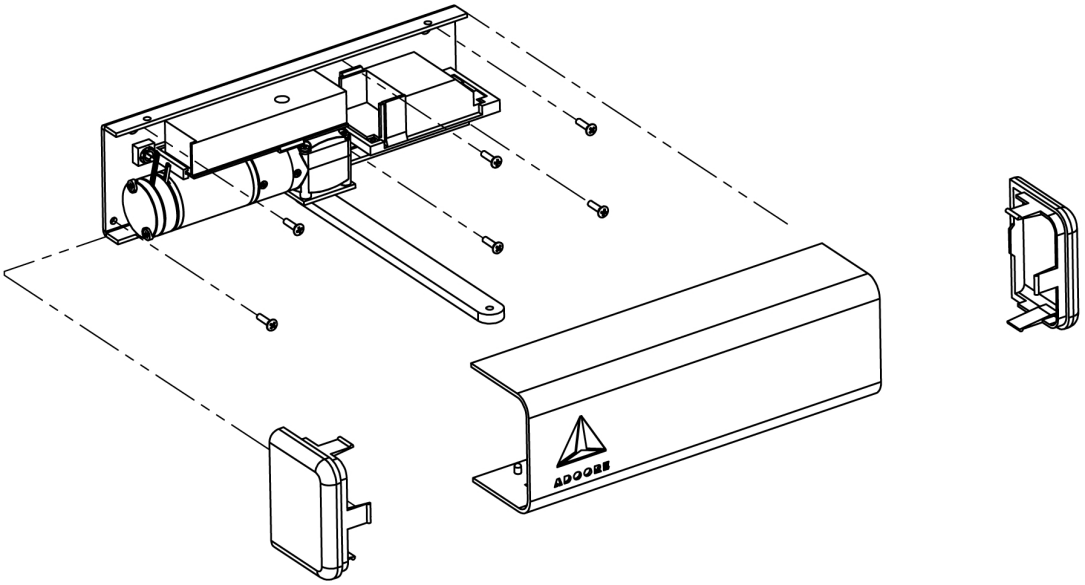
PROCESS REPORT

A Business Proposal for the Automatic Door Market



Master Thesis
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Entrepreneurial Engineering
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AALBORG UNIVERSITY
STUDENT REPORT

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Synopsis:

This report describes the journey of two students on their 10th semester of Entrepreneurial Engineering and their efforts in starting and differentiating a business in the automatic door market, while developing a new and innovative product. It describes their learning process and examines six phases of their new venture creation.

The hand-in consists of a process report and a business report. The process report describes the actions done during the semester and reflect on the outcomes. The business report focuses on the business aspects and its opportunities to become successful.

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READING GUIDE

The full references of sources used in the report can be observed in a Bibliography section at the end of the report, before the Appendix section. Sources include author, year, title, and edition of the source, while websites will be referenced with author, year, title, and the web-page it is available at. Harvard referencing, also known as Parenthetical references, is utilized to cite the sources. In the text itself, sources will be presented as following: [Surname(s), Year]. Most illustration of figures and tables has been made by the author of this report, if taken from a source, the source will be added in the figure caption. Furthermore, informative text that took up too much space in the report, has been placed in the appendix chapter, which will be continuously referred to during the report, to provide the reader with greater insight and information. Shortening of words will also be used throughout the report and put into the list of abbreviations, as a result of certain terms being used frequently. The first time an abbreviation is used, the full length of the word will be positioned in front of it.

List of Abbreviations

ADO	.....	Automatic Door Operator
ANSI	.....	American National Standards Institute
APAC	.....	Asian-Pacific
B2B	.....	Business to Business
B2C	.....	Business to Customer
BLS	.....	Bureau of Labor Statistics
BM	.....	Business Model
BMC	.....	Business Model Canvas
BMI	.....	Business Model Innovation
BMCo	.....	Business Model Configurations
CAGR	.....	Compound Annual Growth Rate
DFMA	.....	Design for Manufacturing and Assembly
DKK	.....	Danish Kroner
EMEA	.....	Europe, Middle East and African
FTO	.....	Freedom to Operate
IP	.....	Intellectual Property
IoT	.....	The Internet of things
MVP	.....	Minimum Viable Product
NOK	.....	Norwegian kroner
PMW	.....	Pulse Width Modulation
PCB	.....	Printed Curcuit Board
SWN	.....	SuperWiseNet
WNUAS	.....	Western Norway University of Applied Sciences

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INTRODUCTION

In this chapter, we will present our project concerning the continuation of Adoore, a startup venture attempting to successfully launch a new type of Automatic Door Operator (ADO). Moreover, the introduction includes focus areas, with the reasoning and background behind them, a presentation of the startup venture, problem definition and goals. This is intended to provide a basis for understanding the context, from this projects starting point.

Simultaneously as our project was carried out, a separate group of three students managed their own school project regarding the same company. Although, they attend the Manufacturing Technology study at AAU, and focused on the technical aspects both projects collaborated in both areas, but with different approaches and responsibilities

BACKGROUND

The startup journey started in 2016 with a bachelor thesis in Norway, where the founders were introduced to a person dependent on his wheel chair as a result of cerebral palsy. He explained numerous problems regarding todays ADO's. In addition, it was given as a thesis with the challenge to enhance the everyday life of mobility impaired individuals. The task involved building a new concept for opening interior doors, while considering their issues. Moreover, the project ended up winning 35 thousand NOK through best innovative bachelor and other smaller competitions at the Western Norway University of Applied Sciences (WNUAS).

In the fall of 2017, considering that the prior project was completed through a mechanical engineering study and the results were too product focused, we decided to start over focusing on creating a business. To elaborate, the main goal during the semester was to build a promising and credible business proposal for an innovative product in the automatic door market, whilst simultaneously developing it. The results turned out to be fairly promising based on feedback and potential partnerships. Through the semester we managed to achieve a much greater market understanding, significant recognition of relevant actors pains, an immature business proposal and a second MVP. Despite this, we had to declare that the main goal was far from fulfilled, but the project showed promise and it was therefore decided to continue to explore the possibility of creating a business in the automatic door market.

ADOORE

To establish a company, it requires a name, and ours was formed based on a combination of the words door and adore, thereby becoming Adoore. The startup's vision is "Opening doors to an enhanced everyday life".

Today automatic door operators are industrialized in both functionality and looks, which tend to be excessive in many situations. This makes the products very expensive, large in size, and in many cases not suited for their surroundings. Adoore's first product consist of smaller and less powerful motors, while unnecessary mechanisms are removed, making the design and opening process perfectly fitted for lighter doors. This will simultaneously answer the initial problems by creating cheaper, smaller, aesthetically and functionally appropriate solutions for areas with interior doors.

Adoore's ambitions is to develop, produce and distribute innovative smart solutions for the automatic door market. In addition to being smart, the goal is that our products will be significantly cheaper than current devices on the market and be suited to their surroundings.

Figure 0.1. Picture of the team: From left: Jakob Kops Muldbjerg, Bjørn Hauge Hansen, Oda Waage Eikill, Mads Mørup Schjoldager and David Lampe

FOCUS AREA

As already mentioned, we are trying to start a new business within the automatic door market, although with a focus on the health care industry. This project is a continuation based on earlier endeavors, starting where the last project ended [Hansen, 2017], therefor it will continue to revolve around the development of our startup venture, which seeks to get further market understanding and validation. The results will address acknowledgments on how to solve the relevant problems for the most suitable target group, if the market is viable and how to market our products. In addition, we attempted to develop a sustainable business model and a product ready for sale.

In Relation to Study

The curriculum displays that during the study program we should acquire knowledge, skills and competencies within the fields of business development, innovation, entrepreneurship, agile processes, prototyping, design thinking and creativity [AAU, 2017]. This implies that at the end of our program we should be able to creatively develop innovative solutions for real problems, target appropriate customer segments and implement it. Additionally we should master the scientific methods, tools and general skills related to those competencies.

