear in the product innovation process, there is no room for iteration here at least not until the 'decision' phase. Overall the model that was sketched in practice is most similar to that of Doz & Kosonen (2010), who also mention the importance of convincing other people and forming a team (leadership unity) as well as creating new resources (resource fluidity) to form the new business model. Furthermore, Doz & Kosonen list distancing (gaining perspective), abstracting (gaining generality) and reframing (iteration) as key steps within their 'strategic sensitivity' phase during business model innovation.

Next, when looking more closely into the BMI process itself and the goals used by managers, it is interesting that most participants use indirect or more distant goals during the BMI process. A small part of the participants uses solely indirect goals and a slightly larger part often uses a combination of both direct and indirect goals. The use of indirect or more distant goals is important during the BMI process, as it could prove to be a link to abductive reasoning. Indirect goals are often more future oriented than direct ones and the path towards reaching these indirect or distant goals entails more insecurities and unknowns than direct goals do. This is in line with one of the criteria that was used to identify whether there was any abductive reasoning within the process, namely: *"This observation triggers the formation of a hypothesis about a future outcome (which can either be true or false)"*. In this case, the distant goal (the future outcomes) of which it is highly likely that mangers will form hypotheses.

Furthermore, the empirical research provides strong evidence for the importance of using intuition during the business model innovation process; almost all participants mention the importance of intuition during that process. This is in line with what scholars mention about the importance of intuition during a manager's decision-making process (Huang & Pierce, 2015). When discussing the concept of intuition with managers in practice, it was found that during the BMI process, managers use a combination of data and insights from their analysis and combine this with their intuition or sometimes their 'gut feeling' to shape their business strategy and/or business model. Furthermore, the participants mention that innovating radically in order to reach sustainable advantage is one of the most important drivers during the BMI process. This is in line with the idea about BMI giving a company more sustainable competitive advantage (Bucherer et al., 2012).

In practice, executives themselves mention that BMI can help a company gain more sustainable competitive advantage because the BMI process is more intuitive and has a hunch-based nature when the ideation for a possible new BM commences. Within this process there are many risks and uncertainties and the use of a variety of forecasting techniques will help them feel more secure to make decisions within this process, whether they ultimately prove to be successful and accurate or not. Again, these results suggest the importance of both abductive reasoning and generative sensing during the BMI process because it often starts with a hunch or gut feeling or, moreover, an initial hypothesis. This hypothesis is later evaluated and validated through extensive research to create evidence to reach a conclusion. Again, these results confirm the use of generative sensing within the BMI process, as the evaluation of a new idea comprises deductive analysis of existing evidence and abductive reasoning explaining the conclusions for example by using intuition and forecasting techniques. This is in line with what the participants describe about the BMI process starting with a hunch or gut feeling, this is highly likely to be a prediction or assumption about the future or a future outcome in the form of a hypothesis. These hypotheses are later evaluated and validated through extensive research to create evidence to reach a certain conclusion. When this co-occurs in a recursive process, it is called generative sensing (Dong et al., 2016).

Before concluding the empirical research, it is important to reflect on the research goals of this thesis. The goal of this research is to discover the presence of the use of abductive reasoning and/or generative sensing by managers during the business model innovation process. The second goal of this research is to examine whether the use of abductive reasoning and of the patterns pertaining to generative sensing, in the business model innovation process, will enhance successful business venturing.

Based on the empirical research, it can be stated that managers reason abductively in the business model innovation process. This research demonstrated that the vast majority of participants use patterns of logical reasoning during this process that can clearly be attributed to those of abductive thinking. Therefore, it can be induced that managers do reason abductively when doing business model innovation, and the first research goal is therefore achieved.

The second research goal is more detailed than the first, namely to examine if the use of abductive reasoning and of the patterns pertaining to generative sensing, in the business model innovation process, will enhance successful business venturing. As discussed in Section 4.2.1 on successful business venturing, the majority of the participants that were reasoning abductively innovated successful business models. Furthermore, for some participants (n=2), models had not been in use long enough to confirm they were a success, which figures did appear promising. It can therefore be inferred that the uses of abductive reasoning in the business model innovation process will enhance successful business venturing. Therefore, the second research goal has also been achieved.

In conclusion, based on the data obtained, it can be stated that the research goals have been achieved since the empirical research strongly suggests a correlation between the use of abductive reasoning in conceiving and implementing BMI and successful business venturing. This is not only due to a more future oriented mindset the ability to predict a future outcome scenario, but more so because it often creates a certain timespan and plausible path into this future outcome scenario and/or future end goal or end value. Rather than only future- or divergent thinking, it helps managers create plausible explanations for their observations and formed hypothesis.

In line with these results, the one example in which abductive reasoning was present during the BMI process but did not ultimately results in success, demonstrates sustainability of the positive effect of using abductive reasoning during the BMI process.

5.2 Limitations

As in all research, there are certain limitations to this research project. Firstly, convenience sampling was used to target the managers and CEOs. In that regard, the researcher knew some of the participants personally and this could result in their giving socially desirable answers, influencing the credibility of the research.

Furthermore, another possible factor is experimenter bias, not only on account of the researcher's inexperience but especially during the measurement and assessment of the presence of abductive reasoning and/or generative sensing within the BMI process.

Next, the inexperience of the researcher should be mentioned. This is only the second time that this researcher has conducted a large-sale research, which means there may be a higher chance of having biased the interviewees. This may result in less confirmability and dependability.

Moreover, the limited sample size should be mentioned: only 16 participants were interviewed for this research and the input of 15 participants was used for further analysis. The study spans companies from a variety of market areas and includes participants with a broad range of educational backgrounds. Despite the minimal number of interviews conducted, the research still provided very rich data and the key findings were found across different companies and market areas, which supports the validity of the research.

However, having conducted only 16 interviews is certainly a limitation for this research and it would be interesting in future research to include a larger sample size to investigate the effect of abductive reasoning in business model innovation on successful business venturing, for example with the aid of quantitative research.

Next, the participants themselves were asked to evaluate themselves to determine the success of the business model. This is a limitation because the managers themselves may view the outcome more positively than the 'cold numbers' might reveal. The topic of successful business venturing is very subjective, it is not an objective presentation. Since this was asked directly to the participants themselves, the answers were only as realistic and correct as the participants view themselves. Since, all participants were very open and also honestly indicated when things or situations did not succeed, it is expected that there is a good chance that the participants were indeed 'being truthful' about the success and hence it should be a sufficient criterion for our assessment.

Lastly, there is a limitation because of the comparability between answers provided in semi-structured interviews. The selected interview format led to detailed discussions during many interviews, which led to interesting and compelling insights into the business model innovation process. The individual answers were investigated extensively within these discussions. As this was initially the main goal of the research, obtaining rich data about the business model innovation process and the reasoning process that managers and/or executives follow during this process, the selected study design is considered to have been appropriate.

Chapter 6.

Conclusion

After the analysis of the results of the empirical research it is possible to answer the research and sub-research questions posed in the introductory chapter. This chapter will start by resuming the research goal and research questions.

As mentioned before, the motivation for this research originates from findings that imply that abductive reasoning plays a huge role in the success of product innovation. It therefore becomes desirable to examine what influence abductive reasoning has on success of business model innovation.

Based on this question, literature research was conducted to discover a possible knowledge gap and it was confirmed that this specific topic had not ben researched previously. Against the backdrop of earlier research, the main contribution of the present investigation is its focus on the role of abductive reasoning in business model innovation. Currently, research has been executed on the role of abductive reasoning in project acceptance as well as the influence on decision making in general. Furthermore, the role of cognition in business model innovation has been researched. However, no research has been conducted on the role of abductive reasoning in business model innovation. In doing so, this study was the first to deal with the issue. This resulted in the following research question:

"What is the effect of using abductive reasoning in Business Model Innovation on successful business venturing?"

This research question holds three topics that required definition, which was found to be challenging on the account of an overwhelming presence of literature on business model innovation and its definition. In order to overcome this challenge, elaborate research was conducted on the definitions of business models and business model innovation.

Furthermore, the definitions of business models and business model innovation and how executives approach business model innovation were examined during the empirical research.

The sub research questions comprise:

SRQ1. What do managers, such as CEOs, perceive by business model and business model innovation?

SRQ2. How do managers approach business model innovation?

SRQ3. How do managers apply abductive reasoning when engaging in business model innovation?

The main conclusions of the research and sub-research questions are synthesized in the following sections.

6.1. SRQ1: What do managers, such as CEOs, perceive by business model and business model innovation?

There has been no clear definition of business models in literature to date. As Magretta (2002, p. 8) states: *"Business model and strategy are among the most sloppily used terms in business, they are so stretched that they mean everything and end up meaning nothing."* In business model literature, most of the definitions have a triple focus, a combination of economic, strategic and operational aspects (Afuah & Tucci, 2001; Mitchell & Coles, 2003; Morris et al., 2005; Lecoq et al., 2006; Teece, 2007; Johnson et al, 2008; Baden-Fuller & Mangematin, 2013; Massa & Tucci, 2013; Casprini, 2015). Therefore, this research should include this triple focus in its definition of the term business model should include this triple focus.

The definition of Teece (2007, p. 1329) was used for this research: *"A business model is a hypothesis about what customers want and how an enterprise can best meet those needs and get paid for doing so."* in which the use of the word hypothesis is striking since it already shows potential for abductive reasoning, during which people create hypotheses to explain given observations to explain a desired value (Dong et al., 2016)

During the interviews, the participants were asked: *"How would you define a business model?"*. Most of the participants mentioned that a business model should entail the company structure, formulate how the company generates income or revenue, how the stakeholders are organized and how the model offers value to its users or the stakeholders of the company. After this, the research continued and the participants were asked what their main drivers were during the BMI process. The most important drivers included: customer satisfaction and profitability. This also shows the similarity between the most important drivers of managers during the BMI process and the definition of the term business model as proposed by Teece (2007). Moreover, customer satisfaction and profitability are the variables that participants mention when discussing how to define the success of a business model. Other important variables to determine whether a business model is successful comprise: stakeholder satisfaction, achieving goals, achieving assumptions, doing radical innovation and the scalability of the model. In conclusion, these variables of success for a business model link closely back to the definition of business models by Teece (2007, p. 1329) that were used within this research: *"A business model is a hypothesis about what customers want and how an enterprise can best meet those needs and get paid for doing so."* Section 3.5.1 elaborates on the participants' view on the term business model differed from this definition.

However, when asked about their variables to measure a successful business model a vast overlap is experienced between the definition of a business model by Teece (2007) and the variables of a successful business model defined by the participants. Namely, the profitability variable links to the last part of the definition by Teece (2007, p. 1329): "*… and get paid for doing so.*". The customer and stakeholder satisfaction variable links to the middle part of the definition of Teece (2007, p. 1329): "*… about what customers want and how an enterprise can best meet those needs…*". Since this shows the potential to (in the end) gain stakeholder satisfaction. Lastly, the achieving goals and achieving assumptions variables shows that before the model was made it was based on certain predictions and/or hypothesis, linking to the first part of the definition of Teece (2007, p. 1329): "*A business model is a hypothesis…*".

Business model innovation is defined in the literature (see Section 2.3) as: "*a reconfiguration of activities in the existing business model of a firm that is new to the product/service market in which the firm competes.*" (Santos et al., 2009, p14). This is in line with what the majority of the participants mentioned during the interviews: *"… But maybe it's more important that you think about it too, well, if we get that Canvas, that can be filled in. On essential parts. So, do not just serve other target groups with the same product, but maybe you might have a very different product, maybe a service, etc. So fundamental changes in your currently existing model."* and *"A reconfiguration, you can take things away, you can add things, you can shuffle it and organize it differently."* It is interesting to note here that most participants already talk about "what to do" rather than "what BMI is". For example, several participants mention that the business model should be considered before creating something more innovative.

Furthermore, thinking about the business model before it is to be implemented and before development of a product or service commences is crucial to the success of BMI. *"Before I start, So I have an Idea, I'm doing something fun, but when it comes to business model innovation, it is about something that is not yet there, because otherwise it is not innovation. So, I know before I go ahead, before I put it on the market and create a business model, I should think about yes, but what are my chances, can this be successful?"* In conclusion, managers perceive business model innovation in a similar way as described in BMI literature. However, they talk more about how to approach BMI rather than its definition, this is further addressed in Section 6.2.

