



UNIVERSITY OF AGDER

Organizing the business model generation process for mobile application development businesses

A case study of SmartRescue

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This master's thesis is carried out as a part of the education at the University of Agder and is therefore approved as a part of this education. However, this does not imply that the University answers for the methods that are used or the conclusions that are drawn.

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PREFACE

This thesis is submitted to the University of Agder (UiA) as a completion of the M.Sc. degree in Industrial Economics and Technology Management at the Faculty of Engineering and Science. During fall 2014 I took the course IND413 – Innovation Management where I wrote a paper about innovation and used Sony’s mobile division as a case. This sparked my interest in business planning and business model generation and I was lucky to get the opportunity to write my master’s thesis for the SmartRescue project at UiA.

First of all I would like to thank my supervisor, Dr. Tor Helge Aas, for his supervision and invaluable comments. You always gave me constructive feedback, and practical solutions to improve my thesis. I am grateful to Prof. Ole-Christoffer Granmo for giving me the opportunity to use SmartRescue as my case, sharing valuable information and letting me arrange a workshop for the SmartRescue team. I also wish to thank Dr. Jaziar Radianti for giving me invaluable advice and encouragement throughout these last five months. You made it possible for me to obtain important documents and information about SmartRescue. I would also like to thank my respondents, especially Mehdi Ben Lazreg for giving me helpful information and for sharing his thoughts about SmartRescue.

To my dear husband, Herman Drevdal, I want to thank you with all my heart for your support, good advice and ideas during these years of my study. You are a fantastic husband who has patiently taken care of our lovely daughter, Eva Mathea, while I was finishing my studies. My special thanks also go to my mother in law, Bjørg Drevdal, who has helped babysitting Eva Mathea and making dinner for us when we were too busy.

I am deeply grateful to my parents, sisters, and brothers in Indonesia for their support and prayers. At last, I want to thank Jesus Christ for giving me the gift of life and making all my dreams come true. If somebody told me four years ago that I would get the opportunity to take a master’s degree in Norway, I would not have believed them.

Grimstad, May 2015

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ABSTRACT

This thesis aims on getting more knowledge about how to build a sustainable business model for mobile app businesses. A business model plays an important role in generating profit and sustaining a company's competitive advantage. In a startup, the customers and the product which customers might find valuable are still unknown. Thus, designing a business model for a startup company involves a set of experiments and in many cases limited funding resource.

The case I am using for my thesis is a research project at the University of Agder which is developing an app for rescue purposes, and the plan is to commercialize the app. The examination of my case is based on a qualitative approach and the study combines an observational approach, which includes interviews and some document readings, and a field-experimental approach where I apply a tool together with the case-organization. In order to answer my research question, I have collected information about- and analyzed the activities SmartRescue has done during the technology development process to see which consequences this has had for the business model generation.

The business model generation process involves experiments to test hypotheses generated for each dimension in the business model canvas. The findings show that the customers' problem, the value propositions and the potential customer segments in a business model are most likely identified as an integrated part of the technology and product development process. The findings also show that several dimensions in a business model are being affected by the technology- and product development process. Furthermore, there are three essential dimensions of the business model which need to be integrated with the product development process: value propositions, customer segments, and revenue streams. Integrating experiments in the business model generation- and product development process will result in a higher chance of launching the right product to the market and shorter technology development cycles which are cheaper than the traditional new-product introduction methods.

TABLE OF CONTENTS

1. INTRODUCTION	1
2. THEORY	3
2.1 HISTORY AND CONCEPT DEVELOPMENT	3
2.2 BUSINESS MODEL APPROACHES AND TOOLS	5
2.2.1 <i>Business Model Canvas by Osterwalder and Pigneur (2010)</i>	6
2.2.2 <i>Other Business Model Approaches</i>	8
2.3 ORGANIZING THE BUSINESS MODEL GENERATION PROCESS	9
2.3.1 <i>The Lean Startup (Ries, 2011)</i>	10
2.3.2 <i>The Customer Development (Blank & Dorf, 2012)</i>	14
2.3.3 <i>Business Model Generation Process (Osterwalder and Pigneur, 2010)</i>	17
2.3.4 <i>Business model Idea Generation</i>	18
2.4 LITERATURE GAP	19
3. RESEARCH METHODS	20
3.1 CHOICE OF RESEARCH STRATEGY	20
3.2 CHOICE OF CASE	21
3.3 THE RESEARCH PROCESS	23
4. FINDINGS	26
4.1 FIRST ROUND OF INTERVIEWS	26
4.2 WORKSHOP	31
4.3 SECOND INTERVIEW ROUND – LEARNING OUTCOME FROM THE WORKSHOP.....	39
5. DISCUSSION AND CONCLUSION	41
5.1 DISCUSSION.....	41
5.2 RESEARCH LIMITATIONS.....	51
5.3 CONCLUSION	54

LIST OF FIGURES

FIGURE 1. NINE BLOCK BUILDINGS IN BUSINESS MODEL CANVAS (OSTERWALDER & PIGNEUR, 2010).....	6
FIGURE 2. THE BUILD-MEASURE-LEARN FEEDBACK LOOP	11
FIGURE 3. NEW PRODUCT INTRODUCTION DIAGRAM IN TRADITIONAL APPROACH	12
FIGURE 4. THE CUSTOMER DEVELOPMENT.....	15
FIGURE 5. DATA COLLECTIONS.....	23
FIGURE 6. THE SMARTRESCUE PROJECT'S TIMELINE	27
FIGURE 7. THE WORKSHOP'S RESULT WITH INNOVENTUS	31
FIGURE 8. VALUE PROPOSITIONS AND CUSTOMER SEGMENTS OF SMARTRESCUE	32
FIGURE 9. SPECIFIED VALUE PROPOSITIONS AND CUSTOMER SEGMENTS OF SMARTRESCUE	33
FIGURE 10. THE WORKSHOP RESULT: SMARTRESCUE'S INITIAL BUSINESS MODEL CANVAS	38
FIGURE 11. SMARTRESCUE'S SUBCONCIOUS AND CONSCIOUS BUSINESS MODEL DESIGN ACTIVITIES	41
FIGURE 12. THE DIMENSIONS IN THE BUSINESS MODEL CANVAS THAT SHOULD BE INTEGRATED WITH PRODUCT DEVELOPMENT	49

LIST OF TABLES

TABLE 1. BUSINESS MODEL DEFINITIONS FROM DIFFERENT RESEARCHERS	4
TABLE 2. THE DIFFERENCES BETWEEN LEAN APPROACH AND TRADITIONAL NEW-PRODUCT INTRODUCTION APPROACH (BLANK, 2013)	14

APPENDIX – INTERVIEW GUIDE

1. Introduction

Interest in how enterprises can maximize its performance and maintain margins through constructing or improving their business model has increased significantly in recent years. There has been a growth in the number of scholarly journals published related to business models in the last decades. Business models shed a light on how firms create, capture and deliver value to customers (Magretta, 2002; Osterwalder & Pigneur, 2010). A business model plays an important part in innovation. Companies need to innovate their business model in order to: generate profit, sustain their competitive advantage, and thus, stave off threats from new entrants. An innovative idea or technological development does not represent any "single object value" until it is commercialized in some way via a business model (Chesbrough, 2010).

Business model innovation provides competitive advantages if the model is sufficiently differentiated and hard to replicate for incumbents and new entrants alike (Teece, 2010). Hence, managers and leaders of companies are concerned with how to design the right business model. For this reason, different business model design approaches such as Osterwalder and Pigneur's business model canvas (2010), activity system perspective by Zott and Amit (2010) and business model representation by Casadesus-Masanell and Ricart (2010) were developed. To a certain degree we know which business model generation approaches/tools that are helpful when it comes to designing a business model. However, not so much is known about what the process in itself looks like. There are knowledge gaps in the literature when it comes to what the business model generation process actually looks like. The business model canvas developed by Osterwalder is perhaps one of the most popular models. It is used by many consultants, firms, and business practitioners around the world, but there is not much literature discussing the limitations of the tool.

Mobile phones became common property for most people in the western world in the end of the 1990's. Since then, mobile phones have developed from being just a device to make calls with, to a multimedia device. Today, there are almost no limitations to what you can do with a phone. The invention of mobile app's and app stores such as App store, Google Play store, and Windows Phone Store, has created economic opportunities for uncounted app developers and software companies. The advanced technology which is embedded in a mobile phone is not only developed and used for communication and entertainment benefit, but also for assisting people in a crisis situation.

At the University of Agder, there is a project named SmartRescue. The project has created an app that can be used in acute crisis situations where individuals need awareness of immediate threats, as well as plans for evacuation from the affected area in the safest possible way (Radianti *et al.*, 2014).

The SmartRescue project is now in a phase where they are trying to find out how they should commercialize their app. They have had one meeting and one workshop with Innoventus which is an external consultant. Innoventus have given the SmartRescue team guidance regarding business model generation. Osterwalder's business model canvas is used as their underlying business model generation tool. Therefore the main objective of this thesis is not to give SmartRescue advice in the commercialization process. The main goal is to learn more about the whole business model generation process and get more knowledge about how to build a sustainable business model¹ for mobile app businesses from a real case, and compare the case findings with the related theory. Furthermore, the main focus is to document how the SmartRescue project team works with business model generation and to evaluate the approach as a whole. To reach the objective of this thesis I have formulated the following research question:

How do mobile application development businesses organize their business model generation process?

To answer the research question, this study is structured the following way: Chapter 2 begins with theories for business model concept development; thereafter it describes a few approaches and tools that can be used when designing a business model. In the end of the chapter I present a few theories related to the business model generation process. In Chapter 3 I specify and discuss the research strategy I have used and the case I have chosen to conduct my research. I also explain the research process and data collection for this study. Chapter 4 begins with reporting the findings of the case study, and thereafter in chapter 5 I discuss my findings and the limitations of my research. In the end of the chapter I come up with some conclusions and suggest possible areas for future research.

¹ A sustainable business model mentioned in this thesis means a scalable, repeatable and profitable business

2. Theory

2.1 History and Concept Development

The attention on business models have increased among scholars and business practitioners. It is shown by a surge in the number of articles published and an abundance of conference session and panels in this field (Zott *et al.*, 2011). The term “business model” was first mentioned in an academic article in 1957 where the construction of the business game for training purpose was being discussed. Even though the term was only mentioned once in the paper, the meaning of business model according to DaSilva and Trkman (2014) can intrinsically be interpreted as representation of reality, a simulation of the real world through a model.

DaSilva & Trkman (2014) argues that the term did not gain widespread use for decades. The number of journal papers on business model remained low until the 1990s, there were only five papers that contained the word business model in their title. However, with the development of information and communication technologies and the emergence of internet based companies, the term quickly gained popularity among practitioners and business scholars.

Margretta (2002) defines business models in terms of the value chain. She contends that a business model is divided into two parts. Part one encompasses all the activities associated with making something: designing it, purchasing raw materials, manufacturing and so on. Part two includes all the activities associated with selling something: finding and reaching customers, transacting a sale, distributing the product or delivering a service. She argues that a new business model may turn on designing a new product for an unmet need or it may turn on a process innovation, making a better way of making or selling an already proven product or service. Osterwalder *et al.* (2005) conducted a study to identify the most common business model elements in the literature. Nine elements in a business model were identified, and these elements became the underlying parts of a prominent template for designing a business model called The Business Model Canvas. Different authors have different notions of the definition of a business model as shown by Table 1. The table is adapted from Baden-Fuller and Morgan (2010) with a few changes and additions.

Table 1. Business model definitions from different researchers

Authors	Definition
Teece (2010)	“how a firm delivers value to customers and converts payment into profits”
Zott and Amit (2010)	“... a system of interdependent activities that transcends the focal firm and spans its boundaries”
Williamson (2010)	Cost innovation business model offers advantages in radically new ways meaning more for less
Gambardella and McGahan (2010)	Business model is a mechanism for turning ideas into revenue at reasonable cost
Itami and Nishino (2010)	...business model is a profit model, a delivery system and a learning system
Yunus <i>et al.</i> (2010)	A value system plus a value constellation
Casadesus-Masanell and Ricart (2010)	The logic of the firm, the way it operates and how it creates value for its stakeholder
Demil and Lecocq (2010)	The way activities and resources are used to ensure sustainability and growth
Sabatier <i>et al.</i> (2010)	Cross roads of competence and consumer needs
Osterwalder and Pigneur (2010)	Business model describes the rationale of how an organization creates, delivers and captures value
Giesen <i>et al.</i> (2010)	...about what and how the value is delivered to customers, how revenue is generated and how the company positions in the industry

Some researchers have various notions about what a good business model is. Magretta (2002) argues that a good business model is one that provides answer to the following questions: “Who is the customer and what does the customer value?” and “How does the company make money in this business and what is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?” A more precise and less broad definition is proposed by Teece (2010) who writes, “A good business model yields a value proposition that is compelling to customers, achieves advantageous cost and risk structure, and enables significant value capture by the business that generates and delivers products and services. While Casadesus-Masanell and Ricart (2011), who have simpler notion, contend that good business models create virtuous cycles which over time, result in competitive advantage.

When business models are compared to each other, one can often be confused by the notion of business model and that of strategy. For this reason, scholars emphasize the distinction between these two notions. A business model describes how a company run its business (Magretta, 2002), how it operates and creates value to its stakeholder (Casadesus-Masanell & Ricart, 2010), and reveals how various elements of the business work together (DaSilva & Trkman, 2014). A business model seems to focus more on cooperation, partnership and joint

value creation (Zott *et al.*, 2011). Meanwhile, strategy explains how a company will do better than its rivals (Magretta, 2002) and thus has its emphasis on competition, value capture and competitive advantage. Despite of the conceptual difference between business model and strategy, these two concepts depend on each other. Casadesus-Masanell and Ricart (2010) explain that a strategy refers to the choice of a business model through which the firm will compete in the marketplace, while a company's business model is a reflection of its realized strategy. DaSilva and Trkman (2014) argue that a business model does not by itself give all the answers on how to operate a business and generate a sustainable competitive advantage. Therefore coupling strategy and business model analysis is needed in order to protect competitive advantage resulting from a new business model design (Teece, 2010). When it comes to product market strategy, Zott & Amit (2008) argue that the business model is a complement to strategy and not a substitute.

2.2 Business model approaches and tools

A business model that works well for one company does not necessarily give great results for other companies. Therefore, a company needs to find its right business model in order to successfully create, capture and deliver value to its customers, and to fully leverage its potential. Chesbrough (2010) contends that a successful business model is developed through many experiments. However, experiments alone are not enough. A successful leadership of organizational change is also an essential key in addition to experiments. A manager needs authority to initiate the experiments, and ability to take actions based on result from the experiments. (Chesbrough, 2010).