In Relation to Idea and Sense of Potential

One of the reasons for moving towards the health care sector is the personal enjoyment we get from helping others and the motivation it gives. More importantly, the idea has to make sense business wise, and we think that it does. Firstly, peoples lives are lasting longer than ever, and with it comes more mobility challenged individuals. Secondly, the future will significantly increase the focus on healthcare and assistance. According to the *Bureau of Labor Statistics* (BLS), the overall job growth worldwide will have an unbelievable rise of about 30 percent within this sector [BLS, 2013]. Finally, these factors will open up for new inventions and advancement in old ones, to create an enhanced everyday life for the physically impaired and relieve workers. Additionally, we have looked into the market for ADO's pertaining to school toilets, which will be further explored during the project.

On the basis of our experiences and explorations from earlier projects, we have discovered multiple aspects regarding ADO's that are in need of improvements. This is especially with regards to the mobility challenged communities. Below is a summarized list of their initial problems. Furthermore, governmental efforts could also turn out to be a customer, which considers the earlier markets research, such as nursing homes, schools and more. Their sole focus are pricing and maintaining the same functionality.

- Low aesthetics as current products are overly-dimensioned, industrial looking and include additional external boxes.
- Immense pricing: In Denmark the average cost is about 12 thousand DKK for one ADO. However, some people are getting them for free through governmental aid.
- Lack of user friendly features concerning activation of the device and safety during blackouts. In addition, the installer has to come over to perform regulations for speed, opening angle, opening time and other relevant features.

In brief, we have a lot of insight into improvements for the product itself, but we are lacking important validation regarding the market, target customers and how to become a legitimate business.

PROBLEM STATEMENT AND GOALS

Our previous project failed to fully solve the problem statement. This time we will try to pursue a similar but more focused problem statement:

"How to start and differentiate a business in the automatic door market, with a new innovative product?"

Finally, below one can view a list of subgoals, which will be used for measuring our success. This will be discussed in a conclusion ending the project.

SUBGOALS

- Determine which target customers to pursue.
- Develop the first product 0-serie.
- Build an innovative business model to differentiate ourselves.
- Establish a Go-to-Market strategy.
- Receive funding from educational programs and/or business angels.
- Execute first sales.

PRELIMINARY CONSIDERATIONS 1

In this Phase, the planning and basis of the project will be described. This is basically the attempt of creating a process that we will use to reach our goal of developing an innovative product with a successful business model in the automatic door market. The chapter will include two theoretical considerations that we try to utilize through the process, a method for building business models and methods for innovating them, user-testing theory and marketing concepts.

1.1 METHODOLOGICAL CONSIDERATIONS

In this section we cover the theoretical considerations that we have done throughout the process. We tried to find material that would be beneficial to use for a start-up where the uncertainties are high. It covers how to use *The Effectuation* and *Lean start-up* theory and how they can benefit a startup.

1.1.1 Effectuation in Entrepreneurship

When starting a new business without a clear idea, it can be difficult to figure out where to start and decide which direction to go, especially in the early part of the process. The principles behind a theory called *The Effectuation* developed by Sara Sarasvorthy [Sarasvathy, 2009] can help ease this process. She basically display that regarding entrepreneurship, effect outsmarts the casual view of the world, which means that the future is not found or predicted, but made, so focus on what you can control. According to Professor Sarasvorthy, there are five principles that should be followed when starting a new business:

1. **Bird in Hand Principle** - The first principle is based on the belief that one should not work from a causal approach, which is firstly to define what you want, and then how to do that. Instead, start on the basis of your own competencies and network, to further see what can be gained from it.
2. **Affordable Loss Principle** - Secondly, the acknowledgement is that successful entrepreneurs do not risk more than what they can afford to loose. They choose to act on activities where there are positive consequences if it fails.
3. **Lemonade Principle** - The next principle, is inspired by the saying "If life deals you lemons, make lemonade". It basically states that entrepreneurs should be flexible, and not be self-opinionated. Furthermore, they should expect to discover the unexpected.
4. **Crazy-Quilt Principle** - This principle essentially encourages entrepreneurs to form networks and partnerships, because it can turn out to be quite beneficial to interact

with potential customers, other companies and experts. They are not afraid to involve relevant stakeholders early in the process or along the way. Partnerships can fuel a given business model (BM) design, and also provide inspiration for a new BM altogether. Furthermore, it can provide the missing proof of BM scalability, which is an important factor for investors.

5. **Pilot in the plane Principle** - Here Sarasvorthy explains that successful entrepreneurs focus on what they are able to act on. Additionally, they believe that the future is something oneself can help create.

Figure 1.1 shows a model describing a typical effectual process for an entrepreneur, which is closely linked to the principles that this theory is built around. First, one look at its own resources, such as who you are, your skills, knowledge and who you know. In regards to this step, a goal that you want to achieve should be established, which is also relevant to what one can afford to loose. Hereafter, it is mainly interactions with other people controlling the process. Trying to include as many individuals as possible, so that the entrepreneur can get feedback, and then whilst heading forward meet people who would like to be part of the project. Furthermore, the new endorsements bring fresh ideas, approaches and competencies. Moreover, while advancing in the process, there will always occur unforeseen surprises making it harder to reach ones goal. This whole process is not linear, but dynamic and will repeat numerous times. By working this way, the entrepreneur will be able to create new products, markets or business models. From the beginning, you have very little knowledge what the final result will become.

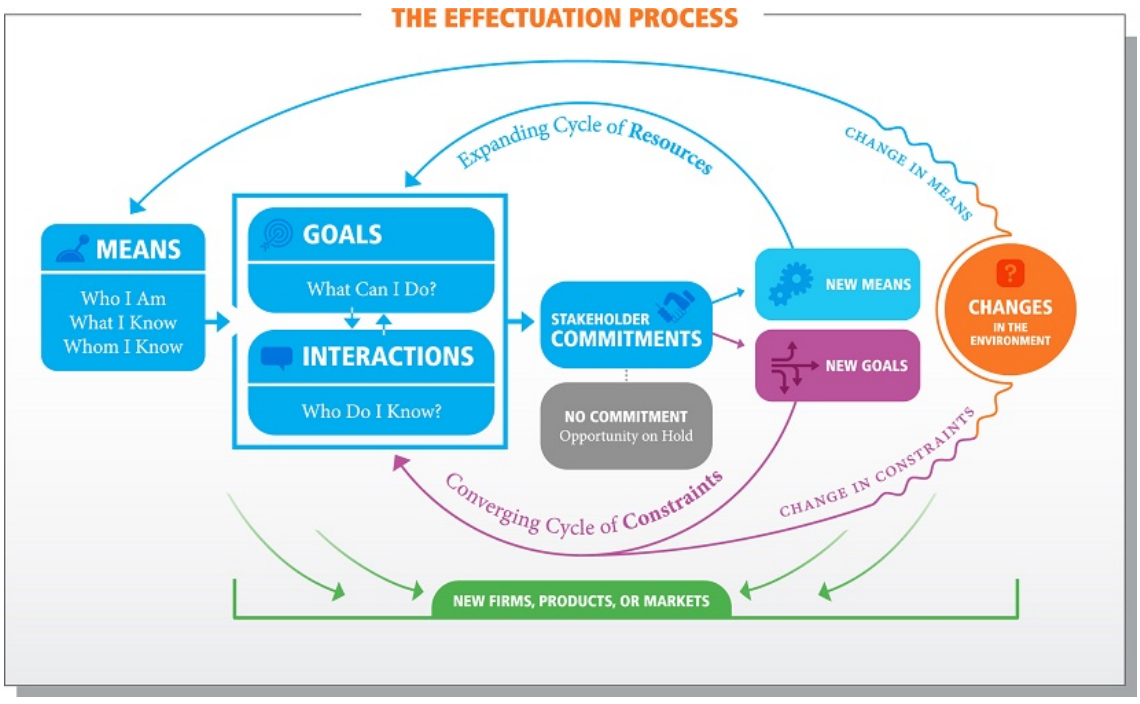

Figure 1.1. The effectuation process [SocietyForEffectualAction, 2018]

At the beginning of this startup venture, we have conducted much work without the effectuation principles in our minds. For instance, we did not start out with basing the project on our own network to get a head start. On the other hand, we focused on a field where we have the technical capabilities to make it happen. From now on, these principles

will help define how to act during the process, as it provides a good inspiration for how and why to contact stakeholders and thereby create commitments.