6.2 SRQ2: How do managers approach business model innovation?

When examining literature on how to approach business model innovation, it was found that all scholars propose a different approach to BMI. Calvancante et al. (2014) take more strategic oriented approach and do not go into detail. Conversely, the framework of Doz & Kosonen (2010) covers all different phases of BMI, not only the design phase but also how to implement it and get the team on board and how to manage a company's resources. Euchner & Ganguly's (2014) framework is very similar to the product innovation process, but does not include anything about customer involvement in this process. The model of Trimi & Berbegal-Mirabent (2012) focusses purely on customers and even the voice of the consumer is integrated in the design phase. When examining the results of the empirical research, it can be stated that all participants choose a different approach, similar to all the different approaches in the literature. Most managers adopt a different approach to BMI but there are still wide-ranging similarities between these processes. Figure 19 presents a generic model of how executives (successfully) approach BMI.

The process shows the presence of both generative sensing as well as abductive reasoning in general. Before a process starts, most managers have either a specific demand from a client or a certain observation or idea that they wanted to develop further; after a certain reframing their analysis phase starts in which they research the user needs, the market/context and competitors and examine future trends. All this input combined is the starting point for developing new ideas and/or concepts. The aforementioned process is very similar to the abductive reasoning process, as it reflects the process of creating hypotheses, entailing a certain feasibility for a possible business venture. Furthermore, the next step in which the new ideas and concepts will be evaluated iteratively, has many similarities with generative sensing. This is highly comparable to what Roozenburg & Eekels (1995) mention about the importance of iteration in the design process in which designers identify situations in an iterative process going back and forth between observations and hypotheses and different forms of reasoning, the so-called generative sensing.

6.3 SRQ3: How do managers apply abductive reasoning when engaging in business model innovation?

As examined in the literature research, see Section 2.4, creative cognition strongly influences the dynamics of business model innovation (Cavalcante et al., 2011). Processes underlying creative cognition may include: conceptual combination, analogy and/or initial problem formulation.

All these processes were found during the interviews. Similar to these ideas are the principles of generative sensing and abductive reasoning.

During the BMI process, managers mostly use indirect or more distant goals. This use of indirect or more distant goals during BMI is important for this research, since it could prove a link to abductive reasoning. Indirect goals are often more future oriented than direct ones and the path towards reaching these indirect or distant goals entails more insecurities and unknowns than direct goals. This is in line with one of the criteria that was used to identify if whether any abduction was present within the process, namely: *"This observation triggers the formation of a hypothesis about a future outcome (which can either be true or false)."* In this case, the distant goal is the future outcome of which it will be highly likely that mangers will form hypotheses.

Furthermore, the empirical research provides strong evidence for the importance of using intuition during the business model innovation process; almost all participants mentions the importance of intuition during the BMI process. This is in line with what scholars mention regarding the importance of intuition during a managers' decision-making process (Huang & Pierce, 2015). When discussing the concept of intuition with managers in practice, it was found that managers use a combination of data and insights from their analysis during the BMI process, and combine this with their intuition or gut feeling to shape their business strategy and/or business model, in line with the idea that BMI can give a company a more sustainable competitive advantage (Bucherer et al., 2012). Furthermore, the participants mention that innovating radically to reach sustainable advantage is one of the most important drivers during the BMI process.

In practice, executives themselves mention that BMI can help a company to gain more sustainable competitive advantages because the BMI process is more intuitive and has a more hunch-based nature when commencing ideation of a possible new BM. There are many risks and uncertainties within this process and the use of a variety of forecasting techniques will help the managers to feel more secure about making decisions within this process, whether they prove to be successful and accurate in the end or not. Again, these results suggest the importance of both abductive reasoning and generative sensing during the BMI process because the process often starts with a hunch, a gut feeling that can be described as an initial hypothesis. This hypothesis is later evaluated and validated by doing extensive research in order to create evidence to reach a conclusion. Again, these results confirm the use of generative sensing within the BMI process, since the evaluation of a new idea comprises deductive analysis of existing evidence and abductive reasoning explaining the conclusions for example with the use of intuition and forecasting techniques. This is in line with what the participants describe about the BMI process starting with a hunch or gut feeling, which is likely to be a prediction or assumption about the future or a future outcome in the form of a hypothesis. These hypotheses are later experimented with and validated by conducting extensive research to create evidence to reach a certain conclusion. When this co-occurs in a recursive process, it is called generative sensing (Dong et al., 2016).

There are many rules that companies should follow to maintain competitiveness. To stay ahead of the competition, companies must rely on dynamic capabilities such as sensing processes, especially while evaluating strategic options.

One of these sensing processes is generative sensing, which can enable companies to leverage relevant information to identify a problematic situation and then iteratively refining the problem formulation, as mentioned before; framing or reframing (Dong et al., 2016). The main difference between abductive reasoning and generative sensing is that instance of abduction may only be a partial solution towards reaching the end-goal or end-problem, depending on the complexity of the final problem or the number of sub-problems to be solved along the way. Indeed, abductive reasoning is unlikely to be purely divergent or convergent and could even be both (Dong et al., 2016). When being more divergent, it could mean creating several hypotheses about the new form of a business model, being more convergent could be after the choice has been made for a certain BM to explain in which use context or which new forms could be explored.

The use of abduction in business model innovation is different from the form of abduction used in product innovation. Product innovation is mainly a much shorter and smaller process than the average business model innovation process. Mainly one or two instances of abduction can be found in product innovation. Whereas in business model innovation, many more instances of abduction are seen. Namely, executives have an idea of where they want to go, such as an end-goal, the sun on the horizon, but they have no idea of how to come there. The establishment of this sun is often already in the form of abduction and the little steps to get there are also smaller forms of abduction.

Chapter 7.

Recommendations and Contributions

Now that the conclusions have been drawn regarding the definition and process of business models and business model innovation and the use of abductive reasoning during the BMI process, it is time to conclude this thesis by making some managerial recommendations. Furthermore, the recommendations for future research are explained in Section 7.2, while the contributions of this research for both science and practice are explained in Section 7.3.

7.1 Recommendations for managers

Preparation of the recommendations of managers included a draft written version which was sent to the executives who participated in this research. Five of the participants responded to the recommendations. The implications were discussed over the phone and some minor changes were subsequently made. The overall conclusion is that the recommendations fit the executives' processes and approaches but this mostly befalls in an intuitive and unconscious manner. This research demonstrated that using instances of abductive reasoning and generative sensing can help managers become more successful during ideation and implementation of business model innovation. Therefore, it is specifically beneficial to managers to consider these methods of reasoning more consciously. This was acknowledged by the participants who stated that these conclusions sound very logical, but entail a rather unconscious and more intuitive way of thinking.

The results presented in this thesis are derived from in-depth conversations with 15 experts on the topic of business model innovation. Their approaches and motivations during the business model innovation process were discussed during these conversations. The research goal was to establish whether managers use instances of abductive reasoning during the BMI process and what the effect of this reasoning is on successful business venturing.

A more elaborate analysis of these results can be found in Section 4.2. Most cases of successful BMI that were explored during this investigation, involve a form of abductive reasoning and/or generative sensing mechanisms. Hence, there is a good likelihood that this may apply on a broader basis. It is therefore likely that there is a correlation between abductive reasoning and successful business venturing, not only because of a more future oriented mindset and already predicting a future outcome scenario but even more because it often creates a certain timespan and plausible path into this future outcome scenario and/or future end goal or end value. Rather than only future or divergent thinking, it helps managers to create plausible explanations for certain observations and hypotheses. After all, any support in business venturing can make a difference between success and failure. In line with what the literature (Dong et al., 2016) describes regarding the importance and benefits of the use of abductive reasoning during the product innovation process, this research demonstrated that the application of abductive reasoning can significantly improve the likelihood of managers to become more successful at the ideation and implementation of new business models. In conclusion, the conducted research suggests that executives can draw substantial benefits from applying higher ratios of abductive reasoning when generating ideas for BMI.

There are many rules that companies should follow to maintain competitiveness. To stay ahead of competition, companies must rely on dynamic capabilities such as sensing processes, especially when evaluating strategic options. One of these sensing processes is generative sensing, which can allow companies to leverage relevant information to identify a problematic situation and then iteratively refine the problem formulation, as aforementioned; framing or reframing (Dong et al., 2016).

The main difference between abductive reasoning and generative sensing is that an instance of abduction may only be a partial solution towards reaching the end-goal or end-problem, depending on the complexity of the final problem or the number of sub-problems that should be solved along the way. Indeed, abductive reasoning is unlikely to be purely divergent or convergent but could be both (Dong et al., 2016). When being more divergent, it could mean creating several hypotheses about the new form of a business model, being more convergent could follow the choice has been made for a certain BM to explain the relevant use context or which new forms might be explored.

Based on the experiences of the interviewed executives, business leaders should make an effort to advance their cognitive capabilities to envision future opportunities by conducting extensive market research, investigating trends and understanding customer needs and wants. As Guenther et al. (2017) state, understanding the market potential and the customer problems lead to more innovative abductive reasoning (abduction-2) than personal experiences. As discussed in Section 2.4, scholars already mention a link between cognitive abilities and successful business model innovation (Cavalcante et al., 2011). Cognitive processes associated with creative cognition include: conceptual combination, analogy & initial problem formulation (Ward, 2004). Managers should be aware that the use of iteration and reframing during the BMI process is key for a successful outcome. Moreover, managers should use forecasting methods such as creating business cases, examining trends and contextual research for example in other domains and to mentally forecast and simulate plausible paths to predict future outcomes and opportunities. As mentioned in Section 2.4, reframing is a method of shifting semantic perspective in order so view things in a new way.

Reframing can help managers become more creative and think out-of-the-box it can transfer a problem from one domain to another, i.e. making use of another, second, set of prior-domain-specific knowledge. This domain specific bias could also be bridged by using metaphors or analogies, since these methods also combine different domain knowledge. Reframing is part of the previously mentioned generative sensing, as it builds on the evaluation of a design concept and can lead to new knowledge changing one's view of this concept resulting in a certain reframing of the problem itself. Furthermore, once aware of the use of abductive reasoning, managers could force themselves and their team to reason abductively before the start of business model innovation. Managers could approach this by prompting their team to think abductively before the start of a new project, for example by doing small brainstorm exercises that probe people to form hypothesis about future situations. Managers should train themselves into adopting such a mindset, train themselves in this business model innovation process, as it can lead them to better understand and capitalize on opportunities. This could be done by searching for inspiration and information in other domains, where managers or entrepreneurs might or might not have prior knowledge (Fiet, 2007; Guenther et al., 2017), to find new opportunities. Furthermore, to become successful at business model innovation, it is important for managers to be open to experimentation, questioning the status-quo and easily recognize patterns (Dyer et al.,2008). Especially pattern recognition shows similar cognitive processes to those used in creative thinking (Weisberg, 1999; Welling 2007) and is often linked to counterfactual thinking (Gaglio, 2004).

In conclusion, the results of the current investigation suggest a correlation between abductive reasoning and successful business venturing.

Combined with the findings from the present investigation, managers should use creative capabilities such as abductive reasoning and generative sensing during the business model innovation process in order to become successful at both the ideation and implementation of a new business model. Managers should train themselves to adopt a mindset such as this, train themselves in this business model innovation process as it can lead them to grasp opportunities better. However, no definite set of capabilities or specific reasoning processes exists that managers should adopt ubiquitously; this research suggests that when applying abductive reasoning logic and using instances of generative sensing during business model innovation, it is highly likely that this will have a positive effect on the final outcome of a business model.

7.2 Recommendations for future research

Both the conclusions of this research and the limitations of the project provide for several starting points for future research. Bearing in mind that this project has been of very exploratory nature, further validation, generalization and operationalization are required to develop the theory further and really understand its possibilities. Much still remains to be discovered about the use of abductive reasoning in business model innovation.

More in-depth and real-life studies into how this business model innovation process is designed and how managers reason within this process are especially encouraged, as the current research focussed more on executives' reflections on their BMI processes.

Furthermore, it would be interesting to examine whether this theory can be evaluated in a more experimental setup, in which managers would be probed to think abductively before making decisions on business model innovations or during the business model innovation process. In this case it will be truly possible to evaluate the effect of the use of abductive reasoning on the outcome (and success) of the innovation. This could be done in the form of experimental research, aiming to create an understanding of causal processes too: using manipulation and controlled experimenting to examine the effect of using abductive reasoning in business model innovation.