In pursuance of building the right business model through experiments, a tool or an approach for designing a business model is needed. There are several business model approaches and tools that have been developed, and some of them can be found in scholarly articles and handbooks. Examples of the business model approaches are provided in the following sections. The criteria I had for choosing approaches is that they have to be widely cited by other scholars and articles. This way I make sure that I use theories that at least to some degree have been discussed and tested.

2.2.1 Business Model Canvas by Osterwalder and Pigneur (2010)

A business model, according to Osterwalder and Pigneur (2010), describes the rational of how an organization creates, delivers, and captures value. They propose a prominent concept of a business model which has been used by many organizations to generate and innovate business models. Osterwalder and Pigneur (2010) developed the business model canvas as a tool and a shared language for describing, visualizing, assessing and changing business models. They divide the canvas into nine building blocks, as depicted in Figure 1, which shows the logic of how a company operates and makes money.

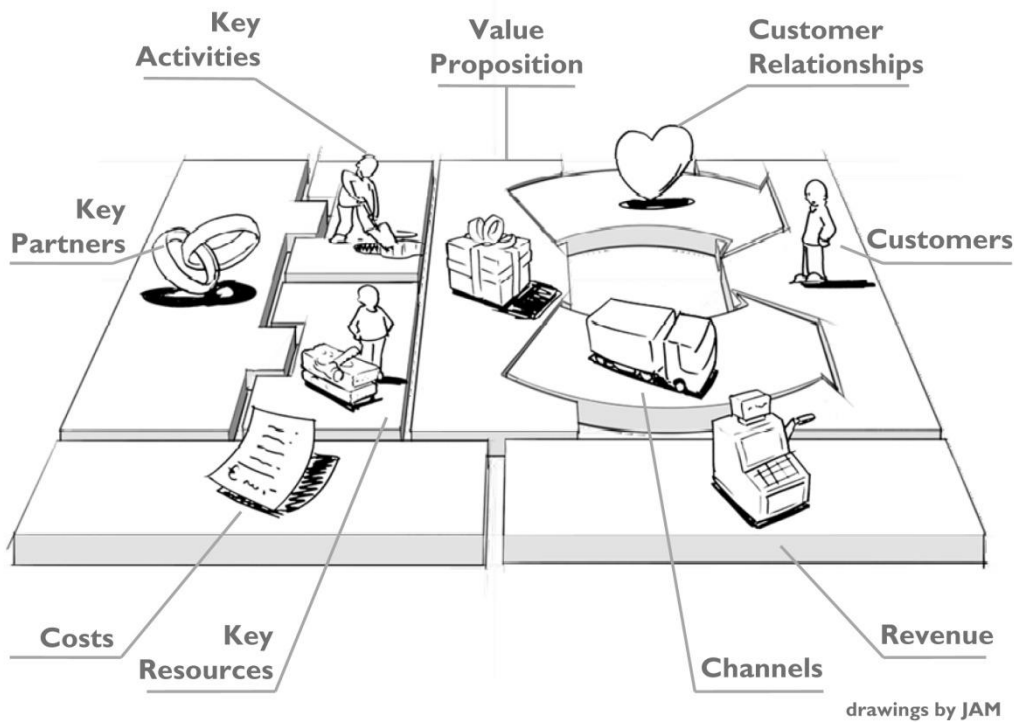


Figure 1. Nine block buildings in Business Model Canvas (Osterwalder & Pigneur, 2010)

- 1) **Customer segments** – This block describes for who a company creates value for and helps to identify the most important customers and prioritize which customers that needs to be served first. To group customer into different segments will help a company to design a business model around a strong understanding of specific customer needs, and thus be able to satisfy customers better. Osterwalder and Pigneur (2010) argues that customer groups speak for different segments if they require a distinct offer, different

types of relationship, have substantially different profitability or if they are reached by different channel distributions.

- 2) **Value Propositions** – A company needs to define the offering value in the form of a bundle of products and/or services which solve the customers' problems or satisfy their needs. Osterwalder and Pigneur (2010) divide the value proposition into three types: newness (no similar offering in the market), performance (improving product or service performance), and customization (tailoring products and/or services to the specific needs of customer segments or individual customers).
- 3) **Channel distributions** – this element describes how the company communicate to reach customer segments in order to deliver value proposition.
- 4) **Customer relationships** – refer to what kind of relationship the company want to establish with its specific customer segments.
- 5) **Revenue streams** – represent how the company generates income from the different customer segments. This building block answers questions such as: What value are customers willing to pay? For what do they currently pay? How much does each revenue stream contribute to overall revenues? Each revenue stream may have different pricing mechanism such as fixed pricing and dynamic pricing. Fixed pricing is related to predefined prices based on static variables, for example price as a function of the quantity purchased or fixed price for individual products or services. Dynamic pricing is a pricing mechanism where the prices change based on market conditions, for example, price depends on the time of purchase, or price depends on negotiation results between two or more partners.
- 6) **Key resources** – focus on what kind of assets that are required in order to create and offer a value proposition, reach markets through distribution channels, maintain relationship with customer segments, and make the cash. Key resources are categorized into four types: physical, intellectual, human and financial.
- 7) **Key activities** – describe the activities required to make the company operate successfully and to support value proposition, distribution channels, customer relationships and revenue stream building blocks, like key resources do. Osterwalder and Pigneur (2010) differentiate key activities into three categories: production, problem solving and platform/network.
- 8) **Key Partnerships** – describe the network of a company's suppliers and partners in order to optimize its business model, reduce risk and acquire resources. By describing the partners, the company will optimize the allocation of resources and activities, and usually

the aim is to reduce the costs by involving outsourcing or sharing infrastructure. Partnership can also help a company to reduce risk in a competitive market characterized by uncertainty. Partnerships are also motivated by the need of a company to acquire knowledge, licences or access to customers.

- 9) **Cost structure** – describes the costs that incur when a company is operating under a particular business model. The costs can be identified easily after the key activities, key resources and key partnerships have been determined. There are two main categories of business models when it comes to the cost structure. These are: Cost-driven and Value-driven. Cost-driven business models emphasize to minimize costs wherever possible, while value-driven business models focus on value creation.

2.2.2 Other Business Model Approaches

Morris and his colleagues (2005) propose a six component framework for characterizing a business model. These six components include offering, market factors, internal capability, competitive strategy, economic, and personal/investor factors. Unlike the approach proposed by Osterwalder and Pigneur, the components of a business model in this approach are defined at three different levels: foundation, proprietary and rules. By this way, the business model developers are forced to carefully think about the implications for the implementation. The authors also contend that their framework allows the user to design and describe categories, and analyze a business model regardless of company type. However, they don't provide a picture of the relationship between components as in Osterwalder and Pigneur's Business Model Canvas. Instead, the authors use tables/matrices to give a better overview and practical examples.

Zott and Amit's approach (2010) offer a conceptual toolkit to design a business model using an activity system perspective. Their approach is different from Osterwalder and Pigneur's approach in the way it focuses on interdependencies among activities in a system centred on a focal firm. The authors propose two sets of design parameters that should be taken into account when designing a business model: *design elements* and *design themes*. Design elements describe the content of the activities performed, the structures of "how the activities are linked", and the governance of "who performs the activities". Design elements are applied to create value through the exploitation of business opportunities. Meanwhile, design themes

provide more general types of value proposition which include *novelty, lock-in, complementarities, and efficiency*.

Casadesus-Masanell and Ricart (2010) propose another approach where they define a business model as a reflection of the firm's realized strategy. Unlike the other approaches that tend to identify the core elements of a business model and how these components are assembled, Casadesus-Masanell and Ricart address the reasons why a business model actually does work. The authors see a business model as a set of concrete choices that an organization makes and the consequences of the choices. The authors contend that a causal loop diagram can be used to represent the business model. The loop diagram expresses causal relations between choices and consequences. Furthermore, they suggest that a company needs to create a "virtuous cycle" and make good strategic choices that lead to favourable consequences, and enable further choices.

2.3 Organizing the business model generation process

When designing and implementing a business model, one may face some challenges during the process. The challenges could be to find the right business model, to manage uncertainty and ambiguity in defining a viable business model, lack of knowledge in different fields, and to continuously adapt the model in response to market feedback (Cavalcante *et al.*, 2011; Osterwalder & Pigneur, 2010).

There are some popular frameworks applied by entrepreneurs when it comes to establishing a startup company and generating its business model. The Lean Startup framework by Eric Ries (2011) and The Customer Development framework by Steve Blank (2012) provide a strategic framework for entrepreneurs when it comes to building a startup company, while Business Model Generation framework by Osterwalder and Pigneur (2010) provides guidance on how to organize the process and plan for the business.

Business model generation is the main focus of this thesis and therefore I searched for "business model generation" on academic search engines. The first hit I got was the business model generation handbook by Osterwalder. However, this framework seemed to only focus on how to use the business model canvas and the general steps of its application for a business. Since I use a case where the case organization is developing new technology aimed at commercialization, it has led me to also search for theory discussing how new products are

built and launched. That is why The Lean Startup approach by Eric Ries is relevant to describe in this chapter. His approach is one example of a method that can be used to develop a business and build the right product to the customers in shorter cycles. This approach has also currently got a lot of attention from entrepreneurs and students (Blank, 2013). Furthermore, the Customer Development framework by Blank and Dorf (2012) is chosen to fill the gap between the framework of Osterwalder and Ries. Blank and Dorf are using Osterwalder's business model canvas as a tool in the search of a sustainable business model for a startup company using the lean method of Ries.

2.3.1 The Lean Startup (Ries, 2011)

The concept of the Lean Startup originated from the idea of lean manufacturing in Japan. The principle is to focus on value-creating activities by eliminating the waste or non-value creating activities, and to build quality into products. The principle of Lean Startup is intended to answer the most pressing innovation question: "How can we build a sustainable organization around a new set of products or services?" Furthermore, the Lean Startup emphasizes people to figure out the right thing to build which is the thing that customers want and will pay for, as soon as possible. The Lean Startup's purpose is to minimize the risk of investment as much as possible by getting the customers feedback in an uncertainty condition. The Lean Startup framework uses validated learning as a unit of progress within extreme uncertainty where startup companies grow. In a startup, the customers and the product which customers might find valuable are still unknown and are part of the high uncertainty startups experience.

Instead of making complex plans that are based on assumptions, you can make constant adjustments with a steering wheel called the Build-Measure-Learn feedback loop, as depicted in Figure 2. A build-measure-learn feedback loop is a core component and once you fulfil a whole loop, your validated learning is increased. The loop is started from having a business idea and then continuing to enter the build phase as quickly as possible with a minimum viable product (MVP). The MVP is a version of the product that enables a full turn of the build-measure-learn feedback loop with a minimum amount of effort and the least amount of development time. Once the MVP is established, a startup begins its learning process by involving measurement and learning. The experiment is then performed by bringing the MVP to the early adopters who are willing to be the first to adopt a new product or technology. The

measured data, for example sign-up and trial rates, will be a valuable foundation for learning about customers and their reactions to the product. The decision either to pivot or to preserve the idea then needs to be made. A pivot is to make a structural course correction to test a new fundamental hypothesis about the product, strategy and engine of growth and to seek greater validated learning based on what you have learned from the loop so far.

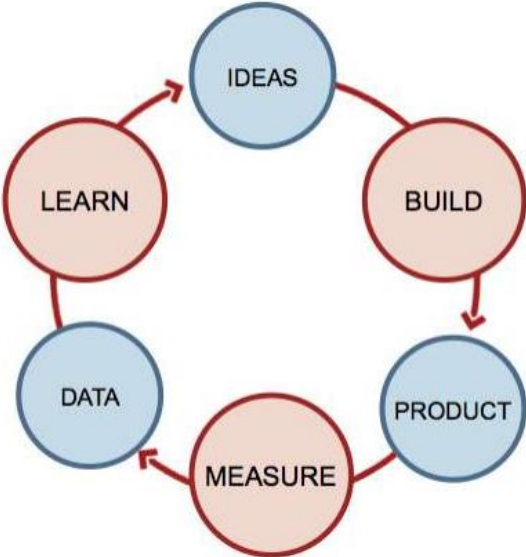


Figure 2. The build-measure-learn feedback loop

As summarized by Blank (Blank, 2013) in the article “Why the Lean Startup changes everything”, the lean method is based on three key principles: First, instead of engaging in months of planning and research, entrepreneurs accept that everything they have on day one is a series of untested hypotheses. So instead of writing an intricate business plan, founders summarize their hypotheses in a framework called a business model canvas (See section 2.2.1.).

Unlike the lean method, the traditional new-product introduction approach typically starts with capturing the founders’ passion and vision for the company and turns them into a set of key ideas, which then become the outline of the business plan. Statistical and market research are conducted as a basis for defining market-size and financial section which contains calculation and forecasting of revenue and expenses in the business plan.

Second, lean startups use a "get out of the building" approach called the Customer Development to test their hypotheses (See section 2.3.2.). The emphasis is on activities and speed: New ventures rapidly assemble minimum viable products and immediately trigger

customer feedback. Then, using customers' input to revise their assumptions, they start the cycle over again, testing redesigned offerings and making small adjustments (iterations) or more substantive ones (pivots) to ideas that aren't working.

In contrast to customer-centric in the lean approach, the traditional method uses some form of product management model (see Figure 3). A new product moves from development to customer testing (alpha/beta test). The feedback they get from the initial testing is then used by the product engineers to fix technical errors in the product before the product is launched and shipped to customers.

Blank (2012) argues that the product-centric approach is a good fit for an existing company where the customers are known, the product features can be specified upfront, the market is well defined, and the basis of competition is understood. As mentioned earlier, the customers and the product, which customers might find valuable are still unknown in a startup. Therefore, startups need to operate in a “search” mode as they test and prove every one of their initial hypotheses. As in the lean method, they learn from the results of each test, refine the hypothesis and test again in order to find a repeatable, scalable and profitable business model. On the contrary, the traditional approach assumes that building a startup is a step-by-step, sequential, execution oriented process. This approach and the business plan assume that every step a startup takes proceeds flawlessly and smoothly to the next. The approach therefore leaves little room for error, learning, iteration or customer feedback. This leads to the *startup's premature scaling* where the company finds out that the product features they have developed do not appeal to customers after they have executed the plan and spent huge amounts of money for investment and marketing.