1.1.2 Lean Start-Up

First and foremost, Lean Startup is a not a tool, but a framework. It was developed as a result of Eric Ries identifying that *"startups were creating products nobody wanted, they were pulled down from the shelves and countless dreams ended up unrealized"* [Ries, 2011]. The theory of Lean Startup is built on five principles:

1. Entrepreneurs are everywhere
2. Entrepreneurship is management
3. Validated learning
4. Build-Measure-Learn
5. Innovation accounting

For this report we will focus on validated learning, the Build-Measure-Learn (BML) loop and Innovation accounting. The reason is that we acknowledge these principles to help steering our project in the right direction and benefit us during product development and marketing strategies.

Validated learning and the Build-Measure-Learn loop

The principles behind validated learning and BML is that instead of making detailed plans based on assumptions, one should try to follow a set-up that allows for constant adjustments. The BML is used to learn when it is time to pivot or figure out if what you are doing is correct.

Validated learning is about learning valuable information when needed and not to late in the process. It is about engaging with as many actors as possible to figure out what their needs/wants are and then perform tests to see the response of others. The more frequent one is able to do this, the more validated learning is generated. Often it is possible to generate validated learning before you build and incorporate the change or idea. This is especially true with the technology of today. Many scenarios can be simulated on a phone, computer or physical materials. The key aspect of validated learning is that it is backed up by empirical data collected from real customers [Ries, 2011]. Every part of the startup venture should be treated as an experiment with a scientific method. It has a hypothesis with predictions about the outcome and it test them empirically. The goal is to find early adopters since these tend to have the same desires as regular customers, but are more forgiving and willing to perform tests. This leads into the BML loop, the core of lean start-up, which is illustrated in figure 1.2.

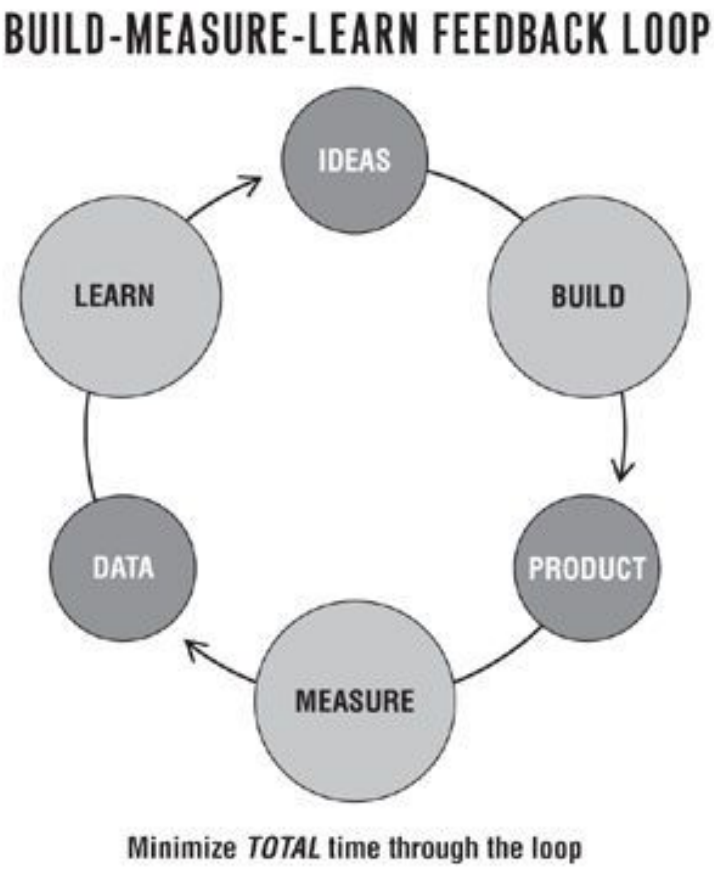

Figure 1.2. The Build-Measure-Learn loop by eric ries

The importance is not to be excellent in each step in the loop, but to minimize the time it takes to go through it [Ries, 2011]. It is an improvement over the "just do it" approach by making the process more iterative and incremental. The process can be divided into four steps as suggested by [MindTools].

1. The first step in the in the process is planning. Here you define the idea that needs to be tested and what information you are seeking. This leads to the hypothesis needed for validated learning. Next you need to decide what parameters to measure so the hypothesis can be tested and plan can be made for collection of the data.
2. The second step goes into the BML loop starting with building. The goal is to build a minimum viable product (MVP) that allows for testing of the hypothesis. The MVP will get more sophisticated the more times you go through the loop. Once the MVP is done it should be launched so measuring can begin.
3. Step three is measuring. Here the measuring and analysis of data takes place. Data is compared to the hypothesis made in step one and results are documented.
4. The fourth and last step of the BML loop is the learning stage. This is where the decision to persevere or pivot is made based on the data measured in step three and hypothesis made in step one. If prepared for, it should be fairly easy to see which decision needs to be made.

Innovation accounting

Innovation accounting is about setting clear milestones for the startup to have something to measure against when trying to reach the goals of the start-up. In the, end innovation accounting should provide answers if a start-up is learning how to grow a sustainable business with concrete facts [Ries, 2011]. There are three steps in innovation accounting:

1. To use the MVP to figure out where the company is right now.
2. Tuning the engine towards the ideal. This leads towards the decision point in the BML loop and step three
3. Pivot or persevere

It is very similar to the BML loop except the learning gained is converted into money. First the team or company needs to figure out which metrics to measure on. It can be conversion rate, website visitors, sales made, etc. Some questions that are good to ask during this process are:

- Did we do what we said we were going to do?
- Are our people working differently?
- Do customers (internal or external) recognize the improvement?
- Are we unlocking new sources of growth as a company?

Next a dashboard can be made to measure these questions. For an online store where you make weekly improvements the metrics could be visitors, how many stay for more than 30 seconds, how many products do they buy, etc. Each week you measure these metrics, make changes and remeasure. By doing this you get an easier way of seeing if your improvements are actual improvements and have an impact on the website. While doings this its important to keep notice of vanity metrics since these can lead to false conclusions. For a website an example could be the amount of visitors. If the number of visitors go up, one need to know if the number is unique visitors or simple the same users visiting the site more frequently.

1.2 BUSINESS MODELLING

In this section Business Modelling is covered, by exploring The Business Model Canvas, Business Model Innovation, Business Model Configurations and a Business Model Framework. We explain why Business Modelling is valuable, and how our chosen framework can be applied to differentiate a business and create unique companies.

1.2.1 Business Model Canvas

The Business Model Canvas (BMC) is a popular business tool utilized by both existing companies and startups. There are many things to consider when creating a business model, which the book *Business Model Generation* [Osterwalder and Pigneur, 2010] has taken into consideration, with a simple and good template. It consists of nine building blocks titled value proposition, channels, customer segments, customer relationships, revenue streams, key activities, key resources, key partnerships, and cost structure. Each of the 9 blocks has to be accurately filled out and function together. Moreover, they should be

frequently revisited through the venture to ensure that the business model still is truthful to the market. Multiple methods on how to use the template has later been discovered. *14 ways to apply the Business Model Canvas* [Garner, 2015] explains how people now use for single purposes like innovation, understanding competition and consumers, etc. In this report we will use the BMC to map out our own BM.