In conclusion, much still remains to be discovered about the effect of abductive reasoning in business model innovation, and work addressing these issues is very welcome.

7.3 Contributions

The scientific and managerial contributions will be discussed and elaborated on in this section.

7.3.1 Scientific Contributions

Against the backdrop of prior research, the main contribution of the present investigation is its focus on the role of abductive reasoning in business model innovation. Currently, research has been conducted on the role of abductive reasoning in project acceptance as well as the influence on decision making in general. However, no research has been conducted on the role of abductive reasoning in business model innovation. In doing so, this study was the first to address this issue. The research has formed a basis for further exploration of opportunities for using abductive reasoning and generative sensing during business model innovation.

This research contributes to current understanding and science by proposing a theoretical strategy based on both relevant literature and extensive empirical research concerning the effect of abductive reasoning in business model innovation on successful business venturing. Moreover, by making this conclusion explicit, handles are provided for more elaborate research into the effect of abductive reasoning and generative sensing in business model innovation and how this might be approached.

7.3.2 Managerial contributions

Not only does this research have scientific value, it also contributes in a more practical way. This research has generally contributed to the 'industry' of business model innovation by introducing an overview of the existing literature on both business models and business model innovation. This was then validated with 15 semi-structured qualitative interviews. The main managerial contribution is the conclusion that abductive reasoning in business model innovations has a positive effect on successful business venturing. This is explained in Section 7.1, in which recommendations for managers are given regarding how to approach business model innovation and how to involve abductive reasoning and generative sensing throughout this process. It became evident during this research that there is no true path to business model innovation, but that everyone employs similar methods and tactics to achieve this.

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Appendices.

Appendix A - Interview Guide
Appendix B - Intermediate Codebook
Appendix C - Definitions of the term Business Model by participants
Appendix D - Definitions of Business Model Innovation by participants
Appendix E - Business model innovation visuals
Appendix F - Abduction in Reasoning process

Appendix A

Interview Guide

General Introduction

Against the backdrop of earlier research, the main contribution of this investigation is its focus on the role of abductive reasoning in business model innovation. Currently, research has been done on the role of abductive reasoning on project acceptance as well as the influence on decision making in general. Furthermore, the role of cognition in business model innovation has been research. However, no research has been done on the role of abductive reasoning in business model innovation. In doing so, my study will be the first to deal with this issue.

Main Research Question

What is the effect of using abductive reasoning in Business model innovation on successful business venturing?

Research Goal

The goal of this research is to examine in what way managers apply abductive reasoning in Business Model Innovation and what the effect of this is on successful business venturing.

Target Group

The target group of this research will be CEO's and top managers of preferably large companies who have recently (in the last 5 years) undergone an innovation in their business model.

Approach for the interview

The interview will be semi-structured, which means that there will be predetermined questions that still have space for elaborating further on certain details or conflicts. This, of course can't be determined beforehand. Below the interview guide for the semi-structured interview is shown.

Interview format

Introduction:
Thank you for joining me and helping me out by participating in this interview today.

Introduction of me

As mentioned before, this research is for my master thesis for the master Strategic Product Design at the faculty of Industrial Design Engineering at the Delft University of Technology.
This research is exploratory and qualitative, this means that I am interested in your personal experience. That means, all your experiences and knowledge are useful for me: there is no right or wrong. The results of this interview will act as a basis for writing both my master thesis itself and a research paper that will likely be published in the near future.

Participating in this interview is completely voluntary. You may withdraw your consent at any time without reason and without consequences to you. All interviews are strictly confidential. Any information provided will be made anonymous and used for scientific purposes only. Please do not hesitate to clarify any questions you may have.

To make the analysis phase more easy for me, I would like to record this discussion. Could I get your permission to record and document the subject during the interview?

Part 1: Sensitizing

Sensitizing question:
When you think about Business Model Innovation, what does it mean to you?

Opening question:
Can you tell me about the recent Business Model Innovation that you have been going through, something where you already know how successful it has been in terms of financial performance/ performance changes resulting from it?

(Probe for BM: "Business model innovation is a reconfiguration of activities in the existing business model of a firm that is new to the product/service market in which the firm competes."
Extra probe: This can be done by innovating when combining their resources or harnessing the resources of your partners, suppliers or customers, to create something more novel, add complementaries to the current business model or to create more efficiency.)

Follow-ups & Probes:
- When was this?
- When did you started thinking about changing your current BM?
- What was the reason for wanting to change the model?
- Why?

Part 2: Reconstructing the reasoning process

Introduction:
I am trying to cover the complete process of BMI, starting from the beginning until the final implementation of the new BM or the adaptations you have made within your current BM.

Opening question:
When looking back to one of the innovations that you have just told me about.
(something where you already know how successful it has been in terms of financial performance)
Can you describe the difference/novelty of the targeted BM from the one that was already there at the time?
- What was the novelty of the new/targeted BM?

What did the process of defining and introducing the new BM look like?
- What or who was the trigger for starting this process?
- What were your main drivers/motivations?
- What did you want to achieve?
- What were the first steps that you took?
- Could you describe the process that started from that point?
- In what way did you explore competitive trends?

- In what way did you explore societal trends?
- In what way did you explore customer needs and/or preferences?

What was the next step/were the next steps?
- Which were the moments where you had to make decisions?
- How does your company/firm typically make a decision like this?
- Who was involved in this decision-making process?
- Why?
- What was their/his/her level of seniority?

To what extent did you explore more distant goals or less immediate goals?
Immediate goals: We had a client/shareholder in mind and wanted to satisfy their concrete demand…
Less immediate goals: We thought the experience would help us with this other project we had started already… or we wanted to see how far we could get with this business model at all. ..
- Could you elaborate on that?
- Why did you make this decision?
- Why did you focus on ….?

Did you use any kind of forecasting techniques and/or metrics to evaluate the opportunity from this BMI?
- What metrics did you use to test/foresight the successfulness of the new/adapted BM?
- How did you prioritize these?
- How was this/were these applied?

When you were making decisions within the process, or within the final decision, how were these metrics used to argue for or against the new BM?
- Could you recall the primary reasons or drivers for your decision?

Could you give me any examples of how people, your customers, will be/are influenced by this new Business Model?
- What kind of corporate restructuring was needed for these changes?
- What kind of concerns were expressed during the process of setting up, defining and discussing the changes of the BMI?

Part 3: Reflection; success

Looking back on the process itself, how do you reflect now on the process that you have followed?

Reflecting purely on the outcome of the BMI, what do you think about the new/adapted BM?
- In what way is it/ is it not more successful than the previous one?
- Why?

Which metrics do you use to evaluate whether a BM is a successful one?
- Why?

Were your forecasts achieved?
- How accurate were your forecasts?
- How much did they differ from the initial expectations?
- Is the BM still in use?
- Do you run it as a separate/parallel BM? Why?
- Has it been developed further?

How would you evaluate the new Business Model in comparison to competitors?
- What is the biggest difference?
- What are the similarities?
- Why?

In what way, do you think that your expertise has influenced the process of BMI within your company?
- What do you think is/was the role of intuition within this process?
- Why?

Part 4: Demographics

Before we end this interview, could you briefly elaborate on your educational background and your career path up to this point?

Could you give me an estimation of how many times you have been involved in business model innovation in your career up to this point?

In case I have any questions regarding our discussion, would it be alright if I contacted you again?

Would you be interested in receiving any of the results in the end of this project?

Appendix B.

Intermediate Codebook

(never) radical innovation
(no) diversity(never) radical innovation
(no) diversity
(no) research
(not) involving customers
(wrong) Forecasts
5R-model
6-Sigma
Abduction
Achieving goals
Activity based costing
Adaptive Power
Added value
Adjusting
Adjusting BM to become interesting for third parties
Advantage = no influence of business visions and models
Adventure
Agile
Agile & Scrum
Amazing period
Amount of clients
Analogies
Analysis
Anticipating
Applying technology
Argumentation + Proof
Argumentation for change
Asking questions (filling in the blanks)
Assumption testing
Assumptions
Autonomy
Backlog
Bankruptcy
Belief
Benchmarking
Best of Industry Team
Blind spots
Blue ocean
Board approval
Board involvement
Brainstorming
Branding
Bridging the gap
Building a business model around innovation
Business case
Business model canvas
Business Model Innovation
Calculations
Challenging culture
Change
Change management
Change mindset
Choice of technique & process
Clear endgoal
Client expectations
Client experience
Client growth
Client impact
Combination of concepts
Combinations
Communication
Company Structure
Competition
Competitor power
Competitor Reactions
Components
Conceptual thinking
Conceptualisation
Consulting
Content
Context Research
Continuous improvement
Converging
Convincing clients
Convincing employees
Costs
Creativity
Criteria
Culture
Curiosity
Customer investment
Customer Journey
Customer satisfaction
Daring
Data driven decision making
Deadlines
Decision making
Design thinking
Different BM
Difficult route
Direct & Indirect Effects
Direct goal

Discovering
Disruptive innovation
Diverging
Domain knowledge
Durable (sustainable) solution
Early to market
Economical Value
Employee satisfaction
End-goal
Enthusiasmizing colleagues
Evaluation
Excel
Expectations
Experience
Experimenting
Expertise
Feeling
Filling in the blanks
Firing non-adapters
Flexibility
Forecasting
Funnel
Future market size
Future oriented
Future user involvement
Global solution
Goal formulation
Growth strategies
Gut feeling
Hiring the right people (knowledge)
Historical inspiration
HIstory
Horizon model
Hypothesis
Hypothesis Testing
I am just gonna build it.'
Ideation
89
Identity
Income/Revenue
Indirect goal
Industry form
Industry impact
Industry shift
Influence of expertise
Innovation
Innovation Drive in Government versus Business
Innovation Strategy
Innovativeness
Inspiration
Interdisciplinary
Internationalisation
Intrinsic drive
Intrinsic motivation
Intuition
Investments
Involving stakeholders
Iteration
Knowledge
Launch plan
Leadership
Lean
Lean
Lean Management
Lean Processes
Learning by doing
Legislation
Lifetime value versus acquisition
List of requirements
Lock-in
Management position
Management skills
Market penetration
Market Research
Making Connections
Measurability
Method of Business Venturing
Methods
Mission/vision
Modular process
Monetization
Money
MoSCoW
Most important choices
Multi company solutions
MVP
Networking
New manners of business creation
no barriers
No commerciality
No competitors
No End-goal
No forecasting!

No room for Business Model Innovation @ Government
non forecastibilities
Non-hierarchical
not embarrassed
Not everything can be lean
Observation
Observing
Open innovation
Open minded
Option Generation
Out of the box thinking
Outsourcing
Overall knowledge
Overview
Parallel development
Parallel model
partnerships
Passion
Performance
Persona
Personal frustration
Pilot
Planning
Policy
Portfolio success
Positioning
Potential lifespan
Prediction
Presentation
Prioritising
Probability calculation
Problem Definition
Problem solutions
Problem solving
Process management
Process mapping
Process/procedure
Product backlog
Product/Service
Profitability
projecting behaviour
Proof
publicity
Quality
Radical innovation
Ratio versus Emotion
Reach
Reconfiguration
Reflection
Reframing
Reorganisation
Repeatability
Requirements
Research
Resistance
Resources
Results
Revenue Creation
Revenue model
Risk analysis
Risk reduction
Roadmap
Room for Abduction
Room for Innovation
Running business
Same client group
Same client process
Scalability
Scenario
Scoping
Scrum
Security
Selling product (prototype) before it's proven that it's working
Servitization
Shared value
Side-effect
Simulation
Small room for innovation
Social corporate responsibility
societal impact
Societal value
Solution forming
Solution market fit
Specialists
Speed
Spin-off (indirect goals)
Sprints
Stage-gate model
Stakeholder acceptance
Stakeholder involvement
Strategic themes
Strategy

Success
Surprises versus planning
Sustainability
Sustainable investments
Sustainable solutions (long-term)
Systemic view
Taking risks
Target group definition
Team formation
Team involvement
Team management
Team rules
Technical feasability
Technique versus BM (first phase)
Technology improvement
Technology Push
Testing
Think big build small
Thinking about results
Time
Time-management
Top-down approach
Transformation
Translating
transparency
Trends
Trend development
Trial & Error
TRL
Urgence
User Centeredness
User needs
User Research
User Stories
User testing
Validating
Value
Value Creation
Value proposition
Variables
Vision
Visual representation
Why, how, what
Wirefames
Wondering

Appendix C.