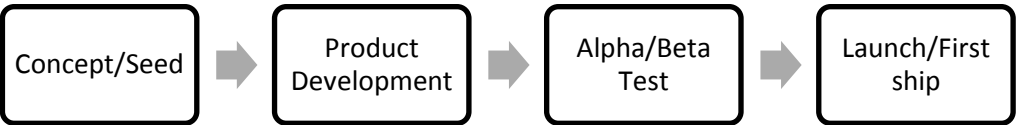


Figure 3. New Product Introduction Diagram in traditional approach

Third, lean startups practice something called agile development, which originated in the software industry. Agile development works hand-in-hand with customer development. Agile development eliminates wasted time and resources because it focuses on developing the product iteratively and incrementally. Agile development builds a product in short, repeated

cycles. This is the process where startups create the minimum viable products, gather feedback on it from customers, and then starts over with a revised minimum viable product.

In the traditional approach, the startup company begins to focus on product development and specialize by function after making the business plan and getting funding resource. The people in marketing department refine the size of the market defined in the business plan and begin to target the first customers, start to build a sales demo and write sales materials (websites, presentations). Meanwhile, the engineering department begins to focus on specifying and building a product. The product development stage typically expands into a “waterfall” model which means once this process starts, changes or new ideas cannot interrupt the process. It begins with the founder’s vision being expanded into the products final features and functions and further into detailed engineering specification. As a result, the product is nearly impossible to revise (Blank & Dorf, 2012).

In the traditional approach, financial progress is tracked using metrics like income statement, balance sheet and cash flow even when there’s no revenue to measure. In reality, none of these are useful for startups since a startup’s only goal is to find a repeatable and scalable business model (Blank, 2012). Therefore, the unit of progress used in the Lean Startup approach is a learning milestone. The learning milestone is generated by conducting experiments using the MVP and measuring data results from the experiments (Ries, 2011).

Startups face constraints which include the high costs of getting the first customer and even higher costs of getting the product wrong, and long technology development cycles. The lean approach reduces these constraints by helping new ventures launch products that customers want, far more quickly and cheaply than traditional methods, and by making startups less risky by the help of MVP testing.

The difference between lean and traditional approach, according to Blank (2013), is shown in Table 2.

Table 2. The differences between lean approach and traditional new-product introduction approach (Blank, 2013)

<i>Lean</i>	<i>Traditional</i>
Strategy	
Business Model Hypothesis-driven	Business Plan Implementation-driven
New-Product Process	
Customer Development Get-out-of the office and test hypotheses	Product Management Prepare offering for market following a linear, step-by-step plan
Engineering	
Agile development Build the product iteratively and incrementally	Agile or Waterfall development Build the product iteratively, or fully specify the product before building it
Organization	
Customer and Agile Development Teams Hire for learning, nimbleness and speed	Departments by function Hire for experience and ability to execute
Financial Reporting	
Metrics that matter Customer acquisition cost, lifetime Customer value, viralness	Accounting Income statement, balance sheet, cash flow statement
Failure	
Expected Fix by iterating on ideas and pivoting away from ones that don't work	Exception Fix by firing executives
Speed	
Rapid Operates on good enough data	Measured Operates on complete data

2.3.2 The Customer Development (Blank & Dorf, 2012)

Blank and Dorf (2012) introduces The Customer Development Model, as depicted in Figure 4, which explains the customer-related activities of a startup company in two main phases: search and execute. The search phase includes customer discovery and customer validation, while the execute phase includes customer creation and company building. In essence, the search phase refines, corroborates, and tests a startup's business model, while the execution phase executes the business model that has been developed, tested and proven in the previous step. Since the case that I am using is still in the phase of designing a business model, I will only explain the theory of the search phase.

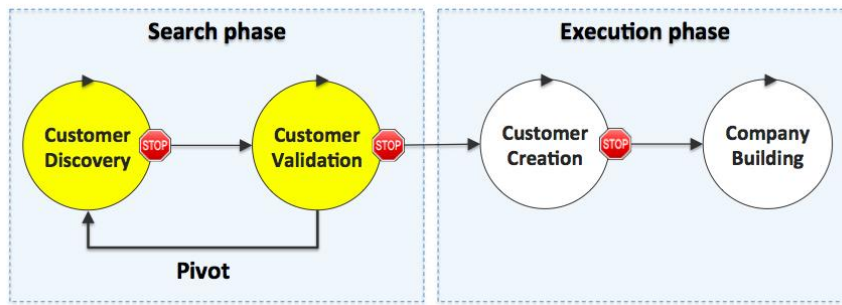


Figure 4. The customer development

Customer discovery

The essence of the customer discovery is to determine whether the value proposition matches the customer segment the company plans to target. The customer discovery phase translates the founder’s vision for the company into hypotheses about each component of the business model and creates a set of experiments to test each hypothesis. As in the Lean Startup principle, Blank and Dorf (2012) emphasize “getting out of the building” approach and validating each of those hypotheses to discover a repeatable, scalable business model. Founders need to test their hypotheses by talking to potential customer to gain insights from the customers’ feedback and adjust the business model. They need to go out and ask potential users, purchasers, and partners for feedback on all elements of the business model, including product features, pricing, distribution channels, and affordable customer acquisition strategies. Founders also need to learn in-depth about the customers’ problem, product features they believe will solve those problems and the process in the customers’ company for recommending, approving and purchasing products. This information helps the founders to build a successful product, articulate the product’s unique differences, and propose a compelling reason why customers should buy it.

Blank and Dorf (2012) also use the concept of mini viable product. The founders need to start the MVP brief by defining what needs to be learned and from whom. The sooner the MVP is in the targeted customers’ hand, the sooner feedback can arrive in which the founders can learn from it. Blank distinguishes between: low fidelity MVP and hi-fidelity MVP. The low fidelity MVP tests whether you have accurately identified a problem that customers care about. It can be as simple as a single web page used to gather customer feedback about the problem the product will solve. The hi-fidelity MVP will later test whether the product is on

the right path to solve that problem. This step is actually not to collect feature lists from prospective customers, but to find customers and a market for the product vision defined by the founders.

The founders need to translate their vision into a business model canvas. The authors, in this case, use Osterwalder's business model canvas which means that the vision should be transformed into the nine parts of the canvas. Each hypothesis need to be described briefly in a page including the list of experiments or tests that need to be conducted to test the hypothesis. Instead of using the business model canvas as a business illustration at a single moment, the canvas is used as a "scorecard" to track the progress in searching for a business model. The canvas is updated to reflect any pivots or iterations.

Thereafter, the founders should conduct experiments to test the "problem" hypotheses. The first phase of the interview is conducted to find out about the customer's perception of the problem and the customer's need to solve the problem. The goal is to turn hypotheses into facts, discard the hypotheses that are wrong and replace it with new hypotheses in the form of an updated business model canvas.

The proposed solution to the customers' problem is then being tested by presenting the value proposition and the mini viable product (MVP) to customers. The customers' responses are furthermore compared to the pass/fail goals which have been developed earlier. In web/mobile channel, this phase tests the hi-fidelity MVP. The goal is not to sell the product, but to validate the problem and assure that the product solves the problem or fill the need which will persuade lots of customers to buy it.

The next step is to assess the results from the experiment. In this step you need to decide whether you have learned enough from the customers and the experiments you have done in the previous phases and whether you should proceed to customer validation, or if you need to go back to your customers to learn some more.

Customer validation

Customer validation tests whether the business model is repeatable and scalable. Customer validation proves the existence of a set of customers, confirms that customers will accept the MVP (hi-fidelity MVP), and validates serious measurable purchase intent among customers. The hi-fidelity MVP in this step will be exposed to many more customers and should look and operate much more like a finished product. In brief, the hypotheses tested and proven in the

customer discovery phase will be validated by orders or usage of the MVP from the early customer who are willing to buy an early product.

2.3.3 Business Model Generation Process (Osterwalder and Pigneur, 2010)

The business model generation process is meant to simplify the task of setting up and executing a business model design initiative. Osterwalder and Pigneur (2010) divide the process into five steps : Mobilize, Understand, Design, Implement and Manage.

In the mobilize step, the activities include planning the project scope and its main objectives, team assembling and establishing a shared language. Establishing a shared language helps to structure and present preliminary ideas more effectively. It also helps to improve communication when the team describes, designs, analyses and discusses business models. The Business Model canvas and other similar tools can be employed in order to build a common language within the team. When establishing initial business model ideas Osterwalder and Pigneur (2010) contend that it is important to not overestimate the potential of those initial ideas. Behaviour like that can lead to a closed mind-set and limited exploration of other possibilities.

Understanding the environment can be done by researching and analyzing elements needed for the business model design effort. The activities can be market research, studying and involving customers, interviewing domain experts, and sketching out competitors' business model. However, the team should be aware of over researching (Osterwalder & Pigneur, 2010). One useful method to avoid excessive researching is prototyping. The method will help the team to quickly collect feedback from customers. In some cases, different business model patterns of existing businesses may be used as a starting point and as a source of inspiration. Furthermore, the team begins to design a business model by discussing and generating hypothesis for each business model element. When a final business model design is generated, the team will implement the business model in the field. The implemented business model needs to be managed by assessing it continuously to see if it needs to be adapted and modified because of market response.

2.3.4 Business model Idea Generation

One of the most challenging tasks for a management team is to generate innovative and sustainable business models (Chesbrough, 2006). A research conducted by Bresciani, *et. al* (2011) focused on the idea generation phase as the first crucial step towards developing a new business model. The authors stated that no study has addressed which idea generation methods that are most suitable for business model innovation. Business model canvas developed by Osterwalder and Pigneur (2010) is a method specifically intended for business model innovation. Despite the frequent use of the method in practice, it has not been systematically tested and analysed in terms of its effect on team performance (Bresciani *et al.*, 2011).

For this reason, Bresciani, *et al.* (2011) conducted experiments to test different tools and its effect on team performance in order to try to generate new business model ideas. The tools tested included empty power point slides to collect ideas, physical objects in combination with sketching, such as toys and office subjects, and Osterwalder's business model canvas. The study showed that facilitating business model teamwork with a template such as Osterwalder's business model appear to improve group collaboration in brainstorming sessions when performing complex and abstract tasks such as generating new business model ideas. Nevertheless, the use of the template can lead to a low perceived creativity because it can constrain new and innovative thoughts.

Osterwalder (2010) in his book proposes a general approach for generating business model ideas. He states that a diverse team is essential to generate effective new business model ideas. The members should be diverse in relation to seniority, age, experience level, business unit represented, customer knowledge and professional expertise. Before generating business model ideas, a general study should also be conducted. It can be done in the form of, for example, assessing existing business models, studying customer or prospects, and scrutinizing new technologies. During the process of idea generation, the goal is to generate as many ideas as possible. The criteria selection is defined afterwards so the participants can start the process of idea generation with an open mind. The criteria selection can for example be estimated implementation time, revenue potential, possible customer resistance and impact on competitive advantage. The idea generation process results in several potential business model innovations in the form of different business model canvas alternatives. This method makes it easier to compare the positive and negative sides of the canvases.

2.4 Literature gap

During the search for business model generation theory, I found out that most of the literature about business model design is very normative. In most cases the literature suggests different tools that can be used to create a business model. There have been few descriptive studies that look into how startup companies actually work with their business model generation process. This thesis addresses how the business model generation process is performed as an integrated part of the new product development process by following a case. My thesis is therefore mainly a contribution to descriptive studies in the business model generation field.

3. Research methods

The word method comes from the Greek word *methodos*, which means to follow a certain path to reach a goal. Social science methodology focuses on how to go about when you gather information about the real world, and how to analyze this information. The most important characteristics of methods and empirical research are systematics, thoroughness and openness. The doctrine of methodology helps us to make suitable choices and discover new knowledge (Johannessen *et al.*, 2010).

3.1 Choice of research strategy

When conducting this research, I have combined an observational approach for a particular case including interviews and some document readings and a field-experimental approach where I apply a tool together with the case-organization. Thus, I employ a qualitative case study combined with action research approach as my research strategy.

Qualitative method implies an emphasis on words and understanding rather than numbers (quantitative). It stresses the intimate relationship between the researcher and what is studied. In qualitative studies the researcher often concentrates on relatively few units and has good knowledge of each case, and it is common to conduct interviews with key informants and do observations (Denzin & Lincoln, 2000; Saunders *et al.*, 2012). In this thesis, I am looking to gain a deeper understanding of the SmartRescue project and their process to generate a business model. If I conducted a market research for the SmartRescue project instead, a quantitative approach targeting consumers in related geographical area would have been a valid choice.

Action research is a research process that makes people able to study, evaluate, learn from, and possibly improve their own work and practices in the particular situation they are finding themselves in (McNiff & Whitehead, 2006). In action research, the researcher wants to try out a theory with practitioners in real situations, gain feedback from this experience, modifying the theory as a result of this feedback, and try it again (McNiff & Whitehead, 2006).

Through this study, I want to learn from the chosen case how mobile app development businesses organize their business model generation process, especially when it comes to commercializing an innovative and new technology. I believe that if mobile app developers

understand how to generate a sustainable business model, in addition to develop a useful app there will be less commercial failures. Mobile app businesses, such as Facebook, Instagram, Dropbox, Evernote, and Snapchat, just to name a few, are examples of mobile app startups that have achieved great success. Despite many success stories, Shikhar Kosh says that, 75 % of startups fail (Blank, 2013).

In the first phase of my research I started to gather as much information as possible about the SmartRescue project. I looked through project documents and meeting reports. I also interviewed people to get a better understanding of how the technology development and the search for a business model process were managed. Through these activities, I could see if SmartRescue had organized their business model generation process the way the literature suggested. In March 2015 I arranged a workshop where Osterwalder's business model canvas was applied to help generating a business model. After the workshop I wanted to find out the role of the workshop in bringing SmartRescue closer to a sustainable business model. Therefore I interviewed the leaders of the project a week after the workshop.

3.2 Choice of case

The SmartRescue project was chosen as a case study because prior to the initialization of my thesis, the team members expressed that the university was planning to commercialize the SmartRescue app. As a result from the first meeting with the external consultant, Innoventus, the SmartRescue team were starting to search for a business model that could work for their project. Using SmartRescue as my case made me able to gain more knowledge about how mobile app development businesses organize their business model generation process.

The SmartRescue project started January 2012. The project got funding from *Aust-Agder utviklings- og kompetansefond* (AAUKF) and the University of Agder (UiA). The project is a part of Centre for Integrated Emergency Management (CIEM) at UiA. CIEM focuses on exploiting the potential of technology to help people when they get caught in a crisis situation. The motivation behind the SmartRescue project is to use technology embedded in a smart phone when for example a fire occurs.

The Smart Rescue (SR) team consists of five people:

1. Project leader
2. Process coordinator
3. Software developer
4. Artificial intelligent expert
5. PhD student

The SmartRescue project has finished most of their work with the development of the app and the technology. The initial project phase is from January 2012 until August 2015², but the team will probably go into a new phase and try to market their product to customers after August. When I began my research in January 2015 the plan was to observe the whole commercialization process. However, after a month passed by I learned that SmartRescue did not plan to focus intensively on the commercialization phase during spring 2015. The basis for the discussion therefore slowly changed from observing the whole process of SmartRescue app's commercialization to a focus on the activities they did during the technology development. This way I could analyze how the activities affected the business model they generated implicitly or explicitly.