1.2.2 Business Model Innovation

Business Model Innovation (BMI) is controversial, and have various opinions concerning what it is. Some researchers do not know how to define it, while others describe it as all types of innovation [Taran, 2017b]. BMI are becoming crucial for growth as a result of the competitive environments continuing to increase their intensity. Companies use BMI to differentiate themselves from competitors, by dealing with various types of changes to an existing BM. These adjustments can be influenced by operations within the business or forced by competitors. The objective of BMI, according to Chesbrough, is offering something unique, relevant and deliver a value that is hard to copy [Chesbrough, 2010]. Regarding startup companies, it is common to only focus on lower prices and new products, which often leaves the firm in a red ocean were it is difficult to compete. Instead companies should differentiate themselves through their BM [Udemy, 2018], for example like spotify changed the music business with their subscription payment accessing all music. However, it can be challenging dealing with BMI, considering that there is no absolute method on how to apply it, mainly because every situation is different.

1.2.3 Business Model Configurations

Lately, there have been small amounts of research in developing BM definitions and frameworks. However, company managers, analysts and consultants alike are still left relatively empty-handed by the existing literature, and the limited available frameworks [Osterwalder and Pigneur, 2010]. Some academics are now trying to identify successful BM processes (configurations) across the different industries, and propose that they can be used as recipes, forming successful businesses. BM's does not only have one configuration in which they operate within, but rather various configurations aligned together [Taran, 2017a]. The process of BMI can be greatly improved by using this mapping process with the BMC building blocks, and it helps practitioners to manage it more efficiently [Taran, 2017a]. The configurations can also be put into a value drivers analysis, explaining primary and secondary levels of the building blocks significance. They also allow prioritizing building blocks, where the primary value drivers identify a specific building block who grant the focal point to the BM. Hence, the secondary value drivers are recognized as factors who will be influenced by the primary value drivers chosen.

1.2.4 Business Model Framework

The BM framework in Figure 1.3, proposed in the article *Business model configurations: a five-V framework to map out potential innovation routes* [Yariv Taran et al., 2016] has been applied in our project to create an innovative BM for our business.

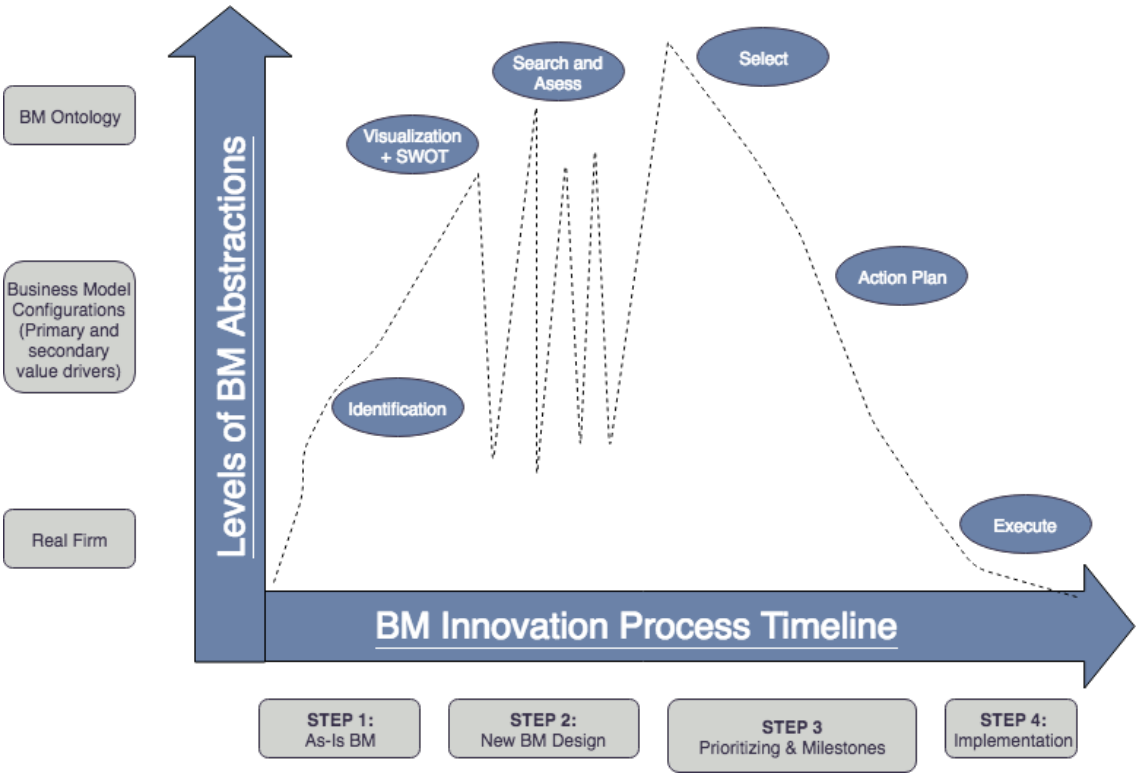

Figure 1.3. Business Model Innovation Process

The model defines a practical process for BMI, and consist of 4 steps guiding a company from its existing BM to a new, innovated and implemented one. The first step involves visualizing the "as-is" BM of a company, and identifying the primary and secondary value drivers. The value drivers are assorted into five categories, based on the model in Figure 1.4, called *the Five V's*.

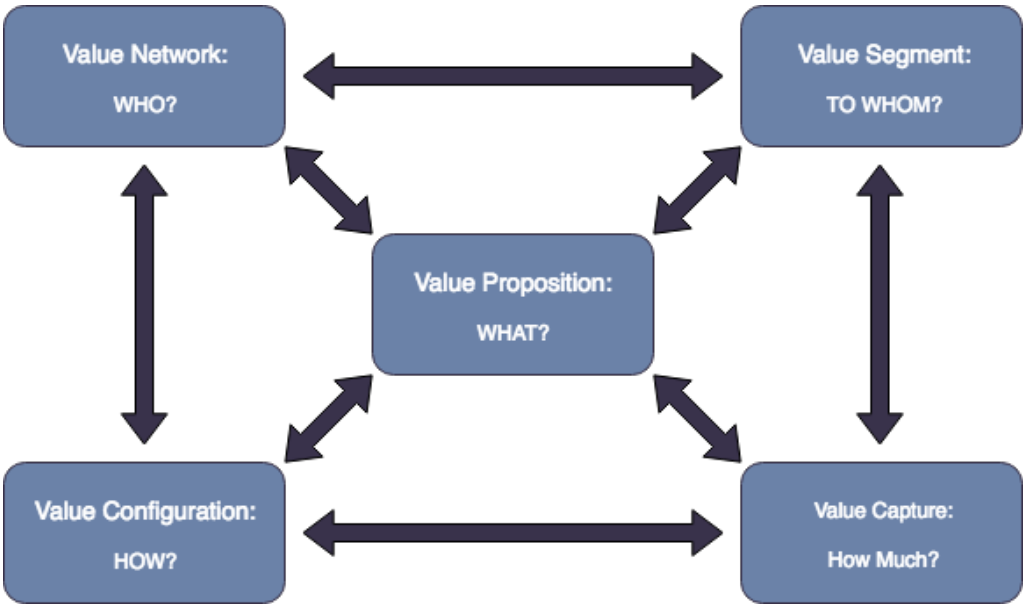

Figure 1.4. The Five-V's

The categories are value proposition, value segment, value configuration, value network and value capture. Thereafter the phase is ended with a competitive analysis of the "as-is" business. Afterwards, in phase 2, the company must go through a "Search and Assessment" process. Firstly, the company explores various configurations for innovating the BM, also considering the competitive analysis. Thereafter an assessment process should be applied, for example using risk management analysis to evaluate the BM innovation alternatives. The next step is "Prioritizing and Milestones", which covers the selection of the most relevant value driver found in step 2. In addition, an action plan is formed. Finally, in phase 4, you get to the actual implementation of the new BM. This is where the company shape a precise execution plan, initiate and act upon it.