Definitions of the term business model by participants

Participant	Definition of the term business model
1	*"Ways in which you structure your business to serve customers. And this should be done in a final profitable way and a way you can make many customers a customer."*
2	*"Well I think about how to set up your business in different ways to achieve your goals."*
3	*"The business model of a company, I think that it is the method that one wants to do business with and get profit. And that is because you could buy and sell something, then the business model is just trade. Or when you produce something, or offer a service, so than you sell for a fixed number of hours or amount of money. But ultimately, the business model, I think, is what you are at the heart of, the basic formula, of the hopes that you want to achieve. The difference between the earnings model and a company is one of the most important difference, it is the customer."*
4	*"Central to the business model is often the earnings model, so how does a business actually gets its money, deserves money. A business model also often looks in a broader context. So, where do I earn my money? What are my costs? But also, what is your value proposition, who are your target groups in it, who are y our partners? What do the internal processes look like? What is strategic and what is not?"*
5	*"A business model is nothing more than value creation, Yes, creating value for the chain, the industry you work in."*
6	*"A business model is a conceptual representation of a number of aspects that form the identity of the company."*
7	*"Business models are the principles and building blocks on which a product or service is made with the purpose of making profit. The product can be for consumers, can be for other companies. The business model consists of several components, so different business models are often another arrangement of the same components."*
8	*"A few things should come forward from the business model, first of all, the Dutch business model must be aimed abroad, a business model that only looks at the Netherlands Is actually to small… Secondly, it must be clear from the business plan how you should achieve your goals, especially when going abroad. Foreign countries have all kind of barriers, politics and other local conditions. So, you can not just generalize, you should also indicate how you intend to enter. And last but not least, there must be of course a sound financial picture."*
9	*"The way in which a company provides its services, or supplies, to an end customer. And thereby trying to create revenues of course. But there is a big difference between a business model and a business case, but the business model is a bit the model that you are doing business with. Financial components and other components."*
10	*"A business model is a systematic representation of how a company will generate revenue, what resources should be in it and what results should come out. A business model, for me, is something strongly visual, it should include at least the investments, revenues and costs. That means the money and effort that you need and the resources you need to set it up and operate it afterwards. So, the cost of operation and what it provides in the end."*
11	*"I work with the government so we do not work with terms as Business models. We talk about what our goals are and how we can approach these goals."*

12	*"Actually, it is the most important choice in an existing value chain, where you will earn money as a company. Of course, you also have companies that develop new value chains, there are few. But in which process of the customer, are you going to earn money, that is it for me."*
13	*"I think that a business model is a systematic order of the efforts you make to achieve a certain result. So, it is an effort. I have to do something in this organisation to get a result. And because it is a model, you do it in a way that is repeatable."*
14	*"Well, a model that will ultimately look at: I am going to invest into something, and it is going to create revenues. That is a bit of the core, I think, of a company. You are doing something that eventually gets you money. And of course, you can do that in a variety of ways."*
15	*"The way you can make profit by offering a product or service or something."*

Appendix D.

Definitions of business model innovation by participants

Participant	Definition of business model innovation
1	*"You always start to look at the customer and the outside world, what are the customer needs and is there a way in which we can fill in the need, or fill it in another way? We go to a much more digital way of customer service and this is a different way. You think about whether to apply pricing or apply costing, or apply customer service, or the way you facilitate your distribution. Will you have a direct model or an indirect model or a model where you work with telesales on a digital department or otherwise. This is what you think of in relation to business model innovation and it is often an exemption because you are trapped in your history, in your legacy; does my current brand suffice or do I want to create a new brand? That is what you should invent."*
2	*"Well, let us say you have some existing ways within companies to achieve goals and I think that if you want to change that or if you want to change the customary ways of an industry to set up a business or run a business, I think that there especially the innovative aspect is very important if you want to do it in a different way. And that you look at how it could work."*
3	*"What we did or in that regard what makes us part of our business model, because what we did was very new and so you had to think about many things on your way. And at the outset, it was because you wanted it to do, it was easier. So, they were solutions to our own problems, but sometimes it offered solutions that could be sold separately. And that is why sometimes we eliminated certain products, or a sellable product in the form of a piece of hardware or marketable service. In our case there were some."*
4	*"That is more about what I am doing. I think the general association that people have is often that they think it is just a different earnings model, that is often the case. But maybe it is more important that you think about it too, for example if you look at the Canvas, that can be filled in in a different way. In the essential parts, so not just serving the same target groups with the same product, but maybe you'll have a whole different product, maybe even a service etc. So, fundamental changes in your standing model."*
5	*"Innovation that you go beyond the other players in the market. [Name of colleague] and I have an assignment within the funeral industry. [Name of colleague] and I have just looked into the extent to which they are innovating within this industry and how they approach it. Well, now I can tell you, that is zero! The industry runs around 10 years behind on all other industries."*
6	*"Business model innovation, looking back at the business model, you could say it is about improving or improving radical, that is the definition of the word innovation, of any of the aspects mentioned. That is the channel, the customer group, the suppliers, the key activities or whatever. Plus, the interconnections between them. For example, you can keep everything intact, but the customer channel, can for example change for example from mailboxes to a more online system. So, you are going to innovate on aspects of the business model."*

7	"The different ordering of components, innovation is often defined but it is almost never something completely new, it is not fundamental such as within research, but it is almost always new combination of existing things. If you look at combinations, yeah 'neue combinationen'. That is why I mention components, with business model innovation you add components or change the order, it is seldom radically new. A reconfiguration, you can subtract things and add things, you can organise it differently. That is almost always why industries, old industries, do not implode because there is no question, but almost always because another industry has an advantage over the existing industry, such as market conditions becoming more important as an advantage."
8	"Yes, that is inherent, because of course I'm assuming that, but then I focus more on myself, that I strongly believe we must be innovative. In other words, you could not realize a business model without innovation. And a business model, especially in the market that I want to go to, must really be a bit focussed on the future. So that always means that innovation should be a part of it. That is why I said that internationalisation is so important because this information needs to be launched. So in such a model, you must look very carefully at how to put that innovation on the market. By definition it means that your innovation must involve future users. If you do not, you run the risk of innovating something that a country or customer does not need.".
9	"New ways to generate business. But how I look at innovation, it is, and I have a very simple definition of innovation, is adding value to your organization. And if you can increase that added value, then you commit innovation and that is how I view business models. A business model innovation is a part of innovation. And if you create a new or adapted business model, that is seen by the end customer, or a client, as an added value to your company, then you have committed innovation. And if that can be done by means of adjusting or creating a new business model, then it is business model innovation."
10	"I think that at some point, some of these variables need to change for organisations. So you may find some of the resources that were first strategic, no longer work for you, they are no longer available or they do not process any benefit. So therefore, your position becomes weaker and your future is threatened. So, a business model innovation is needed to review that model, to see what we can do with the quality or competencies or unique features we have, how can we use it differently. Or what should we develop to become profitable again. Or, if it is not a financial outcome, how can we achieve these goals."
11	"Our goal is not to innovate, our goal is to be a good government organisation, which requires a number of things in terms of structure. It must be an attractive employer, that is the core business of this organisation, so innovation is not a goal for us, it is a means."

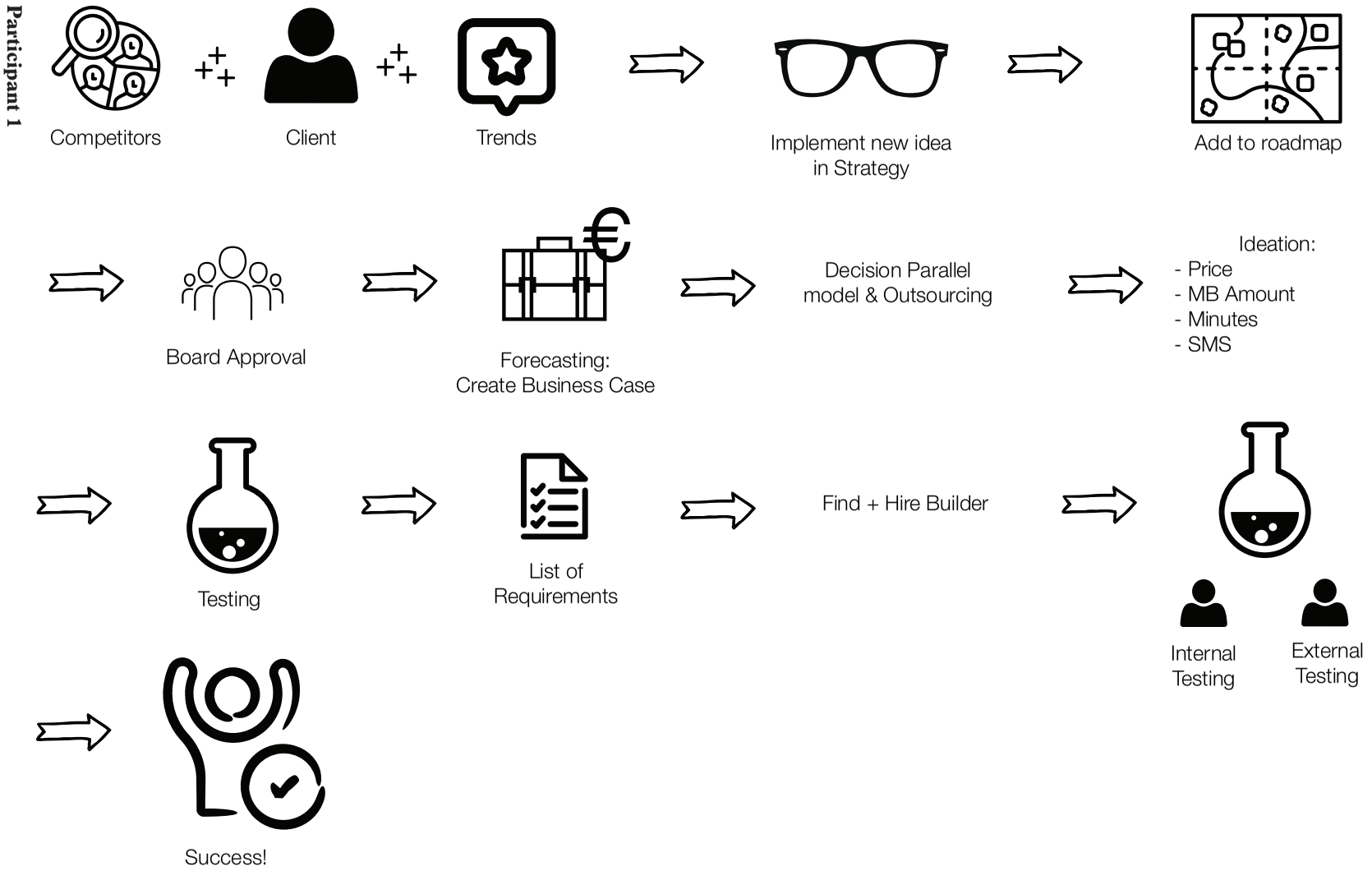
12	"Yeah, for me, business model innovation is the same customer process with the same customer behaviour, defining another business model. That sounds a bit better, makes it a bit clearer, if I look at what I do now, at a group of casinos. I'm creating an online casino for the market, all online casinos now focus on the gambling market, but what we do is that we have looked at customer behaviour which is now deployable in the same value chain or in the same behaviour of a customer who is online, or play online games as we say. So, what we do, we have combined a portal where they can play both games for points to pass times, but also where you can gamble. That sounds very logical, it is logical. It is a very big customer pond, where you can get customers cheaply to generate traffic. This, you can convert internally to online gambling. So, we actually were assuming, what are these people doing now? They are online for 80% of the time playing games and 20% of the time they like to gamble. What if we offer them both? No other competitor is currently doing that, then you have an innovative business process."
13	"You can of course innovate a business model, but you can also say, is there a business model of innovation? So that is exactly the opposite. Innovation is important to an organisation and can you answer to that by providing a business model? For example, I have to innovate in my IT-organisation, I can think of a lot of things, and believe me, that happens. The whole day suppliers enter here with even better innovations than the previous one, big data, open data, apps, methods, the whole lot. But what I am always looking for if I can change it into a business model. If it is not just fun and nice, but it should be useful as well. So I am trying to make a business model from the innovation. And sometimes it is better to create a nursery or lab-like development within your company. Where the simple benefit of this effort will be that you have organised it and that there will be attention for it."
14	"But yes, I would never call innovation as a business model, but I think it is a subset in a larger business model. In our setting, in any case, it is also building intellectual property. So, ultimately, technologies and products that you sell or license, or whatever, that means that you invest in advance. Sometimes up to four years. You feel good about the problem that you are going to solve and what others are already doing and you are trying to find out a smarter methodology, and after that, it has to go to the market. Then the technique and everything is all right, but you'll also have to get the Marketing and sales, and that is a very important part, if you look at investments. We have invested 8 million in new innovations last year, then we have to make the same amount in marketing because otherwise we will never earn back those 8 million ever again. So, it is not the innovation itself, but it is part of the business model."