For me as a researcher, it would have been beneficial if I could follow the project throughout the whole commercialization process. Anyhow, the best thing would be if I had been able to follow the project from start to end. Still, there are important lessons to be learned from this case. Moreover, SmartRescue have been through several meetings regarding business model generation. Through the case I will be able to see how a real project has organized their business model generation process. What makes this case even more interesting is that they are developing a new product. My job then in this thesis is to describe what SmartRescue have done so far and discuss to which degree the different activities has brought them closer to a sustainable business model.

² According to <http://ciem.uia.no/project/smartrescue>, the project period started in August 2012, but the process coordinator corrected it to January 2012.

3.3 The research process

The data collection in this thesis is divided into three steps (see Figure 5): First interview round, workshop, and second interview round.



Figure 5. Data Collections

Step 1 - First round of interviews

The first interviews were conducted with three people from the SmartRescue team. The ones I interviewed have the following roles: project leader, process coordinator and software developer. The goal with the interviews were to obtain a better understanding of the Smart Rescue project and to get more information about the whole process from when they started writing the proposal in 2011 until spring 2015. I wanted to find out more about how the project had developed. Did they have any particular customers in mind from the start? Did they have a step by step plan for commercialization?

According to Thaagard (2003), a qualitative interview can be designed in different ways. On one side you have interviews that are characterized by little structure that can be seen as a conversation between the researcher and the informant about a specific topic. On the other side you have a relatively structured approach. The questions are designed before the interview, and the sequence of the questions is fixed. However, the most common method used in qualitative interviews is the semi structured approach.

In this step, I decided to make an interview guide to make sure I had covered what I thought was the most important questions in relation to my research question. Before I conducted the interviews I sent the interview guide to the interviewees. In order to make the questions for my interview guide I looked through the theory I am using related to business model generation. I also got valuable feedback from my supervisor to make sure that I had relevant questions for my case.

The interviews were semi-structured and conducted face to face since it was important for me to be able to ask complementary questions, and also to avoid misunderstandings. Thaagard (2003) argues that it is important to respond to what the informant says, and at the same time drive the interview ahead to get the right information.

Each interview lasted between 30 minutes to an hour. I decided to use a tape recorder during the interviews and I asked the informants beforehand if it was okay. There are advantages and disadvantages with using a tape recorder, but I assessed the positive aspects to outweigh the negative even though a tape recorder can give the interview a more formal character (Thaagard, 2003). Each interview was then transcribed, translated, synthesized and presented in this thesis as findings. Based on the information I obtained from these interviews, I created a timeline of SmartRescue's activities (see Figure 6).

Step 2 - Workshop

Next step was to conduct a workshop. The background of this workshop was actually based on the previous interview I had with the project leader. As mentioned earlier, the status of when the commercialization process will start was still uncertain. For that reason, I asked if there were anything I could assist the project with so the team could get closer to a business model. Since they were not able to finish discussing all elements in the business model canvas at the Innoventus workshop, the project leader said it would be useful if I could organize a business model workshop for them. The workshop with Innoventus was held on November 6 2014. The idea of conducting a workshop was also supported by the process coordinator who suggested me to organize the workshop so that it could be some kind of a continuation of the workshop they had with Innoventus. Therefore the main goal of my workshop was to help complete SmartRescue's business model canvas that they had started working on in the workshop with Innoventus.

Before conducting the workshop, I needed to see through the meeting report from the workshop with Innoventus. By this, I could start off repeating a bit from the Innoventus workshop and then organize my workshop around the boxes that they had not been able to fill out last time. The workshop was conducted a few weeks after the first interview round, on March 13 2015. The workshop lasted for 2 hours. Out of six people invited, four showed up. The people who participated in the workshop were: the project leader, the process coordinator, the software developer and the PhD student. These four participants were also the

ones who attended the previous workshop with Innoventus. For the workshop I had created Power Point slides to present the material to the participants.

This was the Agenda for the workshop:

- a. Welcome and Introduction five minutes. The background for the workshop was presented and I asked the participants about their understanding of a business model. The purpose of this was to confirm that the participants had a clear understanding of the business model concept.
- b. I spent ten minutes to repeat the outcome of their workshop with Innoventus to revive the participants' memory.
- c. The main part of the workshop lasted 90 minutes. Since this workshop was a continuation of the Innoventus workshop, I applied the same tools that Innoventus used in their workshop. The SmartRescue team did some brainstorming to come up with ideas to the empty boxes in the business model canvas. During the brainstorming session they could use sticky notes or whiteboard to write down their ideas. In the end of this session, the concept of Mini Viable Product (MVP) was introduced. The purpose of this was to give the team knowledge about MVP in relation to new product development and the search of value proposition and to find out whether the team actually had thought of the MVP of SmartRescue.
- d. Conclusion five minutes. The summary of the workshop was presented.

Step 3 – Second round of interviews

Finally in the last step, the second round of interviews was conducted to find out in which way the workshop helped the SmartRescue project to get closer to a sustainable business model. I decided to interview only the project leader and process coordinator since they were the ones responsible for determining the next plans of SmartRescue's commercialization process. For respondent validation, I sent them the interview results and the timeline of SmartRescue I made in step 1 to make sure I had understood them right. Through this process I received a few corrections and additions.

4. Findings

The case findings in this chapter are organized according to the sequences of the data collection mentioned in the research method chapter: first round of interviews, workshop, and second round of interviews.

4.1 First round of interviews

Background

The interviews started with bringing up the background of the SmartRescue Project. As mentioned earlier, the project is a part of Centre for Integrated Emergency Management (CIEM) at UiA. The project have developed an app that can be used in a crisis situation when you need to find the nearest emergency exit or the safest way out of a building if a fire occurs. When I interviewed the process coordinator, she said that:

When an integrated technology from a familiar device is established in the form of a mobile app and used in a crisis situation, it is expected that communication during a crisis situation will be much more effective.

An event that inspired the development of the SmartRescue app was a fire drill at Risør hotel in 2012 where the team joined as observers. When the fire fighters arrived at the hotel, they needed to get a clear picture of the overall situation. The first thing they did was to contact the hotel's owner to find out how many people that were left inside the building. The hotel register how many guests that are living at the hotel, however if a fire breaks out during daytime it is impossible to know how many that are still inside their rooms. Also, the fire fighters were unfamiliar with the building layout, and therefore needed more information in order to be able to navigate efficient inside the building. When I interviewed the project leader, he said that:

A smart phone is equipped with diverse sensors that are able to measure sound, temperature, motion, humidity and capture pictures. From those sensors, information can be obtained and analyzed to help people that are trapped in a fire or another emergency situation

The technology that is embedded in a Smartphone can help both fire fighters and people that are trapped. One of the features of the app can tell where the fire threat is located and how it will spread. A timeline of the SmartRescue project activities is shown in Figure 6.

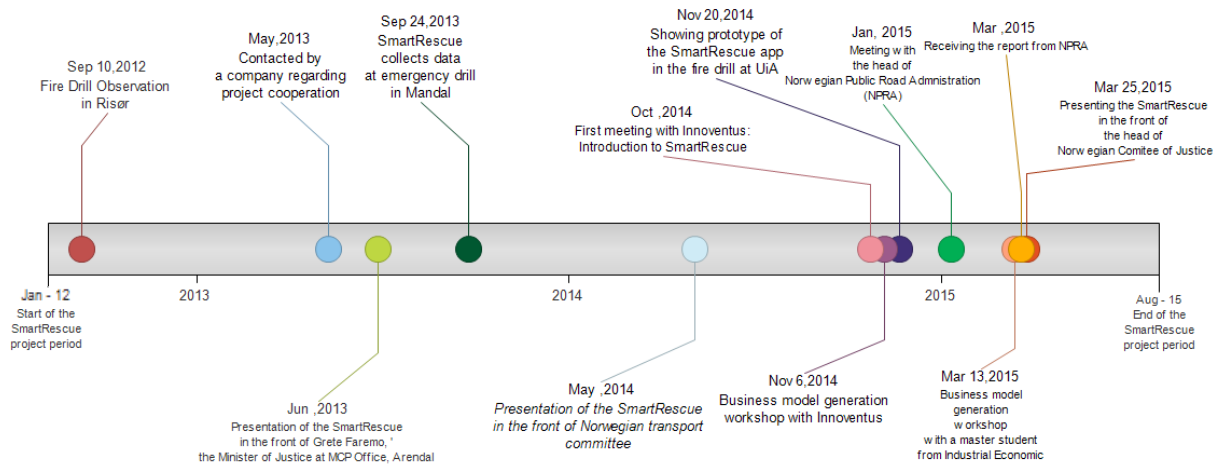


Figure 6. The SmartRescue project's timeline

As shown by the figure above, SmartRescue’s technology has been presented to different audiences, such as politicians and public institutions. Later, these presentations lead the SmartRescue team to one of their potential customers, the Norwegian Public Road Administration (NPRA). In a later interview with the project leader, he recently had a short presentation of CIEM which includes the SmartRescue project in the parliament for the Justice department. The project leader told me that:

The purpose is to make the government know the potential of our technology in emergency management, and also get political attention and support. They (the government) are not a customer, but presenting our project to them is an important strategy to market the product

Decision-making during technology development process

In my interview with the software developer, I asked what has been the first priority for the SmartRescue project since the start. He said that:

The most important thing for us has been the technology development such as modeling and scenario analysis, and to make sure that the app is functioning well.

Through the interviews I did, I learned that the team wanted to have their main focus on the technology development in the start. When they were done with developing the technology they planned to start thinking about the commercialization process. During fall 2014 SmartRescue started to focus on business model generation. That means they started focusing on it almost three years into the project. SmartRescue’s focus on business model generation has been more like a onetime event instead of an iterative process. During my interview with

the project leader, he told me that the SmartRescue team had been thinking about it, but it had not been a formal process. Anyway, the workshop with Innoventus made them think about important aspects of the commercialization process and it brought them closer to a business model.

As the project leader said in the interview, the case they chose for their project is a challenging case. He said that their goal was to find a difficult case to both challenge the participants and to come up with new and useful technology. In the beginning a ferry was chosen as a research case because of the challenging nature of an emergency situation on a ship:

The victims can be easily trapped if a fire occurs. However, later we realized that fire in buildings was a more relevant case for us because of the actors in the region. Also it is very difficult to get hold of a large ship where we can set up a big drill.

Initially, the SmartRescue project aimed on establishing the app based on Ad-Hoc networking which makes the mobile phones able to communicate without having internet connection. In 2013, the SmartRescue team got in touch with a company that builds mobile communication for emergency situations. The company's name is Norwegian Mobile Emergency System (NMES). The representative of the company thought that the combination of their product and artificial intelligent could result in a powerful tool in emergency situations, and therefore they were interested in cooperating with the SmartRescue team. The interaction between the SmartRescue team and the company affected the research focus from prototyping based on Ad-Hoc networking to prototyping based on Wi-Fi connection so that the app prototyping process would be quick and less complicated. Unfortunately, there was no follow up due to some administrative and regulation issues which were not fully developed for accommodating the commercialization of the research results. This issue is mostly related to intellectual property right for research outcomes.³ Still, in a later interview with the project leader, he said that:

They (NMES) are still interested to cooperate with Smart Rescue. We haven't found out what kind of partnership, but we see that there are many opportunities.

In November 2014, SmartRescue held a prototype simulation of the SmartRescue mobile app at The University of Agder. Some fire fighters were invited to the simulation as observers.

³ Interview with the process coordinator February 16, 2015

The purpose of the simulation was to show how that SmartRescue mobile app can be used in a real situation and also to find potential flaws and errors with the app. A month later, SmartRescue presented their project and the app at the CIEM workshop to show the prototype and its selling points. The presentation got positive feedback and the SmartRescue team were told by some of the crisis managers there that their mobile app has the potential of being very useful.

Business Idea

The team members I interviewed had a few ideas about who could be interested in an app like SmartRescue when they started the project. The SmartRescue team were focusing on which features that could be useful for potential customers, but this was more like a subconscious process than an organized one. The SmartRescue team believes that their app has the potential to become a competitive product in the market. As the project leader says:

The SmartRescue app has a lot of different functionalities that can be useful in emergency situations and as far as I know we are pioneers with the technology that we have developed for the SmartRescue app.

In the fire drill at UiA, the software developer had a conversation with some of the fire fighters and the operational manager from UiA:

So these guys from the fire department and that person [the operational manager], they were very interested in this idea. They liked the idea. It is new stuff they haven't seen before and it's very interesting to them. As of today they don't have a reliable way to know if there are people inside a burning building.

In the interview, the process coordinator told me that the features of the SmartRescue should be customized according to the different needs of the customers. She said:

After the simulation, the firemen said that the team should add one more feature. It is important to see which rooms that have been checked and which rooms that have not been checked. It is not necessary for firemen to have a feature on the app that shows how the fire will spread because most of the time they know. However a feature like that can be important for people that are trapped inside a building.

Furthermore, the process coordinator and the software developer believe that the SmartRescue app will be more interesting for the market if they base the technology on Ad-Hoc Networking instead of Wi-Fi.

The workshop with Innoventus

The SmartRescue team was contacted by the innovation department at The University of Agder during the second half of 2014. The innovation department were interested in the app and the new technology they were developing. They encouraged the team to start thinking about the commercialization of the SmartRescue app.⁴ The SmartRescue team got help from Innoventus – a company that offers an environment, competence and network for initiative toward a new company establishment, to generate the initial ideas for commercialization. The SmartRescue team had two meetings with Innoventus during fall 2014. In the first meeting Smartrescue presented their app and told them about the project. The second meeting was a one-day workshop where Innoventus facilitated a brainstorming about business model development. Osterwalder's Business model canvas played an important role in the workshop.⁵

When I asked the process coordinator which benefits she got from the workshop, she said:

The workshop was really helpful for the team, especially since we are researchers who often do not know if our research has commercial value, and what aspects to consider if we want to commercialize the technological solution. The facilitator in the workshop was able to help the SmartRescue team realize what we actually want for our business and help the team describe systematically the ideas we had. However, it was challenging since we are not used to business model generation process.

I asked the same question to the software developer and he answered:

Through the workshop, we were encouraged to start thinking differently. I agree with that. An idea which seems smart in the beginning is maybe not a good idea after a project has been running for a while.