1.3 USER-TESTING THEORY

In this section we cover different ways of testing a product by using the consumers, and how it can greatly benefit the product development process. We also explore ways of how testing can be used to more than just creating the right product. We also look at diffusion of innovation to get a better understanding of the adoption rate of innovative products.

1.3.1 Alpha and Beta Testing

Alpha and Beta testing are usually refereed to by companies that deals in software, but some of its testing methods can also be beneficial in other environments. Testing a product on the customer can greatly benefit the company, but can also carry certain risks. Beta testing can help validate the product concept, find performance problems, and serve as a sales promotion. The risks associated with beta testing comes when the test is poorly designed. It can affect relationships with current partners, generate inaccurate data and negative publicity [Dolan and Matthews, 1993].

Testing a product can be done in many ways and beta testing is one of them. When testing one must consider the price pr. test and the validity the test brings to the product. For example, testing a cosmetic product is much cheaper than testing more complex products. For cosmetics it is usually easy to find respondents and they can quickly form an opinion of the product.

Alpha Testing

In cases where it is expensive to conduct a beta test of a product, an alpha testing phase is done in-house, at the facility where the product is build. Here one can quickly test the functionality of the product and measure how the product performs. The negatives are that in many cases you are not able to test on the target customer to see how they interact with the product, so it can be hard to anticipate their patterns. Although there are ways of generating valuable data from the Alpha stage. For example, concept testing, co-construction, prototype testing, and usability testing are all methods that can help a company design a better product.

Beta Testing

The way we are taught of beta testing is that it is a way of testing the product in the customer's environment, but it can be used for more than just that. Instead of just

focusing on product features, companies can include design and commercialization into the test [Dolan and Matthews, 1993]. Dolan and Matthews list three major classes of purposes for beta testing:

1. Product Function
2. Product Support/Marketing Mix
3. Sales Promotion

It is not required to pursue each, but recommended to move beyond just product function, which is the core of the beta test. For example, some companies use the beta test to help determine the optimal positioning, target market selection and pricing for the introductory phase, factors that cannot be tested inhouse [Dolan and Matthews, 1993].

Beta Testing as a Sales Promotion Device

To further benefit from the beta test, incorporating sales promotions is a viable strategy. A way of framing the beta test can be seen in figure 1.5.

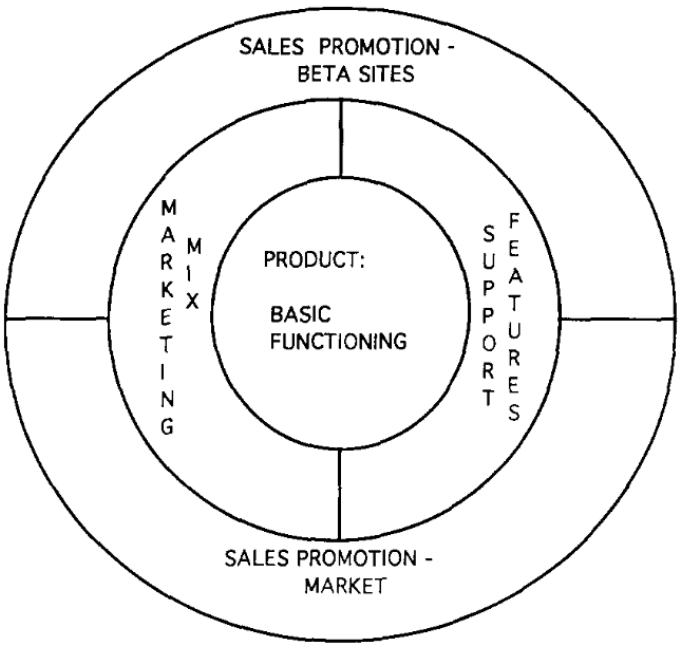

Figure 1.5. Beta test purposes [Dolan and Matthews, 1993]

An example provided by Dolan and Matthews is Xerox and how they increased their test sites from five to twenty-eight when testing their 220.000$ product. By doing this their goal was not only to test their product, but to build closer relationships which could lead to sales. Another benefit of using multiple test sites is that if the beta test is successful it can reduce uncertainty about the product for other potential customers. It can also lead to valuable marketing that the company itself cannot produce. So by expanding the beta test to more than just testing basic functions a company can achieve more, but have to design the test accordingly.

1.3.2 Diffusion of Innovation

The adoption process has been researched for over 30 years, and perhaps the most favoured of its models is presented by Rogers, in the book *Diffusion of Innovations* [Rogers, 2003]. Theory concerning the topic is often seen as a beneficial model for instructing technological innovation, and changes being made are adjusted and introduced in ways that meet the needs of all stages in the adoption process. It also emphasizes the great effect communication and networking with individuals has.

In general, the diffusion of innovation concern the actions that happen as individuals adopt a new idea, product and so on. Rogers established this process, emphasizing that usually, very few people are open to a new idea and choose to use it. Over time, these people have gotten the name innovators, and are in many cases 'spreading the word' so that an increasing amount of people become open to new innovation. As a result, it might become diffused amongst the population to a satisfying point over time [Kaminski, 2011]. Furthermore, Rogers have divided the different adopters of innovation into five categories, which are: innovators, early adopters, early majority, late majority, and laggards. This is illustrated in figure 1.6. The theory's goal is not to relocate the adopters from one category to another but to streamline the innovation to meet the needs of all five categories.

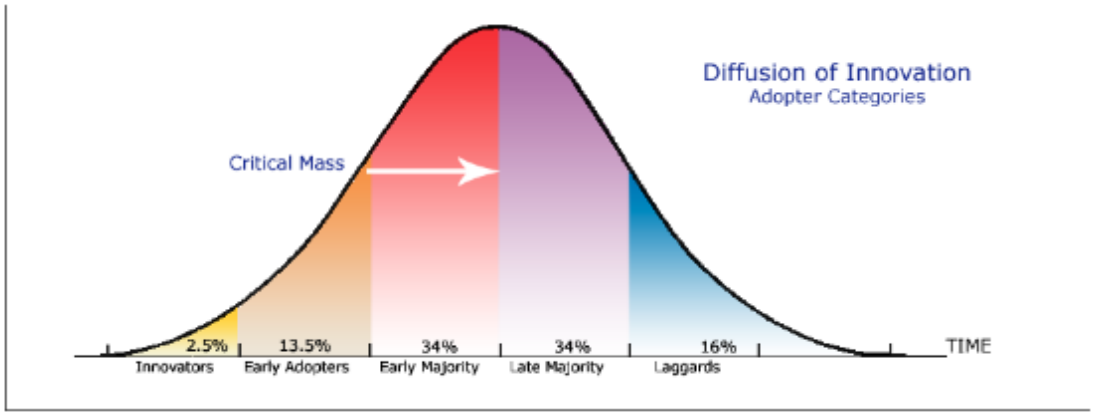

Figure 1.6. Diffusion of Innovation [Kaminski, 2011]

1.4 MARKETING MANAGEMENT

In this section we cover some of the aspects behind marketing management such as the concepts of it, core marketing concepts, marketing channels, supply chain, the new marketing realities, orientation towards the market place and marketing research. Furthermore we explore the benefits of Call to Action and A/B Split testing to try to establish a method for making progress.