15	"Business innovation, which means that I have to think even more clearly about the investments that I have to make to ultimately win profit. Profit can be either financial gain, but profit can also be a qualitative contribution to a better anything. Because in innovation, my risk is bigger. If I just make shoes and I think I'm going to make shoes and I'm going to sell in a place where I can, then I can think of a well-known image about how do I like those shoes? Should they be for man or for women. If I'm going to make shoes that differ from those who have a very different sole concept, then there are just some risks. Then you have to convince people in a different way, I have to choose another approach, so innovation by definition, asks for a very good risk weighing, probability calculation, chance of success. "

Appendix E.

Business model innovation visuals

Participant 1



This is the process of implementation of a mobile phone subscription for an internet company. The idea was initiated by the participant because of a combination of seeing what competitors were doing, seeing the need of consumers and seeing the trends in the market regarding mobile phones. This was then implemented into the strategy and roadmap by him. After the board gave acceptance, several forecasts were made to create a Business case. After which the decision was made to outsource this and start the new Business Model as a parallel model. Then, the ideation phase started where they made decisions regarding the price of the subscription, the amount of minutes and the amount of MB's in the subscription. Later, this was tested and lead to the generation of a list of requirements. Hereafter, a builder was found to start building the concept. This was then tested both internally and externally with actual users. After the implementation the new Business Model was a huge success, even a better success than expected.

Participant 2

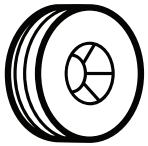
Living in China for 35 years

Observation: In China they import Western Technology

Observation: In China they import Western waste & garbage

Can't we do more with waste streams?

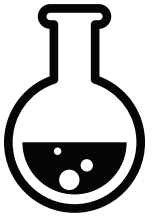
What about Tires?



Technology Research

Conclusion = There is no Technology available.

Develop the technology



Experimenting

Test new BM with clients

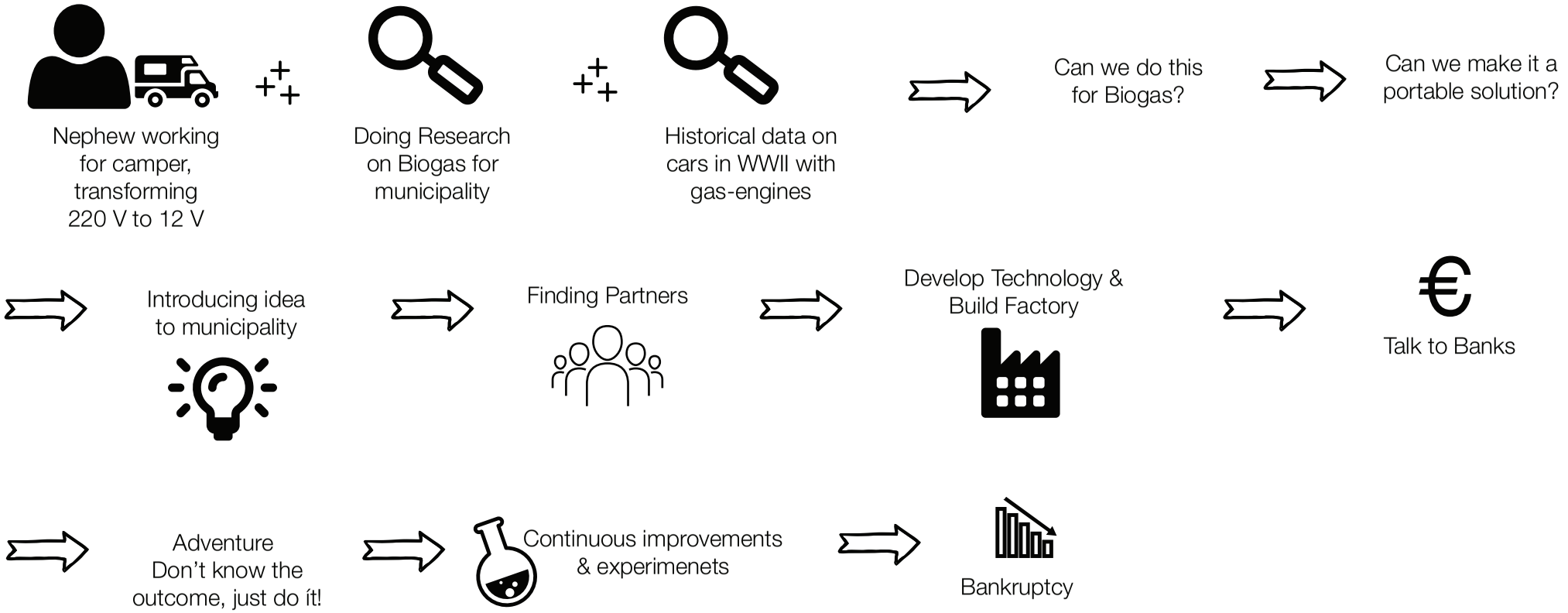
1. How can we be friends with all stakeholders?
2. How will we get the tires?

Joint venture with several tire companies

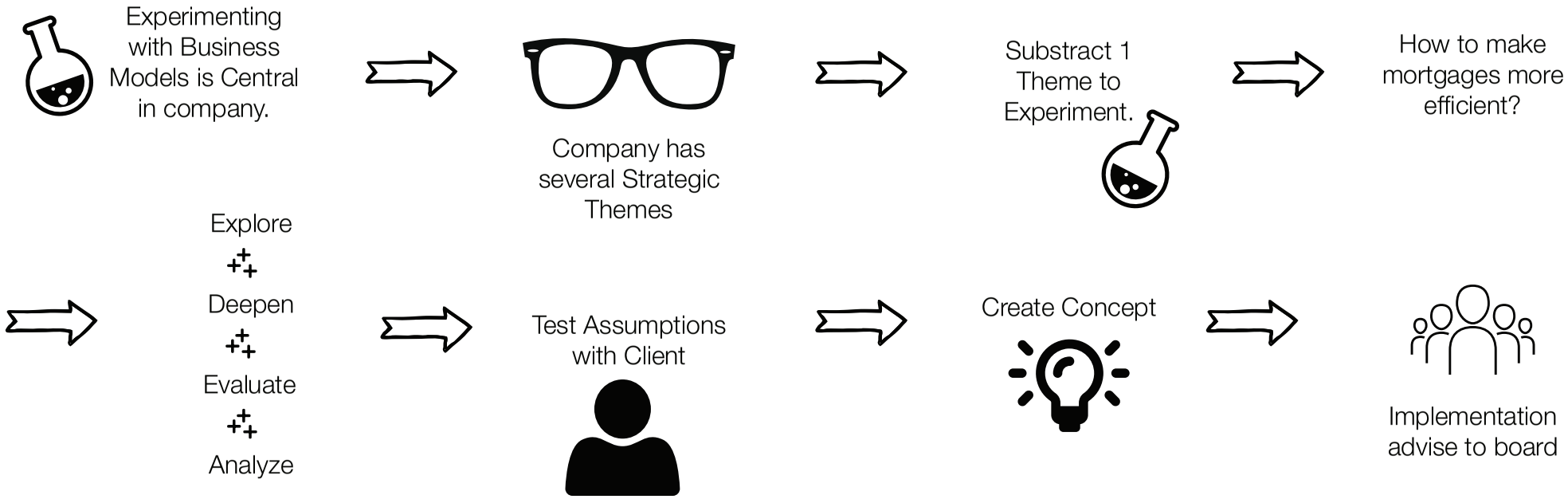
Tire company will produce & this company will sell the product.

This is the process of implementation of a new way to produce a product from the material of tires. The idea was initiated by the participant because of an observation he made when he was living in China for 35 years. On the one hand he saw that the Chinese were importing Western Technology and on the other hand he saw that China bought Western waste & garbage. Therefore he had the Hypothesis of doing something more with waste streams in Europe. He started researching this and came to the conclusion that it would be interesting to do something with tires. He researched the technology to create a certain product from the tires but came to the conclusion that there was no technology available. Therefore he developed the technology himself and tested this in a laboratory and it worked. Later on he created a Business Model which he tested with potential clients. Then he wanted to implement this while being friends with all stakeholders already present in the market as well as having a sustainable way to get the tires. He therefore created a joint venture with several tire companies where the tire company will produce the product from the tires and the company of the participant will sell it for them.

Participant 3

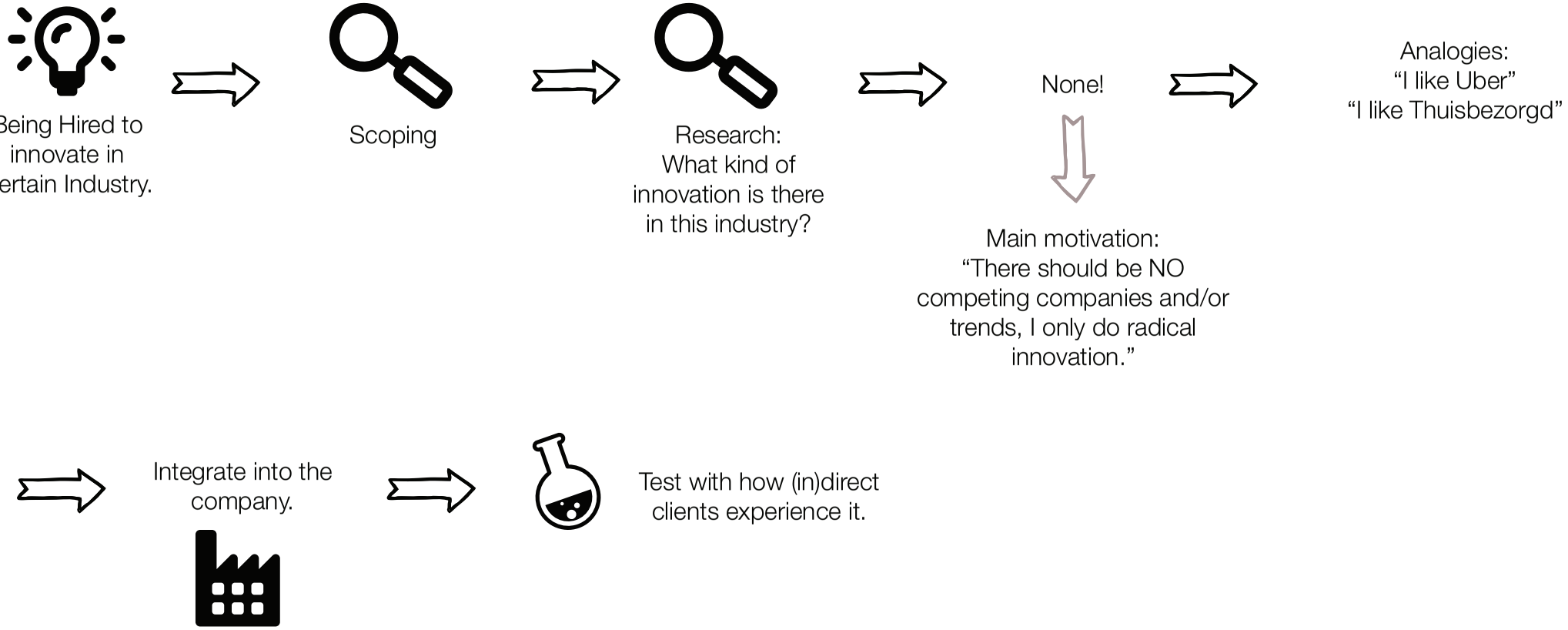


This is the process of implementation of new portable solution for creating Biogas in the form of a start-up company. The idea was initiated by the participant because of an observation about what his nephew was doing at a Camper company, transforming electricity. In combination with the participants' research for a municipality about Biogas as well as his knowledge about the Second World War where certain people would have Gas-engines behind their cars so they could drive. This gave him the idea and created the hypothesis of creating a new portable solution to converge biogas into gas that can be put into the regular gas system. After introducing this to several partners and experiments it was found out to be feasible and it was developed. Interesting in this particular process is to see that the process was quite adventurous and new as the participant mentioned that a lot of times they had to develop new technology and solutions which could be sold afterwards to third parties: "What we did or in that regard makes us part of our business model because what we did was very new. And you had to think about many things on your way. And at the outset, you made it easier to make what you wanted to do. So, there were solutions to your own problem, but it often came up with solutions that were self-marketing again." When being asked what the main motivation of the participant was during the process, he answered: "Discomfort and adventure, going where no one dares to go. Solving problems." There were several times where the solution wasn't proven to be successful but the belief of the participant that it would work was so strong that the idea was already sold to clients before they knew that it would definitely work: "Well, in three factories we used technologies that was never used before, this was a huge risk yeah, we didn't know it for sure. But you definitely need to have the idea that it is going to work, otherwise you wouldn't do it, but if you knew everything for sure, you wouldn't be an entrepreneurial innovation anymore."