⁴ Interview with the project leader March 5, 2015

⁵ Interview with the process coordinator February 16, 2015

4.2 Workshop

As mentioned in the methods chapter, the SmartRescue team was not able to fill out all the spots in the business model canvas in the workshop with Innoventus due to limited time. Therefore, the aim of the workshop I organized was to finish the canvas in order to have a more complete business model that can be used as a starting point for the project's business model generation process.

As mentioned earlier, in the beginning of the workshop, the participants were asked about the definition of a business model according to their understanding. The purpose of this question was to confirm if the participants already had gained an understanding of the concept from the previous workshop with Innoventus. It is important to have an understanding of the business model term in order to have a constructive discussion when it comes to designing a business model. From the participant's answers, I got the impression that they had a clear understanding of the basic concept of a business model. One of the participants answered that:

[A business model describes] all key aspects of the business that need to be considered so that we know how to commercialize our product and gain profit as expected.

Some building blocks in the business model canvas with the discussion results from the previous workshop with Innoventus were presented to revive the participant's memories of the previous workshop. The discussion results from the last workshop included value propositions, customer segments, channels and key activities building blocks (see Figure 7).

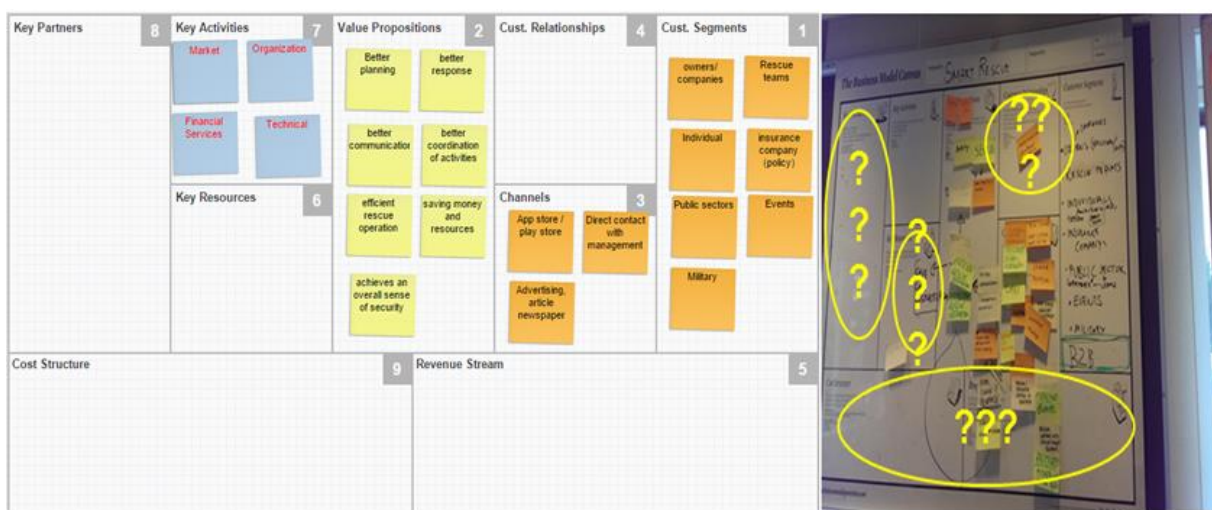


Figure 7. The workshop's result with Innoventus

The value propositions and customer segments that SmartRescue came up with in the workshop with Innoventus is seen below in Figure 8.

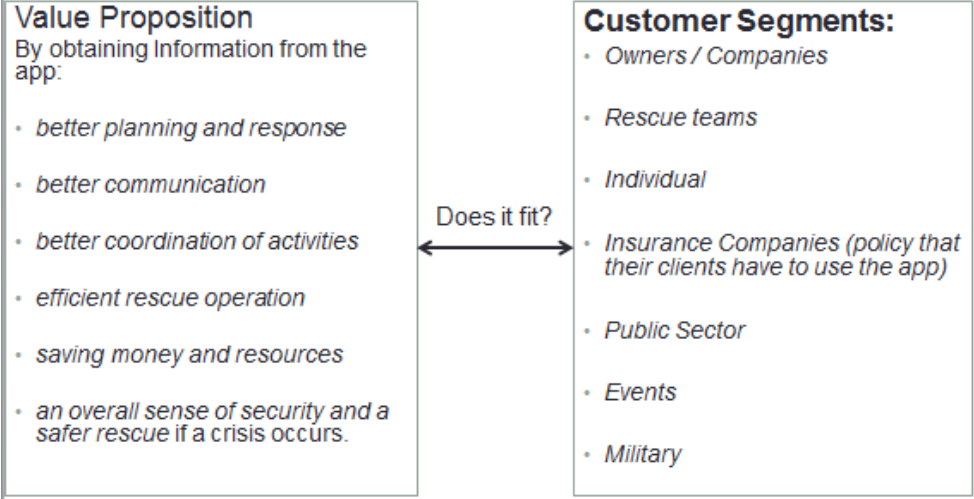


Figure 8. Value propositions and Customer Segments of SmartRescue

The workshop helped the participants to get a common understanding and confirmation of the value proposition they offer to the customer segments they target. In the workshop I asked if all the value propositions the team defined were suitable to all customer segments that they focus on. We discussed if some rescue teams need the value of saving money and resources:

X: When I talked to the fire fighters, the manager said that: “I also have to think about money, because I have to make sure if the area we are going to evacuate needs helicopter or not, because it [to use helicopter] needs a lot of money. So they have to think about it, such as how many helicopters they need.

Y: Then money is relevant to this (fire fighter department). If there are many victims, then they need more helicopters. Yeah, we didn’t know that (money) is a consideration of decision-making when it comes to rescue operations.

In the workshop, the SmartRescue team decided that they want to prioritize three out of seven potential customer segments, and they specified the value proposition for the customers as shown in Figure 9. The customer segments they chose are easier to reach since the team already have established contact with them. The team believes that the customers are pretty interested in the app and the new technology that the SmartRescue project is developing. One of the participants said:

They (Norwegian Public Road Administration) are also interested in Smart Rescue to save resources very concretely, instead of installing sensors in all the tunnels in Norway.

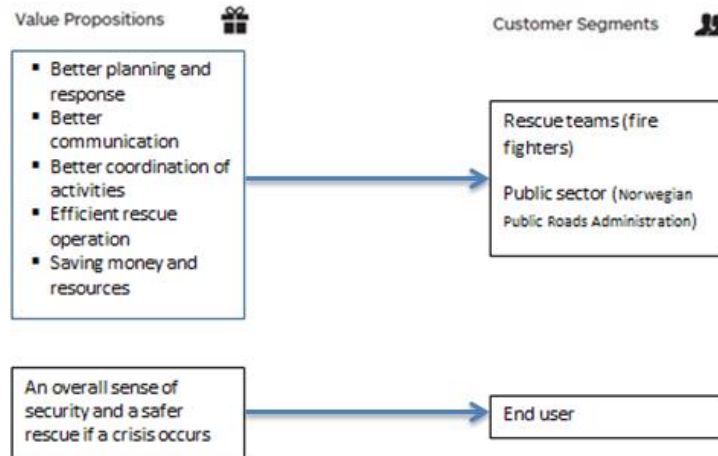


Figure 9. Specified Value Propositions and Customer Segments of SmartRescue

When it comes to customer relationship, the team were discussing about how to get, keep and grow customer base. But since this project is still in a very early phase of commercialization, we decided to focus only on how to get and keep customer base. To make people aware of the product is an important and essential step in order to get customers. As one of the participants commented:

For me raising awareness and showing demos are very important because you have to see the benefit of the technology

The SmartRescue team were thinking about organizing another fire drill similar to the one at UiA, but instead of involving students as direct users in the fire drill, they wanted fire fighters to be the direct users in order to make them more aware of the app. The Smart Rescue team also thought that showing videos to potential customers is a useful tool to raise awareness of their product and show how the app can be used. The team were also discussing about how to keep their customers. Since the SmartRescue app is pretty new, the app may be unstable. Therefore the team were suggesting that customers could report errors and bugs if they experienced problems. In addition customers could suggest other requirements that they needed in the app. When it comes to the end user, the team wanted to utilize social media and other media on the internet to raise product awareness and provide user guidelines.

During the discussion, especially when we were discussing about the revenue stream building block, I observed that the participants often got inspiration for business models from other businesses that they were familiar with. One participant commented:

For example if Statens Vegvesen (Norwegian Public Road Administration) becomes our customer, they can make it mandatory for anyone who lives in Norway to download this app. It can be compared to the app we use to buy bus tickets developed by Red Rock. The app is free, but we understand that it is Nettbuss who paid for the app. So the app itself is free for the passengers, we just buy the tickets with a smart phone. Perhaps, this is the same way to organize the SmartRescue app. The user shouldn't pay for it. It should be a free service offered by Statens Vegvesen.

When the team were discussing about the possible revenue stream for SmartRescue, they had the idea to offer services which the customer may be willing to pay for, one example is customer support and training for using the app. Furthermore, the team also considered the costs for making the features when they were discussing about which features the customers should pay for or get for free:

X: The thing is if the features include indoor fire. It needs customizing effort in each segment. We can say, for example, kommune (municipality) wants to have that (SmartRescue) for schools and they want every school in Grimstad to use the app. We will then have cost calculation of work on, for example, five to six layouts. Then, we cannot just offer service because there is the cost of personnel that also needs to be calculated in the price.

Y: So, we should give the basic features for free, and customized features comes with an extra charge

Z: Maps of the building is one of the extensions that the customers have to pay for.

During the workshop, key partners, key resources, and cost structures were briefly discussed. The team previously had private sector as their customer segments, and therefore they had the idea of making partnership with, for example, travel agencies, hotel owners and insurance company. But since their customer segment focus now was much more narrow, those possible partners were not relevant anymore. The purpose of having partnership for SmartRescue was to be able to reach more people through their partners and therefore they ended up with the

idea of having their customers as their key partners, perhaps by showing it on SmartRescue's official websites. As a reward, the customers could get discount on SmartRescue's services.

The key resources that the team think are important to run the business are divided into four main categories: Physical resources to develop the software, human resources to manage the business and develop the product, financial resources, and patent for SmartRescue's new technology. When it comes to cost structures, the team listed the essential costs that incur in order to run the SmartRescue business. The costs include personnel, app development, software and office.

As mentioned earlier I presented the concept of Mini Viable Product (MVP) to the team in my workshop. A case example of mini viable product was presented to give the participants a better understanding of the MVP concept. Nevertheless, because of the time limit the team were not able to discuss this concept and the potential value for the SmartRescue app. A potential MVP could be the mobile app which was used in the fire drill game at UiA. As the project leader said:

I think the app is close to launching. But maybe we have to adjust it a little bit to the customers and do some manual configuration. It will not take long, maybe just a few days.

From the discussion, the team temporarily defined fire department as their early customer of the SmartRescue product. Furthermore, the product will be offered with a very low price for a short period, for example for the first 3 months to gain interest from customers. At the same time, the team can evaluate the product while it is being used by the customers. Since the end users of the SmartRescue app can be rescuers and people who need to be evacuated from a building, the SmartRescue team need to find out which customers that should get access to the SmartRescue's MVP in addition to the fire fighters.

In the end of workshop I asked what the team had learned from the workshop. One participant said that there are some business model elements that he did not have much knowledge about previously. The participant realized that there are a many things they need to consider in order to generate a sustainable SmartRescue business model. Another participant learned from the workshop that customer segments and value propositions in a business are particularly important. I also asked the participant which activities they plan to do after the workshop in order to reach a sustainable business model. One of the participants said that:

We need a more specific value propositions for each customer and find out the customers willingness to pay.

Other participants argued that it is important to define the team leader and members for the business model generation. The team also need to find out more about intellectual property rights of Smart Rescue since this can affect the revenue stream in the business model. However, the most important thing to do now is to find funding resource for the commercialization process.

The outcome of the workshop I organized was a complete SmartRescue business model as seen in Figure 10. From the business model canvas, we can see that the SmartRescue team distinguishes their value propositions between customers and end users since these two categories of consumers have different needs. The customers are the company or the organization that will pay for the SmartRescue's product or service, for example NPRA and fire departments, while the end users are the people who will use the SmartRescue app directly, for example the people that get caught in a fire inside building or people who experience tunnel fire.

The end users should get the app for free because perhaps they are not interested to pay for an app that they don't use often. Meanwhile, the customers who generate revenue stream for SmartRescue are willing to pay for the SmartRescue's product and service since they are aware of the problem they have and need the Smartrescue app to solve their problem. However, it is not enough if the app is only used and paid by the fire fighters (rescuers). The app should also be used by people that are trapped inside buildings. Therefore, the SmartRescue team should find out who will pay the app for these people, for example municipality or county. The revenue model will change as the SmartRescue starts to target wider areas of customer segments such as the private sector.

Even though the workshop resulted in a complete business model canvas, the elements inside the boxes are still very general and hypothetical. For example, when it comes to channel selection, the SmartRescue team has chosen App Store or Play Store as one option to distribute their product to the end user. Even though this channel is reasonably chosen because its effectiveness to deliver the app to the end user, it is still not sure if this channel is profitable for SmartRescue. The Apple App Store, for example, charges 30 percent of retail pricing for downloadable iPhone applications (Blank and Dorf, 2012). Meanwhile, a free app will have ads while it is being used and I think that is not a good solution for a "serious" app

used in an emergency situation like SmartRescue. Therefore, the elements in the canvas need to be further elaborated and examined, but at least the SmartRescue team has been able to make a business model canvas they can use as a starting point for their commercialization process.