1.4.1 The Concept of Marketing Management

The concept behind Marketing Management is that companies must be customer and market driven to achieve the greatest success. The aspects of marketing is constantly changing and companies need to explore new forms of communication and be ready to adjust and adapt when new information is gathered. Companies have moved from

managing product portfolios to customer portfolios, trying to understand them better and create individualized offerings and messages [Phillip Kotler, 2015]. The marketing department has also evolved over time, it is not longer just in charge of a limited number of tasks. According to Kotler and Keller it is a company-wide undertaking. Marketing now includes decisions about what products and services to offer, the price, communication, channels of distribution, partnerships to develop, etc. The marketing department drives the vision, mission and strategic planning of the company. Kotler and Keller explains that today good marketing are practising holistic marketing, to address the different shifts. "Holistic marketing is the development, design and implementation of marketing programs, processes, and activities that recognize the breadth and interdependencies of today's marketing environment" [Phillip Kotler, 2015]. There are four key dimensions:

1. **Internal marketing** - Ensuring everyone in the organization embraces appropriate marketing principles, especially senior management.
2. **Integrated marketing** - Ensuring that multiple means of creating, delivering, and communicating value are employed and combined in the best way.
3. **Relationship marketing** - having rich, multifaceted relationships with customers, channel members, and other marketing partners.
4. **Performance marketing** - understanding returns to the business from marketing activities and programs, as well as addressing broader concerns and their legal, ethical, social, and environmental effects.

It is important that these four dimensions are kept up to date, especially in today's internet-fuelled environment where changes happen rapidly. Leaders of the industry can quickly lose their footing and new leaders emerge. Examples such as Blockbuster being overtaken by Netflix, MySpace by Google, Barnes & Noble by Amazon.

Marketing covers a wide variety of aspects but a short description is "meeting needs profitably". The American Marketing Association defines it as: *Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large* [Association, 2018]. So one can say that marketing is about delivering something of value to a target through a medium they frequently use. In addition marketing is about building a relationship with this target and growing by finding and reaching new targets as well. Peter Drucker describes the aim of marketing as: *The aim of marketing is not to sell a product but to know and understand the customer so well that the product or service fits him and sells itself.*

1.4.2 Core Marketing Concepts

In marketing there are a set of core concepts that needs to be considered when trying to reach the customer, concepts such as: Needs, Wants and Demands. Needs are basic human requirements such as food, air and water, etc. The need becomes wants when directed to specific objects that can satisfy the need. Demand are wants for a specific product backed by the ability to pay. This is especially important since people might want your product but does not have the ability or willingness to buy it. Looking at these distinctions we need to consider that Marketers do not create needs. The needs are already present or pre-exists the markets. Marketeers can promote an idea that might satisfy a need, for

example to achieve social status, but they do not create the need for social status. Some customers also have needs, which they are not aware of and they can have a hard time articulating their need. Kotler and Keller distinguish five types of needs:

1. Stated needs (The customer wants an inexpensive car)
2. Real needs (The customer wants a car whose operating cost, not initial price, is low)
3. Unstated needs (The customer expects good service from the dealer)
4. Delight needs (The customer would like the dealer to include an onboard GPS system)
5. Secret needs (The customer wants friends to see him or her as a savvy consumer)

Kotler and Keller writes in their book; *"Business that only responds to the stated need may short-change the customer. Consumers did not know much about tablet computers when they were first introduced, but Apple worked hard to shape consumer perception of them".* This shows that by understanding the Needs, Wants, Demands, and deliver something that addresses more than the stated need, a company can gain a better chance of success.

1.4.3 Marketing Channels

There are three channels a marketer uses: Communication channels, distribution channels and service channels. *Communication channels* is where the company can speak directly to the customer which includes billboards, tv, radio, mail, phone, etc. *Distribution channels* are channels that helps to display, sell or deliver the physical product or service, these channels can be the internet, mail, phone, wholesalers, retailers, etc. *Service channels* are channels that help the company deliver to their customer which includes warehouses, transportation companies, banks, etc.

Looking into the media which marketers uses to communicate their product there are three categories which are relevant; Paid, owned and earned media. Paid media includes TV, magazines, sponsorships, all which require the marketer to pay to display their advertisement. Owned media are communication channels the company owns themselves, channels such as their website, newsletters, social media accounts, etc. Earned media classified as streams in which consumers, the press, and others communicate the brand or product via word of mouth, viral marketing, buzz etc.

1.4.4 Supply Chain

The supply chain is a channel which the product goes through from start to the consumer. In many cases it starts from raw materials to components to finished products to consumers [Phillip Kotler, 2015]. Each company in the supply chain only captures a certain percentage of the total value generated by the value delivery system. Companies seek to capture a higher percentage of this value by acquiring competitors, expand upstream or downstream or start their own production of that material. An example is the supply chain for Coffee which can be seen in figure 1.7.

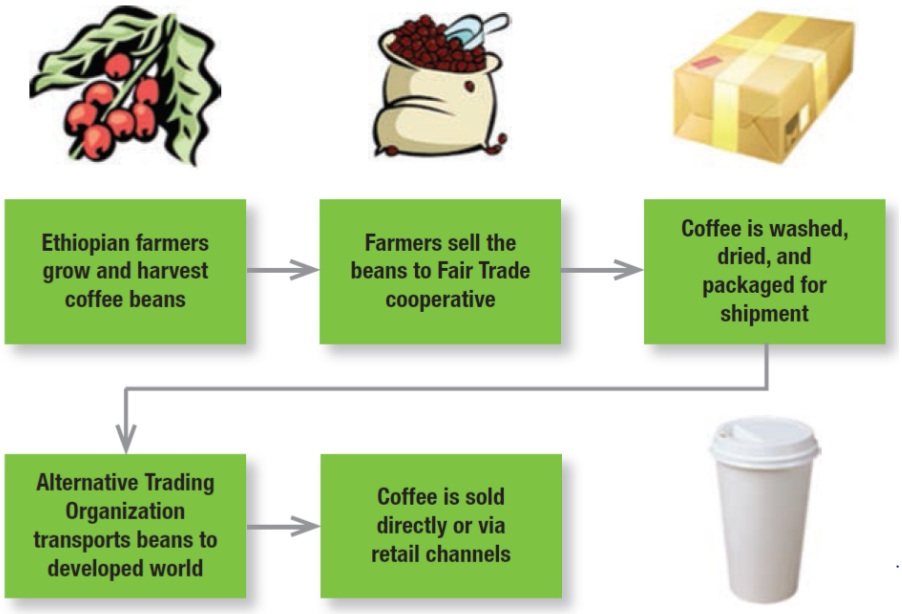

Figure 1.7. Rough example of a supply chain for coffee [Phillip Kotler, 2015]

1.4.5 The New Marketing Realities

The realities of marketing today is that it changes so fast its hard to keep up unless you practice it frequently. More and more consumers are getting access to mobile phones, and the internet which has resulted in customer data being gathered on all its users to better target the consumers or find information about products to buy. There are three transformative forces that Kotler and Keller [Phillip Kotler, 2015] focuses on in their book: technology, globalization and social responsibility.

The change in technology has opened up to many new ways of interacting and attracting customers. Companies engage with customers through raffles where the company seeks information and exposure from the consumer and in return offer them a discount or a free product. Companies have used this to gain new customers at a very low price compared to traditional advertisement. More cleverly, companies makes raffles where consumers have to mention their friends, making sure that even more consumers see their offering besides the initial customer. Technology has also improved the ways workers interact with the consumers physically. New computer systems, Tables, Phones, etc. have made it easier to register costumers and display products and its features to them, making it easier to generate a sale.