In this example, the participants gave a quick example of a recent Business Model Innovation that wasn't implemented. After this he sketched a more frequent approach of Business Model Innovation within the company. As can be seen in the visual, this was a very systematic and strategic approach. Within the company, it is central that they experiment with Business Models. The company has several strategic themes, from which they subtract one from time to time in which they will explore a certain question, such as the "How to make mortgages more efficient?". After this, they enter a phase of exploration, which should then be deepened, evaluated and analysed, this is in the form of an iterative process. After this phase they test their assumptions and forecasts with the client and create a concept from this. The final stage is a presentation to the board, where they advise them to either implement the concept or don't implement the concept.

Participant 5



This example is from a participant who is a consultant working for several different companies where he establishes different ideas for changing current Business models. This example is of his current job, where he was hired to innovate in an industry where there is almost no room for innovation. For him, this is always the starting point, seeing what kind of innovation already is present and then establish the main goal. For this consultant, the main criteria to accept an assignment is that the innovation that he will make should be radical, there should be no other players doing the same thing as he wants to be the trendsetter. For him, the process always start with scoping and/or reframing of the question from the client, after which he does research on the industry and other players in the market. Later he establishes his personal motivation and develops analogies for the situation. He translates those into opportunities for his current assignment and tests them with clients, later they can be implemented.

Participant 6

Participant 7

Trends

Competitor had
good website & app

Take-over

Cross over boards

Let board think it's
their idea.

Client & Market
Research

Projecting Behaviour of
younger generations
into the future.

Assumptions

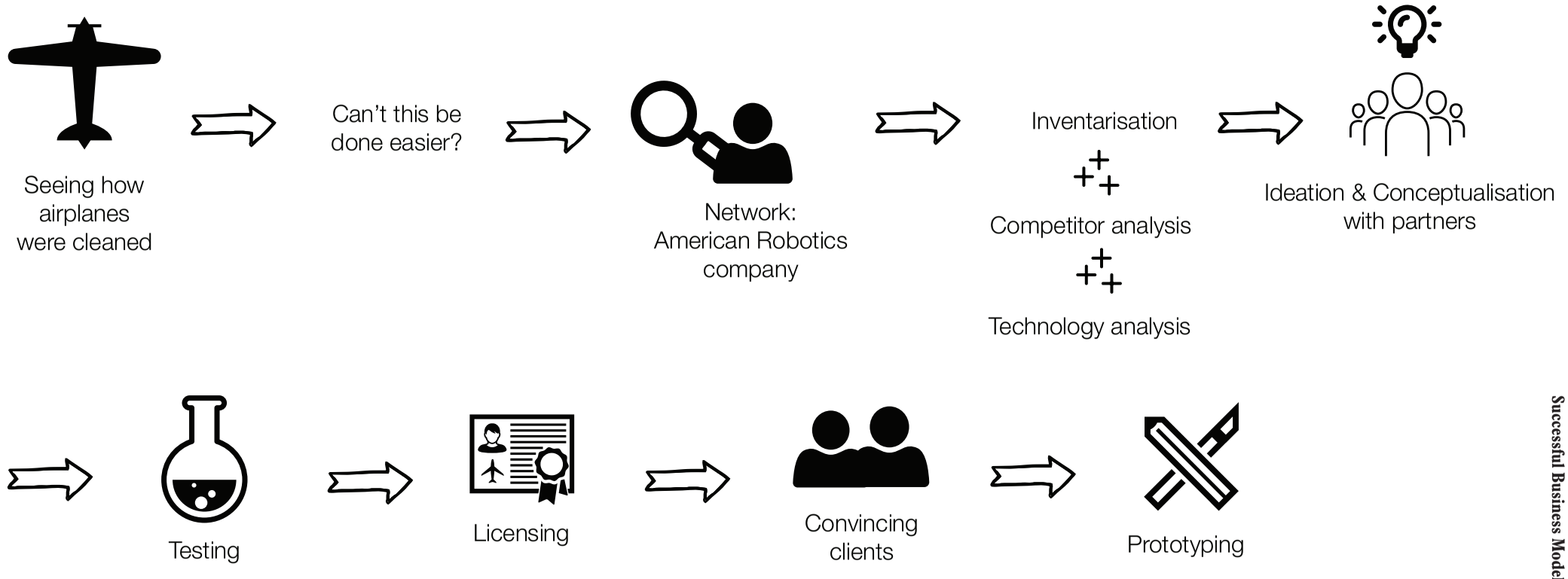
86 Persona +
Customer Journeys

Implementation

More successful
than expected

Everyone followed

In this example the participant saw certain opportunities from a combination of trends and started looking at competitors and found one that was already doing the right thing. Because there was a lot of resistance to his ideas internally, he made sure that his company took over this competitor. Later on, he crossed-over the boards to make sure they saw the business management in both companies. This lead to the board seeing the trends and what was working well in both companies and therefore they had this similar idea but now thought it would be successful and also had the feeling that it was their idea. After this they did extensive market & client research where they projected the behaviour of younger generations into the future. Furthermore, they created several assumptions which we shaped into 86 different personas with corresponding customer journeys. From here, they implemented the new ideas into the company which became a huge success and later on all competitors followed.



This process shows the development of a new way to clean aircrafts of their paint. The participants was once present during this process and saw how chaotic it was and asked himself, can't this be done easier? In his network he knew some people who worked at an American Robotics company, together with him he did an inventarisation of the possibilities of using Robots for this process. He examined different competitors and also the technology that was available. Later, he partnered up with several experts and certain suppliers to start the ideation phase. These concepts were later tested and when proven to be successful, they were licensed. Then the process of convincing clients started where they had to sell their new ideas. After having the first few clients, first prototypes were build.

Participant 9

Questioning himself:
"Why does our company exist? What is our added value?"

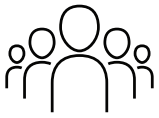
Vision:
We want to add more value to our customer by offering them our product in a context.

Belief:
Think big, build small

How can we do this?

Analogy news-companies

Start building

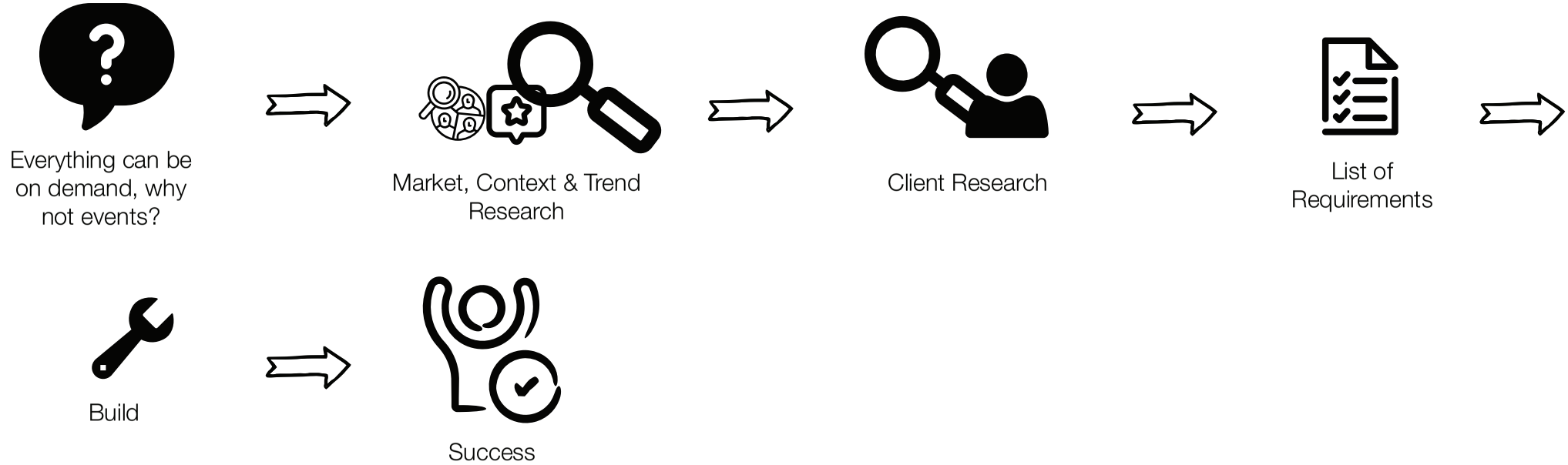


Hiring new employees
(news people)

Implementation

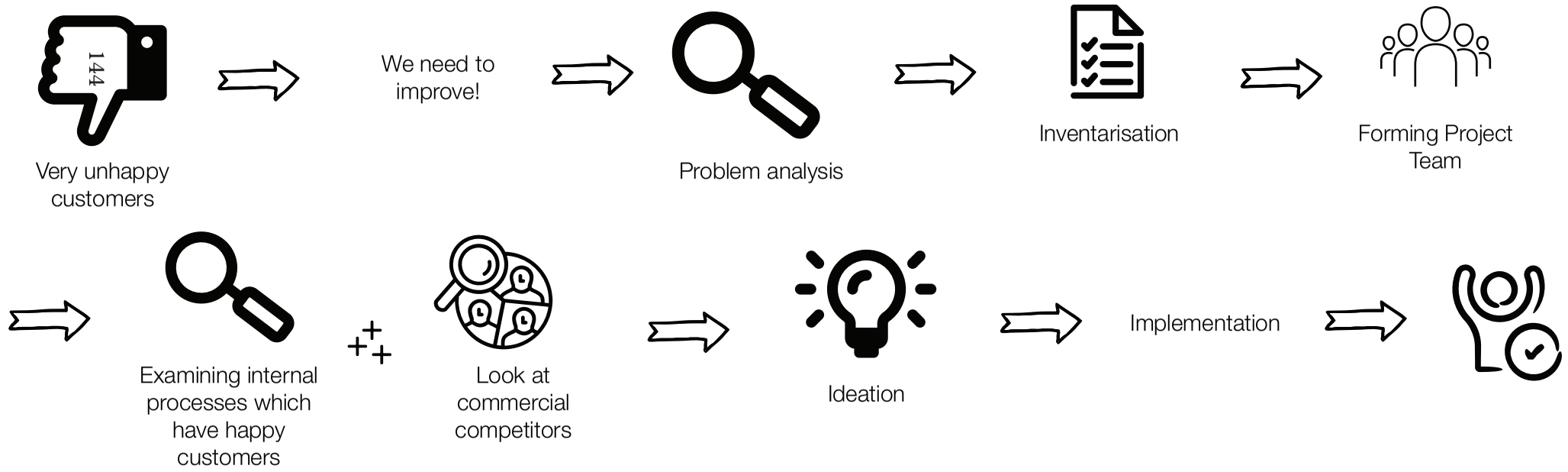
Huge Success
(Companies from all over the world come watch this new concept)

This process started with the central question: Why does our company exist and what is our added value to society? This lead to a certain vision where the participants stated that the company should add more value to their customers by offering the product that they deliver in a certain context. His belief to achieve this was: "And a vision is very important to have, about: I want to go there and this is important, this is my end-goal and I need to go there, but the only way to get there is to start small, build small things and put things down.." . Then he looked at the news industry and took CNN as an example, they improved their current business venturing and hired a lot of different new employees. After the implementation the new business process was a huge success and now companies from all over the world come visit them to see how they have structured this new format.