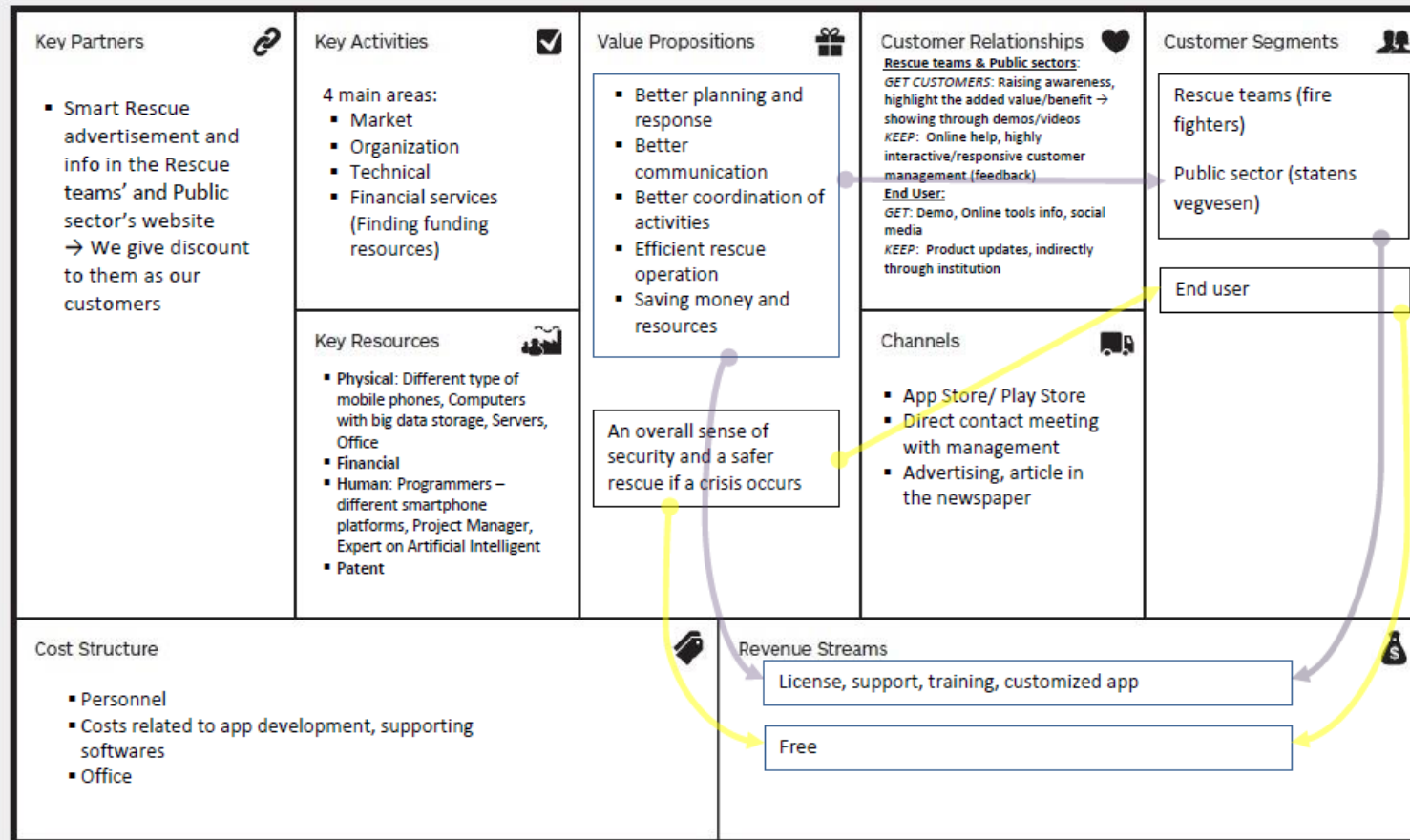
The Business Model Canvas

Designed for: SMART RESCUE

Designed by: Jaziar, Mehdi,
Ole-Christoffer, Parvaneh

Date:
13.03.2015

Version:



DESIGNED BY: Business Model Foundry AG
The makers of Business Model Generation and Strategyzer
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Figure 10. The workshop result: SmartRescue's initial business model canvas

4.3 Second interview round – learning outcome from the workshop

A week after my workshop with SmartRescue I conducted new interviews with the project leader and the process coordinator. The reason I did the interviews was to get more knowledge about the outcome of the workshop. My main question to them was: “In what way was the workshop helpful in order to get closer to a sustainable business model?” The process coordinator said that in general, the workshops (the one with Innoventus and mine) introduced the SmartRescue team to new dimensions that they had never thought of before. She told me that they had been thinking about business model before, but only on the surface, they had not been able to dig deep into the literature. Their main focus as of spring 2015 had been on adjusting the app to what they thought their potential user’s needed, so that they would be willing to adopt it in their daily life. As she says: *Before the workshop we didn’t think of how to “pack” the app in order to make it impressive and attractive for the user.* The project leader told me that the workshop helped them to see the importance of finding potential customer’s needs and distribution channels.

The project has valuable human resources in the field of technical development. However, after the workshops they realised that their project and other projects at the university that are to be commercialized need people with administrative and business model generation skills. The process coordinator also emphasized the importance of good leadership and trust between colleagues in a project like theirs. During the fire drill at UiA in November they were able to confirm that the app actually works in a real situation, but the process coordinator told me that the indoor localization feature would be strengthened if they were able to test it in different building layouts. She continued to say that:

Before the workshops we never thought of potential channels and key partners. The workshop with Innoventus touched upon this, but because of time constraints we were not able to fill out those fields of the canvas. Therefore it was helpful to have a second workshop where we finished what we started with Innoventus.

The SmartRescue team realizes that they need to do some polishing before the actual commercialization can take place, plus some more testing. Through a process like that they will probably be able to add some useful features. The Norwegian Public Road Administration (NPRA), which is one of SmartRescue’s potential customer segments, showed their interest in using the SmartRescue app. On March 25, the NPRA sent a report to the

SmartRescue team. The report describes the needs and challenges if a fire breaks out inside a tunnel. The SmartRescue team sees tunnel fire as an important case they can use to show that their technology can be applied on a larger scope than the initial focus area. As the project leader said:

We can use this (the report) to build up or to describe how the product can be used more concrete. It is a very good start, and next step is to have meeting with Statens Vegvesen (NPRA)

In my interviews after the workshop I also asked if they would have organized the project differently if they had the knowledge they have today from the start? The process coordinator told me that if they should have started all over again she would have had more focus on potential users from day one of the project and defined a scenario closer to the potential user case. They started, as mentioned before, with focusing on fire that can occur on large boats. While today they have their main focus on fire in tunnels and buildings. The project coordinator told me that:

Model and algorithm testing was important for us, because it was the key to our technology development, but it would have been better if we had complemented this with having meetings with the projected end users from the start of the project instead of spending most of our time exploring scientific literature and focusing on theoretical work.

When Smartrescue had their workshops with the reference group they tended to report what they had done instead of talking about requirements for their app that could lead to technological breakthrough. The reference group consists of *Fylkesmannen Beredskapsjef* (the crisis manager of Aust-Agder county), representatives from Department of Health Informatics, Redrock, and Ericsson (before it was closed). When they look back at it now, the SmartRescue team realize that they should have had more focus on getting feedback on the app features from their reference group.

5. Discussion and conclusion

5.1 Discussion

In this section, the research findings will be discussed and compared to my theory chapter in order to answer the research question: *How do mobile application development businesses organize their business model generation process?* In the end of this section, limitations of my research, conclusions and possible areas for future research are outlined.

SmartRescue's activities that contribute to business model generation

Based on the research findings, I find that despite the two meetings about business model generation the SmartRescue team has had, the activities, and the decisions the team made during the technology development process subconsciously have brought them closer to a business model. Based on the activities timeline of the SmartRescue project, as shown in Figure 11, I am going to divide the activities into two groups in respect of the business model generation process; Conscious and Subconscious business model design activities. The team has done conscious activities in relation to business model generation. However, the team has also done a great deal of subconscious activities that have had consequences for their business model generation. In this discussion I will distinguish between these activities.

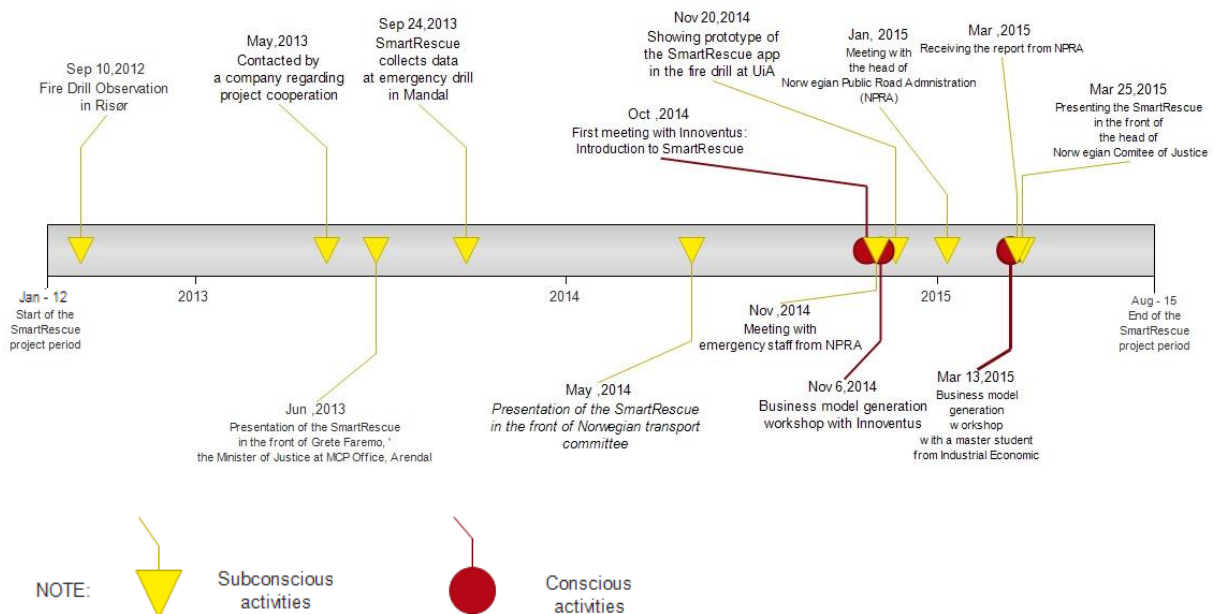


Figure 11. SmartRescue's subconscious and conscious business model design activities

Since the beginning of the project, SmartRescue has been focusing on using smartphone technology in crisis situations. In the context of business model generation, this focus actually shaped the initial rough hypothesis about who the potential customers are (people that are involved in a crisis situation in one way or another). It also shaped the hypothesis of which problems the product can solve. The product (app) can make communication and evacuation plans in a crisis situation more effective by using a daily device, such as a smartphone. The observation made by the SmartRescue team in a fire drill in Risør also had an important role in validating the problem hypothesis, and the team subconsciously targeted fire fighters as their potential customer. In light of Customer Development theory by Blank and Dorf (2012), this activity can be included in the customer discovery phase where the team has “got-out-of-the building” and learn in-depth about the customers’ problem. This activity is also consistent with Osterwalder and Pigneur (2010) who write that a business model should be built on customer insight and the offering value should then solve the customers’ need.

The SmartRescue team had been thinking about entering into partnership with a bigger company for delivering its product. Even though the interaction between the SmartRescue team and NMES has affected the SmartRescue app development process, the partnership between them has not been determined yet. If the SmartRescue team had determined their partnership from the beginning of the technology development process, and utilized the company as a co-development partner, it is possible that they could have generated a sustainable business model more effectively. Chesbrough (2003) argues that the use of partners in research and/or development of a new product or services creates business model options that can significantly reduce R&D expenses, expand innovation output, and open up new markets that may otherwise have been inaccessible. From the interview results, we see that the partnership between the university and the company is suspended because the university does not have any clear policy when it comes to commercializing their research results including intellectual property rights. The policy issue of intellectual property right regarding university and industry relationship is not a new issue. These problems have been discussed in several scientific articles (Carlsson & Fridh, 2002; Crespi *et al.*, 2006; Geuna & Rossi, 2011; Jensen & Thursby, 2001)

The SmartRescue technology concept and the app, as shown in Figure 11, have been presented on different occasions. From a business model generation perspective, the SmartRescue team has subconsciously tested their low-fidelity MVP when they were showing their new technology concept to some of their potential customers or partners, such as fire

department and Norwegian Public Road Administration. Blank and Dorf (2012) write that the low fidelity MVP test helps a company to find out if their concept will be able to solve a problem which is urgent for a potential customer. In this case, the SmartRescue team have managed to get the attention from the Norwegian Public Road Administration (NPRA). NPRA's interest can possibly lead them to become one of the early adopters of the SmartRescue app. However, if the SmartRescue team had focused on commercialization from the beginning of the technology development process, the test of the low-fidelity MVP perhaps could have been a more organized and conscious process. This way the team could have got feedback from every presentation they have had and learn from it, in order to determine the direction of the app development process. As Ries (2011) states, "Getting the customers feedback can minimize the risk of investment as much as possible in an uncertainty condition".

The prototype of the SmartRescue app was shown in a fire drill game at UiA. The SmartRescue team was aiming at showing the potential of the technology to the fire fighters who were invited as observers and to test if the app functions well. They also had personal discussions with the fire fighters regarding the app. In a business model generation context, the prototype of an app can be seen as a hi-fidelity MVP which looks and operates like a finished product (Blank and Dorf, 2012). I also believe that the SmartRescue team have subconsciously tested whether the app is on the right path to solve the problem in a crisis situation, in this case a fire disaster, by getting feedback from the fire fighters. The SmartRescue team did this prototype test only for technology development research purpose. However, this event actually brought the SmartRescue team closer to a business model in respect to the test of its value proposition hypothesis.

As mentioned earlier, the business model generation for the SmartRescue project has been more like a one-time event instead of an iterative process which include experiments. The conscious business model design activities in the form of workshops did not take place before almost three years into the project. Furthermore, the conscious business model design activities were at first triggered by a third party. The reason for this is probably that the SmartRescue team only focused on technology development and they are still in an early phase when it comes to launching the product. Jensen and Thursby (2001) argue that most university inventions are little more than "proof of concept". No one knows their commercial potential because they are in such an early stage of development.

Based on these findings, I offer the first proposition:

P1: The customers' problem, the value propositions, and the potential customer segments in a business model are most likely identified as an integrated part of the technology and the product development process

The business model generation workshop

Chesbrough (2010) argues that a technology by itself has no economic value until it is commercialized in some way via a business model. The same could happen to the SmartRescue project if their innovation is not commercialized. The workshop was essential to make the SmartRescue team realize that their research outcome have commercial value. One of the participant experienced that the brainstorming session in the workshop encouraged the team to start thinking differently and re-examine the ideas that seemed smart in the beginning. Osterwalder and Pigneur (2010) in their article advise people to not overestimate the potential of the initial ideas when establishing the business model. The reason for this is that behaviour like that may lead to a closed mind-set and limited exploration of other possibilities.

The business model generation workshops brought SmartRescue closer to a possible business model, documented in a business model canvas. Based on research findings, the team experienced that the workshop, where the business model canvas was being used, helped them to generate and describe the business ideas systematically. This finding is consistent with Bresciani, *et al.* (2011) findings which shows that facilitating business model teamwork with a template such as business model canvas seems to improve group collaboration in brainstorming sessions. As mentioned earlier I also found out that SmartRescue often got inspiration from the business model of other companies that they were familiar with. Osterwalder and Pigneur (2010) contend that in some cases, different business model patterns of existing businesses may be used as a source of inspiration.

After having the workshop with the SmartRescue team, I learned that since the focus on a business model came up late, the business model ideas the SmartRescue team generated during the workshop were mostly based on the information they acquired during the technology development process. This indicates that the decisions or activities they had done during the technology development process controlled the outcome of the workshop and the

possible business model alternatives for this project. Therefore, the workshop can be seen as a description of reality from the technology developer's point of view.