The advancements in technology has also had a big impact on globalization. It is now possible to easily ship products around the globe very cost effective and consumers can purchase products through sites like eBay, Amazon and Aliexpress for very low prices and have it within a month. Globalization also changes the way companies innovate and do product development. Companies can get inspiration from other countries and easier target their design for them. However, with the advancements within globalization has also had a great impact on social responsibilities. Consumers can now express their dissatisfaction with a company with very little efforts and share their message worldwide. This in return is also beneficial to others that focuses on social conscious where consumers help spread

the message and ways of "living right" by advertising for a certain product or company vision.

1.4.6 Company Orientation Towards the Marketplace

In this subsection some of the philosophies behind marketing is viewed, which at one point can guide our company's marketing efforts. These concepts have been a big part of the evolution of marketing and is worth keeping in mind.

The Product Concept

The product concept is based on the assumption that consumers prefer products that are widely available and inexpensive [Phillip Kotler, 2015]. Companies assume that as long as the product offers the most quality, performance and innovation then consumers will favour your product, which is not true in many cases. This is especially important to consider for start-ups. The price, distribution, advertisement and selling methods needs to be carefully considered.

The Marketing Concept

The marketing concept came to be around 1950 where companies try to find the right product for its costumers and not the right customers for its products. Examples of such a concept is Dell, which instead of building computers for specific customers, allows customers to choose specific components that fits their needs.

The Holistic Marketing Concept

The holistic marketing concept and relationship marketing is something to investigate in todays business world. The holistic marketing concept is based on the development, design and implementation of marketing programs and processes that acknowledges that everything matters in marketing. In figure 1.8 the holistic marketing dimensions are shown. For a startup we consider relationship marketing and integrated marketing of most importance.

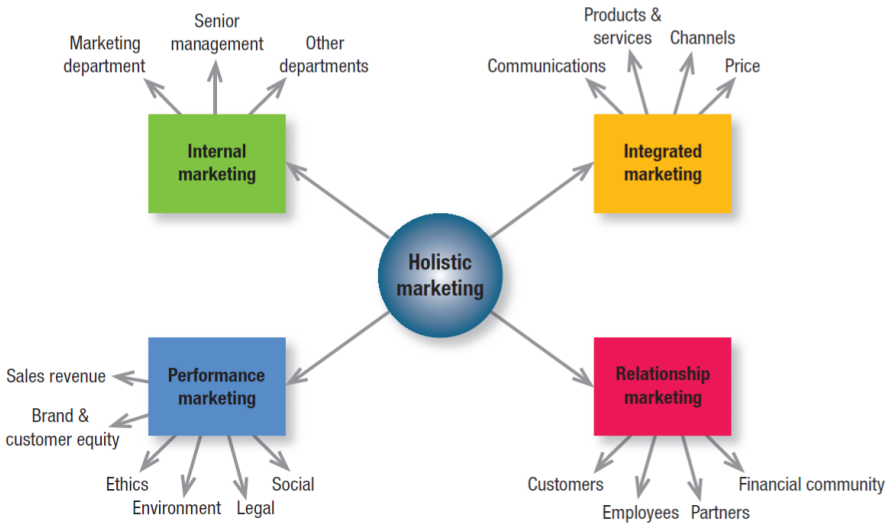

Figure 1.8. Holistic marketing dimensions [Phillip Kotler, 2015]

Relationship marketing is about the relationships of all parties involved with the company and is increasingly becoming a key goal for marketing efforts. The purpose is to develop deep, enduring relationships with people and organizations [Phillip Kotler, 2015]. When talking about relationship marketing Kotler and Keller mentions four relationships: customers, employees, marketing partners (channels, suppliers, distributors, dealers, agencies), and members of the financial community (shareholders, investors, analysts). It is important to understand the needs, goals, desires and capabilities and resources that these relationships can bring.

Integrated marketing is about crafting a program that create, communicate and delivers value for consumers [Phillip Kotler, 2015]. This means that not only does the company sell it's products, but it installs it, maintains it and might offer training in how to use it as well. To do this companies integrate a channel strategy where it asses all channel options and its effect on product sales and brand equity and indirect effects on interactions with other channel options.

1.4.7 Marketing Research

According to Kotler and Keller, the spending on marketing research reached 40.2$ billion on a global scale and most large companies have their own research department which looks into buying behaviours, trends, satisfaction and create brand and customer business strategies based on it. Many of these departments are involved in the product development process from start to finish. But marketing research is not just for large companies. It is a vital tool for small companies as well, especially start-ups. Some companies deals in selling research to others. There are many ways one can do marketing research, but most relevant for smaller companies without many resources to spend, are:

1. Engaging students or professors to design and carry out projects
2. Using the internet
3. Looking at rival companies
4. Marketing partner expertise
5. Use of employee creativity and wisdom

According to Kotler and Keller, companies normally budget around 1 to 2 percent of their sales to marketing research and spend a large part of that on services from outside firms.

To take advantage of the research, marketeers adopt a marketing research process that follows six steps as shown in figure 1.9, [Phillip Kotler, 2015]

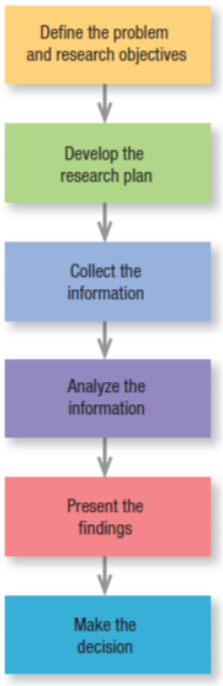

Figure 1.9. Six Steps of marketing research [Phillip Kotler, 2015]

Step 1: Define the Problem, the Decision Alternatives, and the Research Objective

First it's important not to define the problem too broadly or too narrowly for the researcher. You do not want the researcher to gather too much unnecessary information about a subject, but neither to little so important aspects might be missed.

When preparing for the research it is useful to define the decisions that management might face and then work backwards.

But the process is not always set in stone. Research can be exploratory where the goal is to identify problems and suggest solutions. Some are descriptive meaning it seeks to quantify demand. Some research are casual where the purpose is to test a cause-and-effect relationship [Phillip Kotler, 2015].

Step 2: Develop the Research Plan

In this step the most efficient plan for gathering the needed data and an estimate of the cost is made. In this step it is important to consider the data sources, research approaches, research instruments, sampling plan and contact methods since all have some sort of cost associated with them.

Data Sources are primary data, secondary data or both. Primary data refers to freshly collected data for the specific purpose where secondary data is data already available. Secondary data might be stored in the company's own system or bought from outside research firms.

Research Approaches are ways of collecting primary data if the secondary data isn't sufficient or outdated. According to Kotler and Keller there are five main ways this is

done: By observation, focus groups, surveys, behavioural data and experiments.

Observational Research is used to gather fresh data by observing consumers and their behaviour. There are multiple ways of doing this, for example one can give instructions to the consumers, telling them to record their actions while using a given product or simply interview them from time to time at a café, bar, etc. It is also possible to film them interacting with a product giving greater insight into how they use it. It is important that the consumer is unaware of the observation to get the most reliable data, and this can cause some issues regarding privacy.

Ethnographic Research uses anthropology to get a deep cultural understanding of the consumer. The goal is to discover unarticulated desires that other research approaches are unable to reveal. For example, a consumer might buy a food item because it brings people together and not because they taste great.

Sampling plan is a plan that covers who should be surveyed, how many and how to choose them.

- Sampling unit: Whom should we survey?
- Sample size: How many should we survey?
- Sampling procedure: How should we choose the respondents

Contact methods covers how communication with the participants should happen. There are multiple ways as seen below.