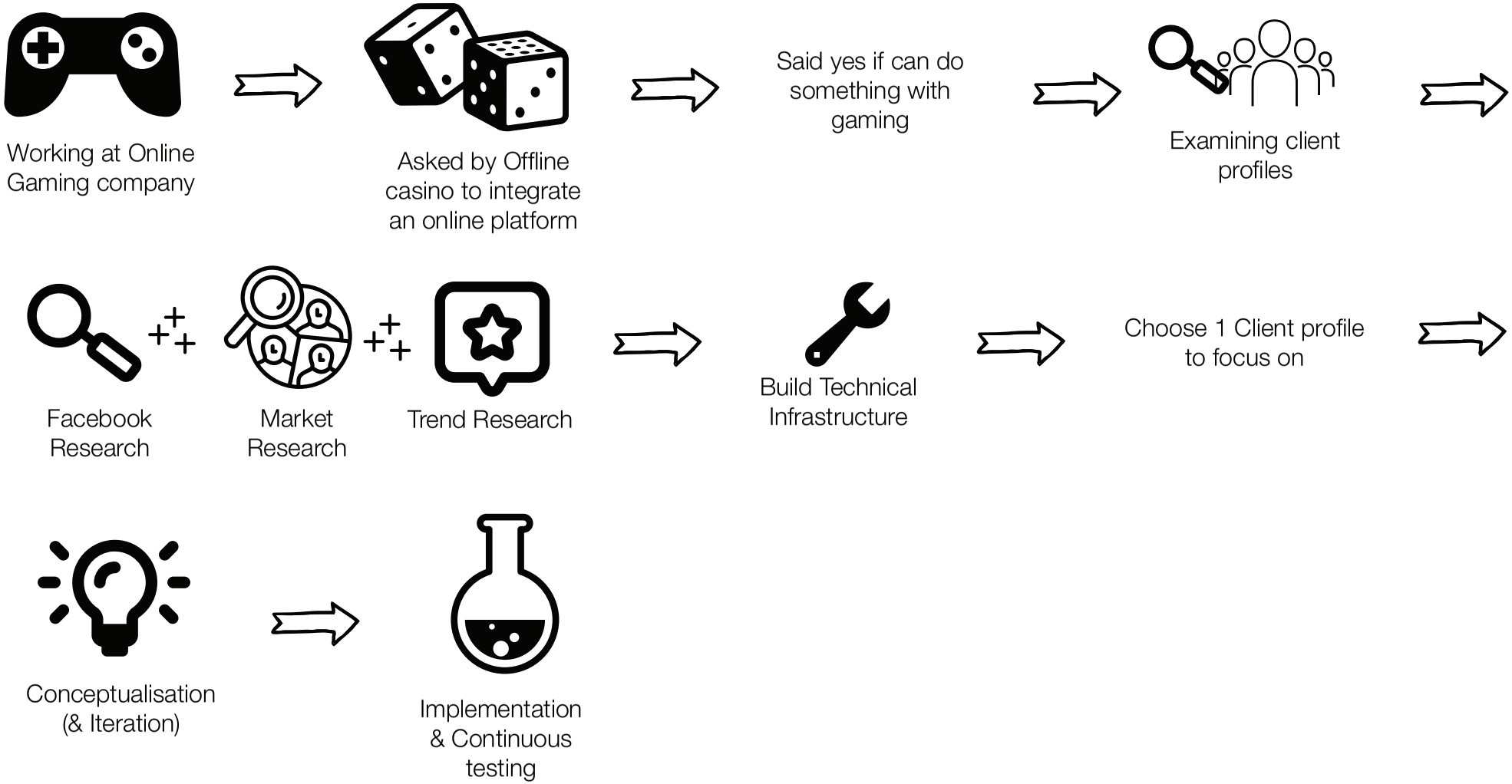


The process of this participant started with the observation that all products and services can be on demand but with events people always have to wait until a certain program or person comes to him/her. Therefore, his hypothesis was that this should also be possible with organising events. Therefore he did market research, context research and looked more into the trend of 'on demand'. Later on he tested some of the ideas with several clients which led to the creation of a list of requirements. This list was then used to build the whole platform and the structure behind it and after the implementation it was proven to be a huge success.

Participant 11

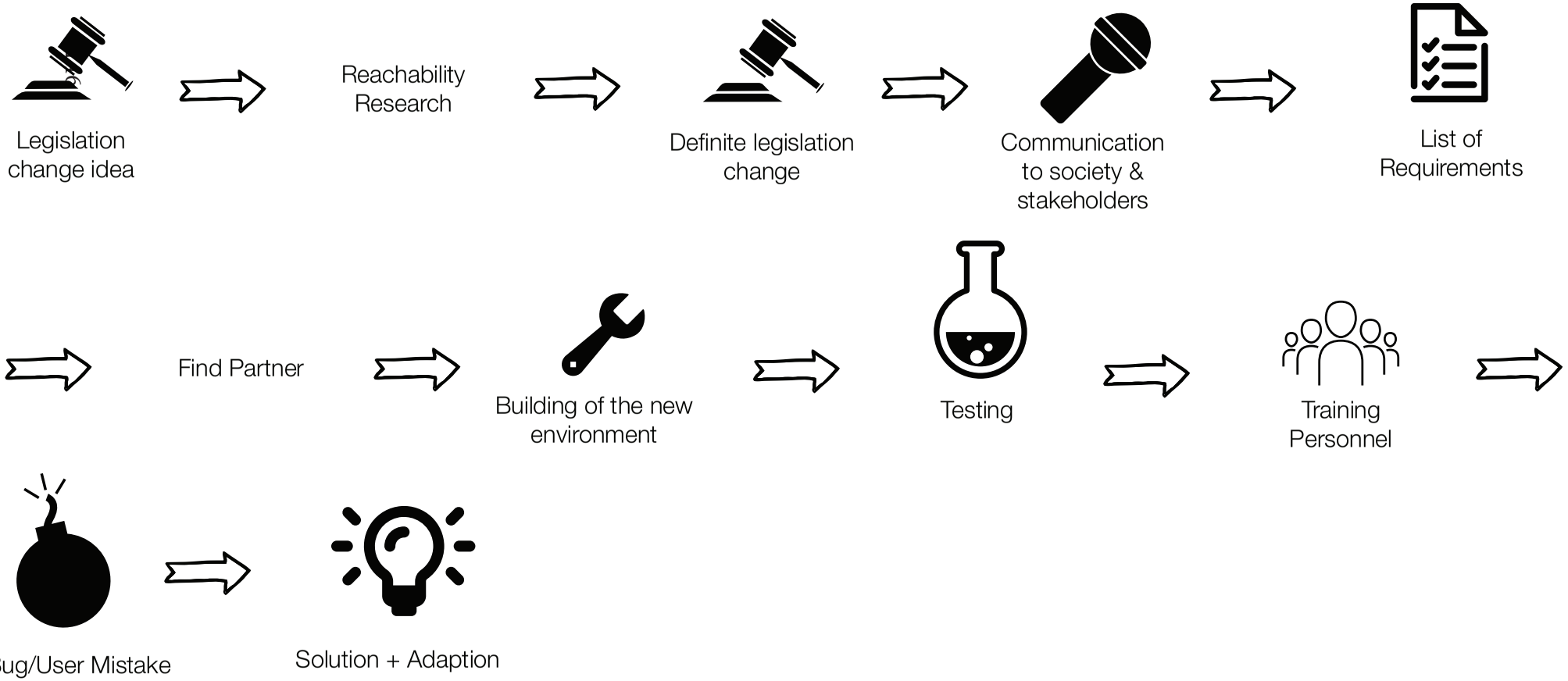


This process started with the evaluation of the current Business Venturing, which got a very low mark on customer satisfaction. This lead to the conclusion that the company should really improve. They started this with an elaborate problem analysis after which they did an inventarisation of the needs and where they can improve. This complete list made it easier for them to start forming a project team. This team started with analysing current processes in the company that were working well and establishing which key factors made these processes well flowing. They combined this knowledge with looking at several commercial competitors and how they approached certain situations. These two things lead to an ideation phase were several ideas were developed and later implemented. After the implementation of the new ideas within the process the customer satisfaction raised to around a seven, which was much higher than before.

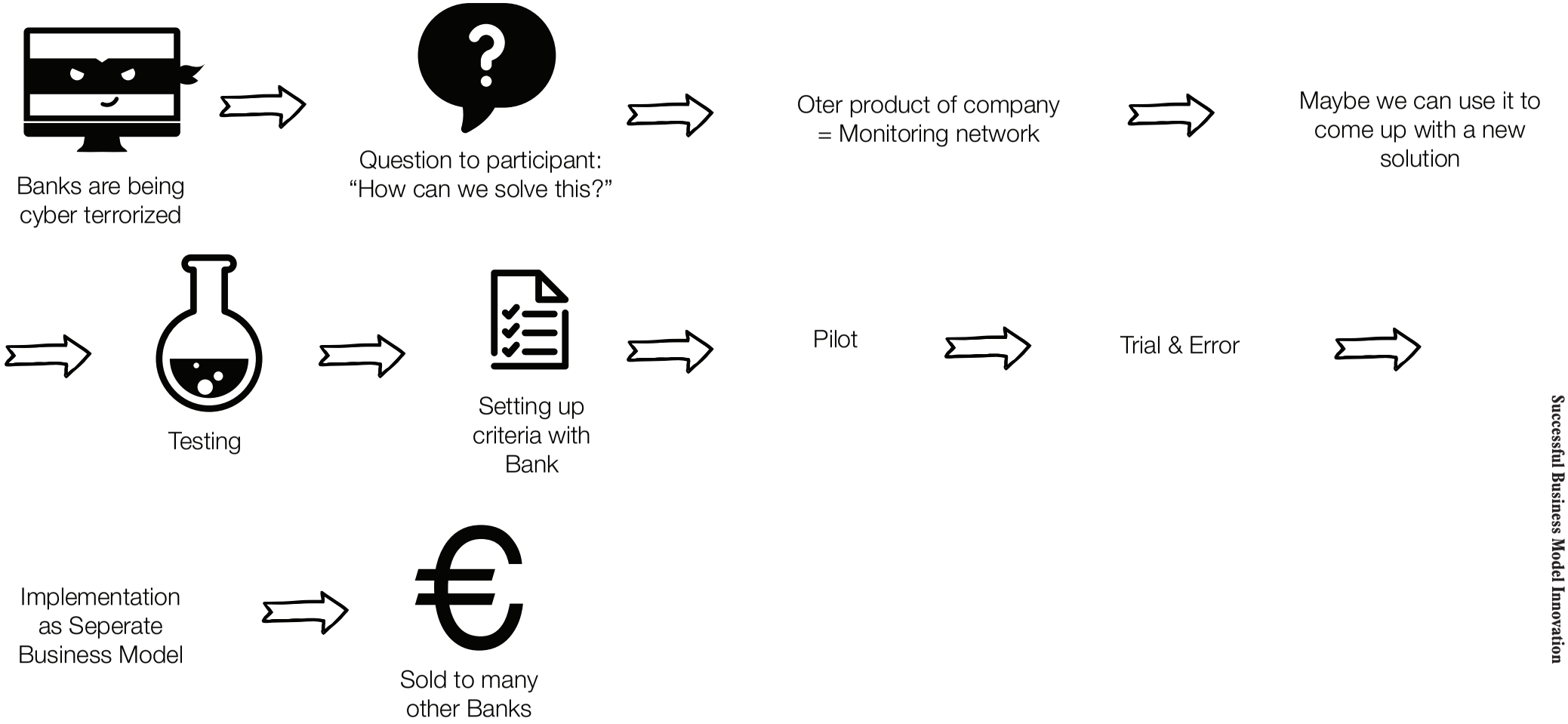


This process visual shows the example of a participant working for a gaming company who was asked by an offline casino to help them implement their online branche. He said yes with the condition that he wanted to include social gaming in this online platform. He started with examining their current client profiles. Then he looked into Facebook and looked at different other players in the market (not only casinos) to see how they approached this. Combined with a trend research, this lead to a more concrete idea which formed the basis to start building the technical infrastructure. After the elaborate analysis they had several client profiles to choose from, they chose one that looked the most promising and started conceptualising the outlines that would follow the technical structure. After this elaborate conceptualisation which was widely iterative, the new idea was implemented and constantly tested and updated.