It seems that the decisions or activities during the technology development process of SmartRescue only had consequences for a few of the dimensions in SmartRescue's business model. The value propositions and the customer segments defined for SmartRescue are the dimensions that are most affected by the decisions taken during the technology development process. SmartRescue's value propositions which solve the customer's problem were in fact defined from the beginning of the technology development process. The team did some research that supported SmartRescue's app features, for example research on threat mapping based on smart phone sensing and smart phone coordinated evacuation planning⁶. These research outcomes hence controlled SmartRescue's value propositions in the canvas. Osterwalder and Pigneur divides (2010) the value proposition into three types: newness, performance and customization. Newness can be seen as the motivation behind the commercialization of the SmartRescue app. The SmartRescue team believe that they are pioneers with their app. As far as they know there are no similar apps available in the market.

The customer segments in SmartRescue's business model canvas shows who the SmartRescue team chose to serve first (Osterwalder, 2010). The customer segments: NPRA and the fire departments were obviously chosen because the SmartRescue team have had frequent contact with them during the technology development. Another dimension in the business model canvas that may be seen as a description of reality from the Smart Rescue team's point of view is the key resource dimension. The description of this dimension in the canvas is in fact the assets that they experienced as needs when they were developing the technology. These assets are then also reflected in the cost structure in the canvas. Meanwhile, other dimensions in the canvas, such as key partnerships, key activities, customer relationships, channels, and revenue streams have mostly been defined during the business model generation workshops.

Thus, I offer the second proposition based on these findings:

P2: Some business model dimensions, including customer relationship, channels, key partnerships, key activities and cost structures are most likely not an integrated part of the technical new product development process, and need to be discussed explicitly by startup businesses.

⁶ Cited from SmartRescue's Project Vision.

Integrating business model- and technology development

Startups face a very high uncertainty according to Ries (2011). Therefore, it is very important that startups build the right product. By that I mean a product or service that has commercial value. A company can find out if they are building the right product with an MVP and test it. SmartRescue has done some testing subconsciously, but since it has not been organized it has taken time to come up with an MVP which can validate whether they are on the right path or not. For this reason, I want to discuss if it is likely that a better and more integrated business model- and technology development would have made SmartRescue able to come up with an MVP at an earlier stage?

SmartRescue were not focusing on coming up with an MVP since they were not aware of what it is and the importance of it when they started their project. Hypothetical questions are always hard to answer, but if a development team focus on customer-centric value creation, it is likely that processes that do not contribute to cash flow will not be carried out. A challenge with University R&D projects in the field of technology that are to be commercialized is that researchers at many universities are not used to think profit. In some cases this leads to interesting inventions, but they do not necessarily have commercial value.

If SmartRescue had more focus on business model generation from the start they would most likely put more emphasis on testing the hypotheses of their business model. A business model describes the rationale of how an organization creates, delivers and captures value (Osterwalder & Pigneur, 2010). In the business model canvas, the dimensions that are placed on the left side of the canvas such as key partnerships, key activities, key resources and cost structures are dimensions that support the company's value creation. On the right side of the canvas, channels and customer relationship are the dimensions that describe how the value propositions will be delivered and how the company will maintain the relationship with the customer segments. At last, the company captures the value through the revenue stream they generate from their customers.

Even though a company have all the elements on the left side of the canvas to create the value, they will not survive if they cannot capture the value in the form of revenue from their customers. As one of the SmartRescue team members mentioned in the end of the second business model generation workshop session, the next activities to do regarding SmartRescue's business model is that they need to find out the customers willingness to pay. This is something that needs to be figured out in order to achieve a sustainable business

model. As Ries (2011) states, “The goal of a startup is to figure out the right thing to build – the thing customers want and will pay for – as quickly as possible”. Therefore, I contend that the dimensions on the right side of the business model canvas, particularly the value propositions, the customer segments and the revenue stream are essential to integrate in the technology development process.

From the theory and the case I have studied, I have found six steps that are essential in order to generate a business model for a mobile app startup company. The first three steps (see Figure 12) are essential to do during the product development process, while the rest of the steps are not necessarily done during the product development process. In my opinion, this is because the first three steps are imperative in order to develop the right product and generate money for the company, while the rest of the steps determine if the generated business model is profitable and sustainable.

First, when developing a new product or technology it is essential to find out if the developed product (value propositions) solves the customer’s problem and furthermore to make sure if the customers are really interested in the product. From this case, for example, SmartRescue could have tested their Low fidelity MVP in the beginning to see if they had identified a problem that customers need to solve. The team could have organized their technology concept presentation (the low fidelity MVP) for the different potential customer segments in order to get feedback from their audience. After reviewing the feedback, the team could have decided whether they had to “pivot” or persevere their technology development strategy (Ries, 2011; Blank & Dorf, 2012). When the team found out that it is difficult and complicated to enter into partnership, perhaps they could have changed their focus right away on product development which targeted the Norwegian Public Road Administration (NPRA) since they have a problem which is urgent to solve, instead of waiting until the SmartRescue technology development project period is finished and starting a new project with NPRA. This opinion is also supported by the second interview with the project coordinator who said that they should have had more focus on potential users from day one of the project and defined a scenario closer to the potential user case. This would have been possible if they had more knowledge about business model generation from the start.

Second, after finding the right solution to the customers’ problem, the Hi-fidelity MVP should be built and subsequently tested to find out if the startup is still on the right path. With a prototype the SmartRescue team can see if their product meets the customers need and get

valuable feedback. Earlier, I mentioned that the team had a discussion with fire fighters during the fire drill at UiA. From the discussion, the team got feedback about a feature of the app that should be added, such as an indicator of the unchecked/checked rooms when a building is on fire. In the discussion the team was also told that a feature that shows how the fire will spread will be valuable for people who are trapped inside the building. The team should have used this opportunity to learn more about what attributes customers care about (Ries, 2011). It should be noted that it is not enough to only test the hi-fidelity MVP only for a small group to get feedback. The SmartRescue team could have talked to, in this case, fire fighters in a wider geographical area than just Grimstad.

Furthermore, the team could have used this opportunity to find out if the potential customers were interested to buy the app. If the case is that the customers are still not interested to pay for the product, it means that the SmartRescue team need to pivot away from their product development strategy and try another (Ries, 2011). Organizing it this way follows the principle of the Lean Startup. As mentioned in the theory chapter, the Lean Startup principle is understood to be an experiment designed to validate learning. Once you get the input from the customers, you can revise your assumptions. By this you can launch a product that the customers really want in shorter technology development cycles and more cheaply than the traditional method.

Third, the hypotheses in the revenue stream dimension need to be generated and tested. The revenue streams describe how the company will generate income from their customers (Osterwalder & Pigneur, 2010). The SmartRescue team started to think about this dimensions when they had the business model generation workshop. The SmartRescue team has chosen license, support, training, and customized app as their revenue streams. However, these hypotheses have not been tested. They do not know yet if their potential customers are really interested in the product and the services they offer, and if they are willing to spend money to buy the product. Neither do they know what price the customers are willing to pay.

The SmartRescue team have had several meetings with their potential customers, but the purpose of the meetings was only to present their technology. The SmartRescue team could have used the opportunity to test the seriousness of the potential customers in these meetings. Perhaps, they could have arranged another meeting to find out if the customers really want to deploy the app. If the customers are ready to deploy it, the team can find out how the customers plan to deploy the app, what groups would get it first, and the criteria to measure its

success (Blank & Dorf, 2012). Since the SmartRescue team target big organizations as their main customers, they should find out if the customers have a budget for buying a product like theirs (Blank & Dorf, 2012). It is also important for the SmartRescue team to find out about the customers’ price boundaries. After getting such information, the team can dig deeper and ask question like: “How much would you expect to pay for additional services (the customization and maintenance)?” After meeting with a few customers, it is easier to understand the average selling price and sense the lifetime value of a customer (Blank & Dorf, 2012). These activities also test the revenue stream hypotheses in the business model canvas.

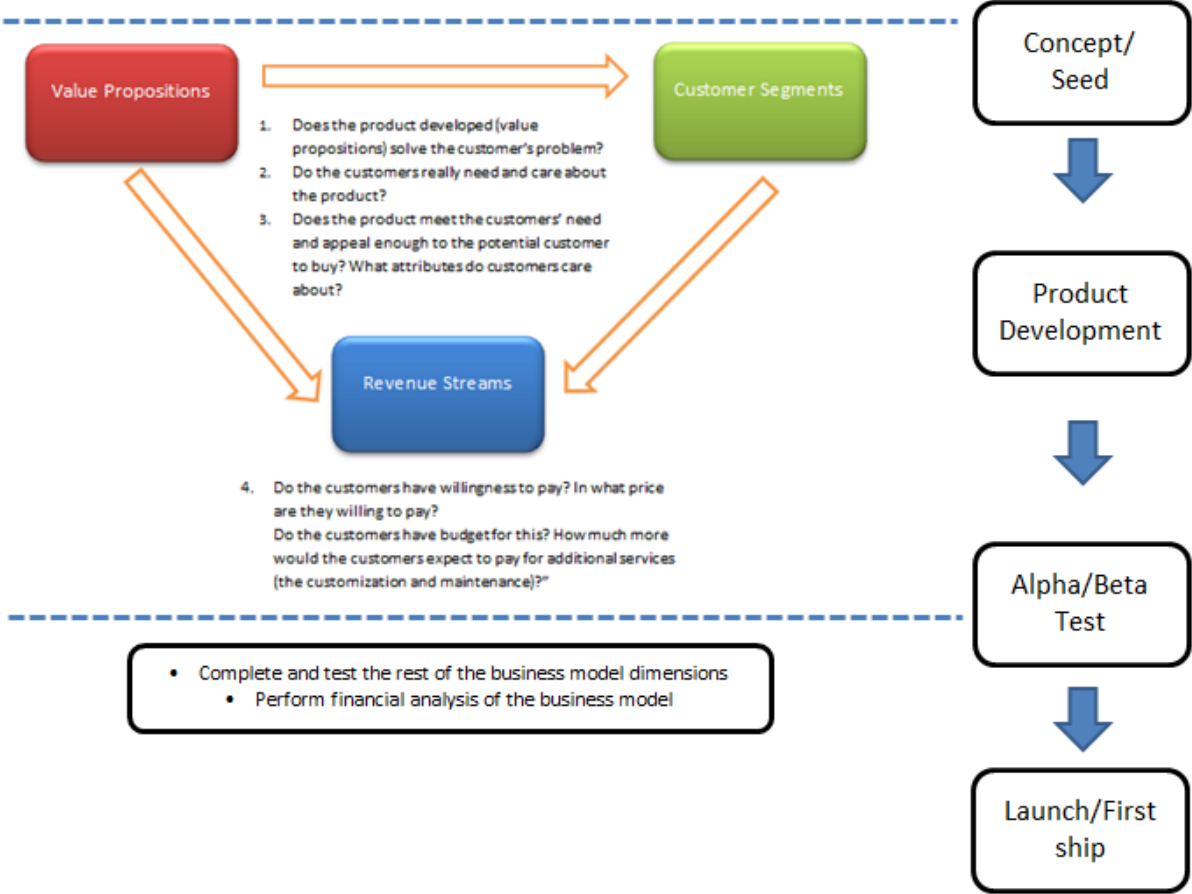


Figure 12. The dimensions in the business model canvas that should be integrated with product development

Fourth, the hypotheses in the customer relationship dimension in the business model canvas need to be designed and tested. According to Osterwalder and Pigneur (2010) this dimension describes what kind of relationship the company want to establish with its specific customer segments, while Blank and Dorf (2012) explain this dimension in a more practical way. The customer relationship describes how you get customers, keep them, and grow additional

revenue from them over time. From this case, the presentation of the SmartRescue technology in the front of different audiences and the fire drill are ways to raise potential customer's awareness of the product, and hence one way to get customers. While the way to keep customers and grow additional revenue can be done after the company have got customers, or more specific early customers who want to deploy the hi-fidelity MVP of the app.

Fifth, the selection of channels can be done by extensive contact with potential customers. The SmartRescue team need to find out if the chosen channels are effective enough to reach the customers. During the technology development phase, different media including local newspaper wrote about the project⁷. This is a good way to get publicity around their technology and app. However if this does not catch potential customers' attention there is a chance that these channels are not effective enough. According to Ries (2011), a startup might create a complete prototype (MVP) of its product and sell it to customers through its main marketing channel. From this case, perhaps the SmartRescue could have tested if App Store / Play Store are effective ways to deliver the hi-fidelity MVP to their early customers, or they could just let customers download the app through SmartRescue's own website. Furthermore, decisions about channels and pricing are interrelated. Channel selection changes the company's revenue model. So the team have to make sure to update revenue stream hypothesis based on the company cost and net revenue when making channel selection (Blank & Dorf, 2012).

Sixth, each dimension in the business model should be evaluated in terms of its ability to contribute to the profit and ensuring the company's sustainability and growth. This can be done by doing rough calculation over the net revenue by subtracting the revenue streams forecast for next periods, for example for the next four quarters, with all the costs on the left side of the business model canvas and costs related to channels and customer relationships. If this calculation does not seem profitable and promising, it means that the team should change their strategy in the business model, perhaps by modifying the value propositions to target more customers or reducing the cost by changing channel alternative or choosing cheaper resources.

During this study, I also learned that the team could have developed a right product faster with minimum efforts and resources. Through my thesis I have found out that the most essential things needed in the process of commercialization are human and financial

⁷ <http://ciem.uia.no/about-ciem/media>

resources. The business process seems to halt since the participants in the SmartRescue project need to manage other projects and do not have capacity to handle the commercialization process at the moment. Moreover the funding resource they have is limited to the development of the app. Perhaps this constraint could have been overcome if the SmartRescue team started to integrate the search of business model with the technology development process from the early beginning.

As mentioned in the result chapter, the process coordinator told me after the workshop that she realized that it is important to have a good leadership and trust between colleagues. This aspect is consistent with Chesbrough (2010) who argues that a successful business model is developed through a successful leadership and experiments.

From this discussion, the following proposition is offered:

P3: Integrating the value propositions, the customer segments and the revenue stream dimensions in a business model into the new technology and product development will reduce the risk of building a product that customers do not need or want as well as eliminate wasted time and resources during the product development.

5.2 Research limitations

SmartRescue's goal is to commercialize the mobile app they have developed. Therefore, the theoretical outcome of this study can be affected by the decisions and activities SmartRescue has made during the product development and the business model generation process, as well as their knowledge about product commercialization. Even though this study is based on a single case study, my findings can serve as a basis for discussing the more general aspect of how the business model generation process is organized.