Participant 13

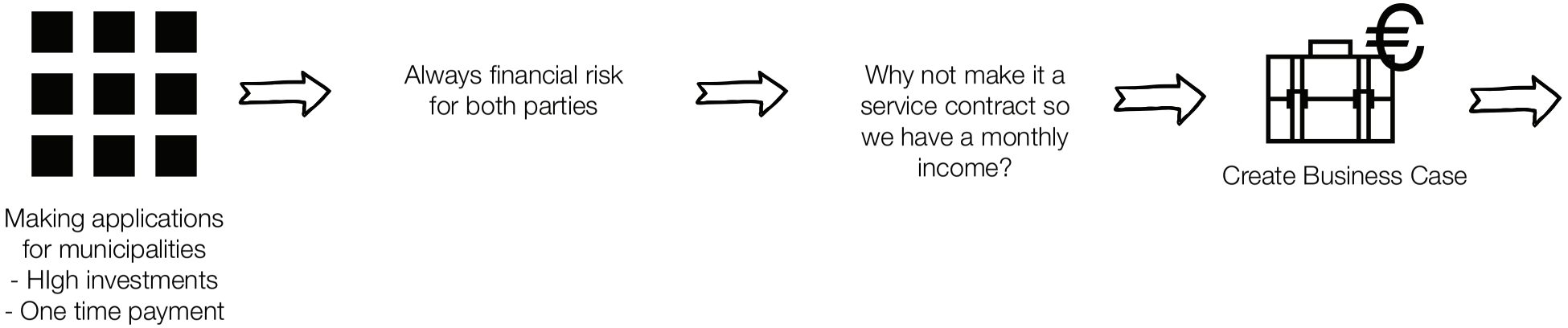


This is the process of another one of the participants who was working for a semi government organisation. This process started with the idea of the government to make a legislation change. Since this company is the only partner that helps them with a certain topic, the company was included in this process and hired to do a reachability research, after which it was decided to implement the new legislation. The participant then communicated this to the society and all stakeholders. The next step was to create a list of requirements which helped them to make the demands more concrete and also to find partners to build the new environment. After testing this elaborately their personnel was tested and the new environment went life. Unfortunately there was one mistake in the new program that gave a disadvantage to their clients, this was fixed and the model was adopted to a new situation.



This process started with a concrete question from the Dutch banks to this company, because they were cyber terrorized. They asked the company of the participants if they could help them to solve this. The participant said yes because he saw that he already had another tool to work with, which was monitoring networks, they could use this tool to come up with a new solution. Later on they tested the new solution, set up criteria together with the bank and piloted the new prototype. After some minor adjustments via trial & error, they implemented the new solution as a separate Business model. Which is now sold to several banks all over the world and saves the banks millions per year.

Participant 15



This process started when the participant was looking at the numbers of their company. This example is a classical servitization example. The company made applications for municipalities, but had the disadvantage that there were high investments and only one time payments. Therefore, there was always a huge financial risk for both parties. The participant got the idea when examining their financial results: "... Then you saw that your profit rate and profit margin was only in the first year. Then I said, you know what, we are not going to do it anymore, we are going to put it all down, we are just going to get a lease, something close to a lease. So you pay a percentage of x per year, a fixed amount, and for that amount we will do everything in the future. That was a very different business model, which made our profit margin way bigger." After creating an elaborate Business case, he pitched the ideas to their clients to discuss and together with them formed a list of requirements. After the implementation the new model was proven to be successful and all their competitors changed accordingly.

Appendix F.

Abduction in Reasoning process

Participant 1:

Here the abduction can be seen as the hypothesis of the participant to start moving into a different direction on the roadmap & strategy of the company by an observation he made of client behaviour, competitor behaviour and trend analysis. When being asked how the new idea started, the participant mentioned: *"On the one hand it was our competitor [names competitor], they were already doing it and we weren't. Furthermore, I saw that people were living online, you are busy with your TV for around 2-3 hours a day, but the rest of the day you are online on your phone, so that's where you want to be, as a telecom provider. So, in the strategy we tried to converge this. On the other hand, we saw the trends of connectivity and WIFI and mobility, those things are converging… So, I made a development roadmap which included mobile telephony as well."*

Participant 2:

Here the abduction can be seen as the hypothesis of the participant to stemming from two observations that he made. After seeing those observations he had the idea of creating a solution for that. This is illustrated in the following quote: "*It originated because I lived in China for 35 years and did two things in China. One is the import of western technology, of the modern technology they needed there. And the second thing they did was importing waste from Europe and America. So, the waste was transported to China and used for raw materials and other applications. When I returned to the Netherlands for twenty-five years, I wondered if we could do any more with those waste streams that are now being shipped to China. And then I got on tires."*

Participant 3:

Here the abduction can be seen as the hypothesis of the participant to create a portable solution to create Biogas from a certain basic product. The interesting thing to see is that his hypothesis is stemming from three reasons; the observation of his nephew at the camper company, the observation from the research for the municipality on Biogas, which can be seen as context and market research, and his historical knowledge on cars in the Second World War. The combination of those different ideas and/or concept lead him to be sustainably competitive, this different from other competitors since: *"So it was already suitable, the notion already existed, only everyone was trying to adjust the engine in the bus to adjust the bad Gas. How can you adjust that? And my innovation was, knowing about all these different kinds of technologies, to combine them in one spot and create a portable solution to create Biogas."*.

Participant 4:

The abduction here is a bit more difficult to examine and establish, since no specific example was given. Rather, the participant talked more vaguely and broadly about the process of Business model innovation. However, what can be seen from the process as described above in Appendix E. The participant himself already mentioned the importance of Design Thinking within this whole process, however in this case he mentioned the user-centred part of Design Thinking: *"Realising, is something we do with Scrum, but Design Thinking is also a part of it of course. We often make a customer journey, so that we can stick that on the wall, it also looks nice and structured, and that is what people like. It is a nice tool to use."* Within the process the participant talks frequently about making assumptions. However, what is the difference between a hypothesis and an assumption? A hypothesis is an argument that is put forward to explain a certain phenomenon and this is not a theory until it has been proved. Whereas anything taken for granted is an assumption, and a hypothesis can be an assumption at best. When we look at the specific example, the participant actually means hypothesis but uses the word assumptions, since the assumptions are tested afterwards. When looking at the definition of an assumption, we can see that

assumptions don't have to be tested, because these are things that one takes for granted, it is a statement that is believed to be true. *"Validation takes most of the time, then we have lean, lean start-up central, what are your main assumptions? How can I test them, then I test them and then the question is what can I learn from it?"*

Participant 5:

This participant was very creative and had a lot of experience with Business Model Innovation. Therefore, within the questions we didn't stick to only one specific example, but we discussed several. In several of the examples abduction was present, I will stick to discussing one. This example is from when the participant was sitting in the pub, looking around and thought to himself, how can I see which people are single in this pub and how can I find out if we have the same interests, before talking to them? *"Then I suddenly had the idea of how beautiful it would be if you were at a pub, we are talking about 15-20 years ago), that you could see who is single and besides that if they love sailing or nature, on a map or something in like 15-20 distance."* However, phones were too old, because this couldn't be done on a Nokia 3310. Therefore, he decided to create a dating website where you can meet other people and share common interests. *"However, the mobiles were too old, such as a Nokia 3310, black and white. So, then I set up the first dating site worldwide."* However, when his website got too much attention from the porn industry, he stopped the website and sold it to someone else. We didn't go into depth in this specific example, but you can see here that he had an observation when he was in the pub, seeing & feeling the need to get to know other people, their interest and their relationship status and started to create something (his hypothesis was that it should be a website) to solve this idea he had from his observation.

Participant 7:

In this case the abduction is present but not very indepth and clear. The participant mentions: *"Well, with the rise of digitization, we said then what's changing now in customer behaviour, people are no longer going to banks and post is actually incredibly slow and outdated… Customers want to get something done immediately… This means that the classic model of banks is out of date. Nobody works with sale anymore and customers have often done their own research before. So, we had to do it differently, and the one closest to that was competitor [names competitor]. Because they had a very good internet site and later a mobile app."* Concluding, there was an observation of certain trends and the participant created hypothesis that customer behaviour would change accordingly, therefore he created a new vision and new ideas for the company to work with.

Participant 9:

In this case, the participant created the hypothesis about the observation of the airplanes being cleaned in a very inefficient and time-consuming way. The following quote illustrates this: *"The trigger was actually when I first saw how that actually happened. But I was not specialised in this. But at one point I saw what happened about the dust and the paint and people in moon suits, I thought this should be done easier!"*.

Participant 10:

In this case we can also talk about abduction. Here the participant had the idea or end value that he wanted to create more value for his users. *"What I did when I got the new job, was thinking about yeah, how should I work with this organisation? How can I make sure we innovate and then I thought, how can we add value with the things we deliver? And then I thought, we should become some kind of news organisation. And then I started thinking about how I was going to do that… Then we just started building to make sure that it was going through."*. His hypothesis

was that he should do this in a way that a news company does this and this will ensure more value for his end-users. After implementation, it was proven to be hugely successful and therefore his Hypothesis were confirmed.

Participant 11:

As the process already shows, there was definitely presence of abduction within this process. There was an observation of the market which rose a question that lead to the hypothesis that On Demand Events would be interesting and a success. This is illustrated by: *"More from personal frustration … we were talking to artists… Why can't we play a role in this, people pay a crazy amount of money to buy tickets to a show, why couldn't they have some more influence. I already had experience with event organising, so I thought. Hmm yeah, that is true."*

Participant 13:

The abduction within this process is more clear than the previous process. Because of the participants experience with gaming, he had the idea and hypothesis that integrating this into the online casino platform would be a really good idea. This can also be seen as a combination of two concepts as discussed in Section 2.4. This is illustrated by: *"… they asked me to build up the online gambling company. And my idea was to do it via a broader way, so we could get new customers via social. Because if you look at the Netherlands around [names number of people] people are active in gambling, and around [number of people] are active in playing online games. So, if I could get 10% of that market, I have a much larger online footprint and much better marketing, so I will get higher on every search engines. So that combination was made than, that was my proposition, that was my one condition and that it how it was established."*. When talking about intuition and the influence on intuition on the process of Business Model Innovation, he mentions abduction again and also in a more structured way he describes an observation and a hypothesis that he created to test it. *"The trigger was that I saw this at social gaming, that people who were their best customers, also had an online gambling account somewhere. I thought, all these people already have both, they are both on internet, both sides they are doing already, then we should be able to, when we offer both, when we offer this on one side, regardless the separation of both world. "*

Participant 15:

In this situation, the participant also used abduction. When the client came to them with a specific question, they looked at their current Business and examined how they could use this to help them solve their question. *"And we already had an innovation, monitoring networks, so we can tap very well. Eavesdropping yeah Then, when we're on this line already, we are basically the web server of the bank. So, with [names client], we are tapping them as we speak, we can now see when you are doing a transaction or when a criminal is secretly behind your laptop."* In this case, they made the hypothesis that their current model could also work for a different situation and then they tried to fit this into the new situation. In the end, it worked.

Participant 16:

In this case, there was an instant of abduction. When the participant was examining the company's numbers, he had the idea that this could be done differently. *"I was looking at the numbers and I thought, do you know what we should do? We should just smash this all, we are just going to make a lease-contract.."*. That was his observation. The hypothesis that he created accordingly was, we should create a service model which will reduce risks and lead to more money: *"You are just looking at your numbers and you see yeah, now we can't do it any differently. Than you calculate, and calculate and you talk to clients and ask, what do you think about it? And they say, yeah it makes me happy."* do it differently. This hypothesis was tested with a business case and with their clients and proven to be a successful idea and therefore implemented.