With an existing project as a case study, there is a consequence that results are also affected by time limitations due to my submission deadline. The consequence is that I am not able to follow SmartRescue all the way to actual commercialization.

In assessing the research results, the criteria of reliability and validity of the research method need to be ensured. However these criteria are seen as only applicable to quantitative research. Lincoln and Guba (1985, as cited in Shenton, 2004) have formulated new names for

versions of these criteria that recognise the nature of qualitative research which are ‘dependability’ for reliability, ‘credibility’ for internal validity and ‘transferability’ for external validity, in addition to one additional criteria, ‘confirmability’ which refers to objectivity.

Reliability or dependability refers to whether the data collection techniques and analytic procedures would provide similar results if they were repeated on another occasion or if they were replicated by a different researcher (Saunders *et al.*, 2012; Shenton, 2004). The reliability of this study largely deals with the methods of gaining the information used in this study. To increase the reliability, I made sure the interviewees have had the same opportunity to share information by giving them the same set of semi-structured questions. I have also gained similar answers in many areas including the sequences of activities during product development. However, the reliability of the research may be affected by the fact that this study is only covering a single event of a company. Thus, results obtained during this study will be verified to be reliable by conducting a similar study in several cases.

When it comes to credibility, Lincoln and Guba (1985, as cited in Shenton, 2004) argue that it is one of the most important factors in establishing research trustworthiness. To increase the credibility of this study, I recorded and transcribed the interviews and sent the synthesis of the interview results to the interviewees to get validation.

The transferability of a research deals with the problem of knowing whether a study’s findings are generalizable beyond the immediate study (Yin, 2014). A common concern about case study research is an apparent inability to generalize from case study findings. A frequent question is: “How can you generalize from a single case?” (Yin, 2014). The answer is not simple. The short answer is that case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. In doing case studies the goal will be to expand and generalize theories which is called analytic generalizations, not to extrapolate probabilities (statistical generalizations) (Yin, 2014).

In this study the generalization is limited considering I have used a single case study approach at a university project. Hence, I cannot offer transferability on the pieces covering the organizing of the business model generation process for SmartRescue mobile app and the technology development. The fact that I have only researched the SmartRescue project for

this thesis limits the input of business model generation process to the process of organizing business model in the event of commercializing a new mobile app to the market.

Since the findings in a qualitative study are specific to a small number of particular environments and individuals, it is impossible to demonstrate that the findings and conclusions are applicable to other situations and populations (Shenton, 2004). In the end, the result of a qualitative study must be understood within the context of the particular characteristics of the organisation and, perhaps, geographical area in which the study was carried out. In order to assess the extent to which findings may be true of people in other settings, similar studies employing same methods, but conducted in different environments could well be of great value. Even though it is rare to conduct such complementary work, the accumulation of findings from studies staged in different settings might enable a more inclusive, overall picture to be gained. (Shenton, 2004).

The transferability in a single case qualitative study thus includes relating the research findings to existing theory in order to be able to demonstrate the applicability of existing theory to the settings that the researcher is examining. It will also allow theoretical propositions to be advanced that can then be tested in another context (Saunders *et al.*, 2012). Although this study is using a single case, I have come up with conclusions to provide a theoretical and more widely applicable approach within the subject of organizing business model generation. I also attached the interview guide of my interviews, which could be provided in the case of future replication of this study. In other parts, I have also provided a clear picture of the activities done when conducting this study and it should therefore be possible to reach a similar result if a similar study is being conducted and the same method chosen.

The confirmability of a research is the same as objectivity. The activities during the study need to be outlined in order to ensure that the study findings are the result of the experiences and ideas of the informants, rather than characteristic's and preferences of the researcher (Shenton, 2004). When conducting this study, I have tried to be as objective as possible. But as Bryman and Bell (2007) have acknowledged, qualitative research depends on the interest and opinions of the researchers. For that reason, I have tried to build the argumentations on theory and facts. I am aware that it is very important to not only rely on the existing knowledge of the reader. Therefore, I have also tried to provide the reader with the information needed to follow my argumentation.

5.3 Conclusion

The main goal of this thesis has been to shed light on how mobile application businesses organize their business model generation process. To achieve this goal, I have collected information about- and analysed the activities done during the technology development process in order to see which consequences this has had for the business model generation. I have also facilitated a business model generation workshop for SmartRescue in order to generate a complete business model canvas. The business model generation process involves experiments to test hypotheses generated for each dimension in the business model canvas.

From my case, I have found that that the customers' problem, the value propositions and the potential customer segments in a business model are most likely identified as an integrated part of the technology and product development process. The findings furthermore show that several dimensions in a business model are being affected by the technology- and product development process. I have also found that there are three essential dimensions of the business model which need to be integrated with the product development process. These dimensions include value propositions, customer relationship, and revenue streams. By integrating experiments in the business model generation- and product development process, the company will have a higher chance of launching the right product that the customers really want. This will also result in shorter technology development cycles that are cheaper than the traditional new-product introduction methods. This method also follows the Lean Startup principle proposed by Eric Ries (2011). Other dimensions of the business model canvas can be defined and put in the experiments after the hypotheses of the previous dimensions have been tested. These dimensions will ultimately determine if the generated business model is profitable and sustainable or not. A good leadership, human and financial resources are essential to conduct experiments to help generating a successful business model.

My research is based on a research project at the University of Agder, thus a single case. Despite the limitations of my research using a single case, I believe that my findings are applicable for other mobile app development businesses involved in new product development, but more cases need to be explored to be certain. I contend that my findings in some instances also can be applied to other businesses such as companies producing physical products. But I acknowledge that there might be a need of some adjustments. The process of building a prototype for businesses that produce physical products will be different. For example companies in the jewellery and toy business may use 3D printing to build the

prototype to test it and get feedback. However more cases need to be explored in this area as well.

Through this thesis I have had the possibility to see how a new technology and innovative product have been developed and how the first iteration of the business model has been designed. Hence, I have not been able to see the further process of how the hypotheses in the business model dimensions have been tested. Therefore, I suggest further research to include:

- How business model experiments for each element in the business model canvas should be organized in order to achieve a sustainable business model.
- More cases within the same industry to see if the same process for generating a business model during the product development process also applies to other companies
- Cases from other industries to see if the organizing process of business model generation is similar across industries.

References

- Baden-Fuller, C., & Morgan, M. S. (2010). Business Models as Models. *Long Range Plan.*, 43(2-3), 156-171. doi: 10.1016/j.lrp.2010.02.005
- Blank, S. (2013). Why the Lean Start-Up Changes Everything. *Harv. Bus. Rev.*, 91(5), 64-+.
- Blank, S., & Dorf, B. (2012). *The startup owner's manual: the step-by-step guide for building a great company*. Pescadero, Calif: K & S Ranch.
- Bresciani, S., Eppler, M. J., & Hoffmann, F. (2011). NEW BUSINESS MODELS THROUGH COLLABORATIVE IDEA GENERATION. *International journal of innovation management*, 15(6), 1323-1342.
- Bryman, A., & Bell, E. (2007). *Business research methods* (2nd ed. ed.). Oxford: Oxford University Press.
- Carlsson, B., & Fridh, A. (2002). Technology transfer in United States universities - A survey and statistical analysis. *J. Evol. Econ.*, 12(1-2), 199-232.
- Casadesus-Masanell, R., & Ricart, J. E. (2010). From Strategy to Business Models and onto Tactics. *Long Range Plan.*, 43(2-3), 195-215. doi: 10.1016/j.lrp.2010.01.004
- Casadesus-Masanell, R., & Ricart, J. E. (2011). How to design a winning business model. *Harvard Business Review*, 89(1-2).
- Cavalcante, S., Kesting, P., & Ulhoi, J. (2011). Business model dynamics and innovation: (re)establishing the missing linkages. *Manag. Decis.*, 49(7-8), 1327-1342. doi: 10.1108/00251741111163142
- Chesbrough, H. (2003). *Open innovation : the new imperative for creating and profiting from technology*. Boston, Mass: Harvard Business School Press.
- Chesbrough, H. (2006). *Open business models: how to thrive in the new innovation landscape*. Boston, Mass: Harvard Business School Press.
- Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Plan.*, 43(2-3), 354-363. doi: 10.1016/j.lrp.2009.07.010
- Crespi, G. A., Geuna, A., & Verspagen, B. (2006). University IPRs and knowledge transfer. Is the IPR ownership model more efficient. *6th Annual Roundtable of Engineering Research, Georgia Tech College of Management*, 1-3.
- DaSilva, C. M., & Trkman, P. (2014). Business model: What it is and what it is not. *Long Range Planning*, 47(6), 379-389. doi: 10.1016/j.lrp.2013.08.004
- Demil, B., & Lecocq, X. (2010). Business Model Evolution: In Search of Dynamic Consistency. *Long Range Plan.*, 43(2-3), 227-246. doi: 10.1016/j.lrp.2010.02.004
- Denzin, N. K., & Lincoln, Y. S. (2000). Introduction: The Discipline and Practice of Qualitative Research. In N. K. L. Denzin, Yvonna S (Ed.), *Handbook of Qualitative Research*. Thousand Oaks, California: Sage.
- Gambardella, A., & McGahan, A. M. (2010). Business-model innovation: General purpose technologies and their implications for industry structure. *Long Range Planning*, 43(2-3), 262-271. doi: 10.1016/j.lrp.2009.07.009
- Geuna, A., & Rossi, F. (2011). Changes to university IPR regulations in Europe and the impact on academic patenting. *Res. Policy*, 40(8), 1068-1076. doi: 10.1016/j.respol.2011.05.008
- Giesen, E., Riddleberger, E., Christner, R., & Bell, R. (2010). When and how to innovate your business model. *Strategy & Leadership*, 38(4), 17-26. doi: doi:10.1108/10878571011059700
- Itami, H., & Nishino, K. (2010). Killing two birds with one stone: Profit for now and learning for the future. *Long Range Planning*, 43(2-3), 364-369. doi: 10.1016/j.lrp.2009.07.007
- Jensen, R., & Thursby, M. (2001). Proofs and prototypes for sale: The licensing of university inventions. *Am. Econ. Rev.*, 91(1), 240-259.
- Johannessen, A., Christoffersen, L., & Tufte, P. A. (2010). *Introduksjon til samfunnsvitenskapelig metode*. Oslo: Abstrakt
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, Calif: Sage.

- Magretta, J. (2002). Why business models matter. *Harv. Bus. Rev.*, 80(5), 86-+.
- McNiff, J., & Whitehead, J. (2006). *All you need to know about action research*. London: Sage.
- Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. *J. Bus. Res.*, 58(6), 726-735. doi: 10.1016/j.jbusres.2003.11.001
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*. Hoboken, N.J: Wiley.
- Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: Origins, present, and future of the concept. *Communications of the association for Information Systems*, 16(1), 1.
- Radianti, J., Gonzalez, J. J., & Granmo, O. C. (2014, 24-28 March 2014). *Publish-subscribe smartphone sensing platform for the acute phase of a disaster: A framework for emergency management support*. Paper presented at the Pervasive Computing and Communications Workshops (PERCOM Workshops), 2014 IEEE International Conference on.
- Ries, E. (2011). *The lean startup : how constant innovation creates radically successful businesses*. London: Portfolio Penguin.
- Sabatier, V., Mangematin, V., & Rousselle, T. (2010). From Recipe to Dinner: Business Model Portfolios in the European Biopharmaceutical Industry. *Long Range Plan.*, 43(2-3), 431-447. doi: 10.1016/j.lrp.2010.02.001
- Saunders, M. N. K., Lewis, P., & Thornhill, A. (2012). *Research methods for business students* (6th ed. ed.). Harlow: Pearson.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63-75.
- Teece, D. (2010). Business Models, Business Strategy and Innovation. *Long Range Plan.*, 43(2-3), 172-194. doi: 10.1016/j.lrp.2009.07.003
- Thaagard, T. (2003). *Systematikk og innlevelse : en innføring i kvalitativ metode*. Bergen: Fagbokforlaget.
- Williamson, P. (2010). Cost Innovation: Preparing for a 'Value-for-Money' Revolution. *Long Range Plan.*, 43(2-3), 343-353. doi: 10.1016/j.lrp.2009.07.008
- Yin, R. K. (2014). *Case Study Research Design and Methods*. Thousand Oaks, California: Sage.
- Yunus, M., Moingeon, B., & Lehmann-Ortega, L. (2010). Building Social Business Models: Lessons from the Grameen Experience. *Long Range Plan.*, 43(2-3), 308-325. doi: 10.1016/j.lrp.2009.12.005
- Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*, 29(1), 1-26.
- Zott, C., & Amit, R. (2010). Business Model Design: An Activity System Perspective. *Long Range Plan.*, 43(2-3), 216-226. doi: 10.1016/j.lrp.2009.07.004
- Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. *Journal of Management*, 37(4), 1019-1042. doi: 10.1177/0149206311406265

APPENDIX

INTERVIEW GUIDE

First round of interviews

1. How did the idea for this project come about
2. How have you worked with the technology development?
3. When you searched for funds, had you thought about business opportunities in relation to this project?
4. What was it that made you thought that you had business opportunities? What activities have you done in relation to commercialization?
5. What was it that influenced your decisions in the project? For example, why did you decide to focus on fire, instead of other types of emergency situations? Indoor outdoor instead? The features available in the app, etc.
6. Which customer segments do you think is the most important?
7. Have you contacted or talked to potential customers? If yes, which one?
8. Are there any activities I can contribute with to make the project closer to business model generation?
9. Which functions in the SmartRescue app do you think are unique and competitive in the market? Are there several aspects in the app that have to be further developed to reach a competitive level?
10. What kind of short-term and long term barriers do you see toward commercialization?
11. Which benefit did you get from the workshop?
12. Is there something which was presented in the workshop that you had not thought about earlier?
13. What impact did the workshop have for the further development of the project?

Workshop

1. What do you know about business model?
2. Discuss if value propositions/features you offer fit to each customer segments' need or problem to solve? Does the value propositions need to be customized for each customer segments? Choose 3-4 customer segments that you prioritize (distinguish between customer and end user)
3. What customer relationship are establishing with each segment? How will you get, keep, and grow your customer base?
4. How to get revenue stream from each segments?
5. What assets do you need to make your business model work? These assets is divided into physical, financial, intellectual property, or human
6. What partnership do you need to reach customers or deliver a value proposition?
7. List all of the costs incurred by your business (*Tip: Only list significant cost*)
8. What is the possible Minimum Viable Product (MVP) for this project?
9. What did you learn from this workshop?
10. What are the next activities to do?

Second round of interviews

1. In which way the workshop helped the SmartRescue project to get closer to a sustainable business model?
2. How would you have organized the project/process differently if you had the knowledge that you have now about business model development?