- Mail contacts
- Telephone contacts
- Personal contacts
- Online contacts

Step 3: Collect the Information

Collecting the information about the consumers is usually the most expensive and error-prone step in the process. The chosen respondents might not be available and must be replaced. Others might refuse to participate or give dishonest answers. The biggest issue is achieving consistency. Different groups have different preferences. Some might be uncomfortable when being interview either personally or on the internet. There might be language barriers, or social norms that skew the results.

Step 4: Analyse the Information

During this step the data gathered is analysed by applying statistical techniques to measure the responses. Here the purpose is to confirm the assumptions and discover additional findings.

Step 5: Present the findings

In the last step the researcher is responsible for present their findings. This is done to present the discoveries to the managers in a way that is understandable and relateable, so decisions can be made. Researchers can do this by creating persona's which are detailed profiles of the consumers.

Step 6: Make the Decision

In the last step of the process, the managers a faced with a decision to make. Here they use the findings provided by the marketer to either deciding to go forward with action, abandon it or decide to gather more information.

1.4.8 Call to Action and A/B Split Testing

Call to action (CTA) is about getting the customers to interact with your advertisement in a way that makes them do, what you want them to do. But it can also be used in other scenarios such as seeing if there is an interest in the business one try to create. In our case, we want to see if, given the opportunity, private customers are willing to sign-up for an automatic door opener without us talking to them directly. There are many ways of doing this efficiently and tests have been done to figure out what works best. For example, according to Michael Aagaard, International keynote speaker & Conversion optimizer, demonstrates on his website how using first person singular form instead of second person increased his conversion rate by 24.95 % as seen in figure 1.10 [Aagaard, 2013a].

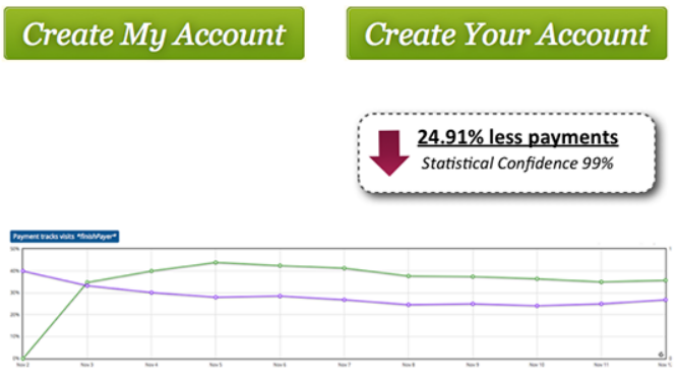

Figure 1.10. Comparrison of the effects of My and Your on a call to action button [Aagaard, 2013a]

The assumption that the word My was more effective than Your was further illustrated when he tested it at his company site Unbounce.com where they tested their two call to action buttons “Start your free 30 day trial” and “Start my free 30 day trial”. According to Aagaard the conversion rate went up by 90 % by using the "start my free 30 day trial" [Aagaard, 2013b].

Another example of efficient CTA design is based on an major European e-commerce site that sells hand printed porcelain. They were able to boost the sales by 35.81 % by changing the colour and design of the “Add to cart” button as seen in figure 1.11. According to Aagaard the goal is to make your CTA stand out from the rest, so it is easy to locate once the customer is ready to take the next step.

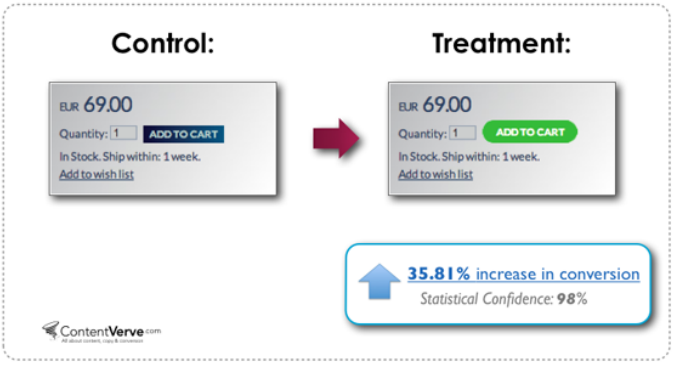

Figure 1.11. Shows the effects of changing the design of the "add to cart" button on a website [Aagaard, 2013b]

In marketing it's important that your advertisement or message is doing what it is intended to do, but it is hard to know the effects of your efforts without testing the underlying assumptions. One might have different ideas of how to attract customers through Facebook advertisement but how do one know which idea is best? One way of testing the assumption is to do an A/B split test. The idea is that you create two different advertisements and expose them to different customers to see which one generates the best results.

MARKET RESEARCH 2

In this phase the essence is to take a step back and review the markets that we have been focusing on to see if they still present the same opportunity as earlier or has changed. Furthermore, we will try to discover new markets and opportunities that we might have missed. We will use the research steps presented in section 1.4.7 to make a plan for how to best research the potential B2B, B2C and B2G segments. Moreover, there will be a competitor analysis based, and the phase will end with presenting some of the interactions we have had with people of interest throughout the semester.

2.1 MARKET OVERVIEW

To get a better view of the general market, we try to find as much secondary data as possible to keep the time spent and costs as low as possible. We will research both how the market looks on a global scale and how other similar solutions is being used and sold. We attempted to discover the market trends, restraints and drivers to get a better understanding of it and we try to look for other key factors which will influence it. Then we segmented the market by type, application and end user, ending it all with an illustration of the customer journey in today's market.

2.1.1 General Information

In general, the market for ADO's are increasing significantly. A report from *Beige Market Intelligence* [Intelligence, 2017] states that the compound annual growth rate (CAGR) for this market will be close to 9% during 2017-2022, and cross 16 billion US dollars. The reason for this is that the products are now applied to a wide variety of circumstances and are becoming more common in all sorts of buildings. From another market report named *Technavio* [Technavio, 2016], they found that the market of EMEA had 2.43 billion dollars turnover in 2016, most of it in Europe alone.

There are several reasons why ADO's are utilized, depending on which places and situations they are applied to. The products can be used for impressing customers, increasing their service, reducing heating and cooling costs, for convenience and in most cases they are a must so that people with reduced mobility can enter and exit [Store, 2017]. Additionally, there are several factors affecting the ADO market, its trends, restraints and drivers, which can be viewed in figure 2.1.

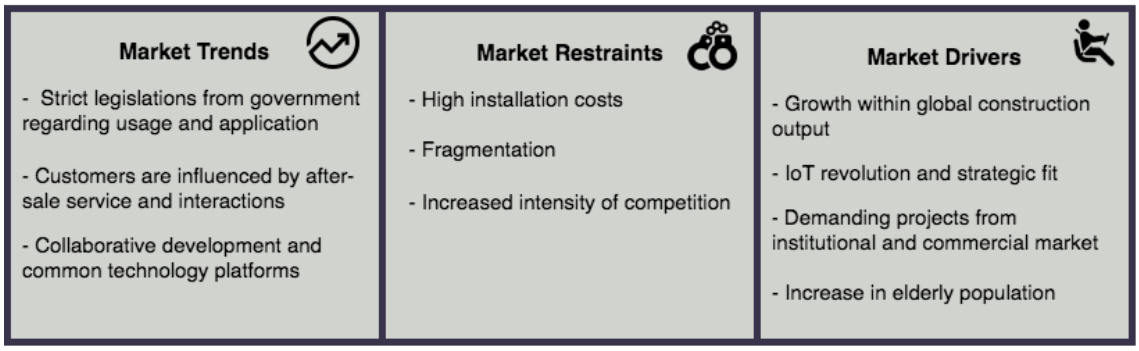

Figure 2.1. Market trends, restraints and drivers

Furthermore, below is a list of other key factors that will influence the global economy for the next five years, and might further impact the ADO market[Technavio, 2016].

- Radical changes in consumption patterns
- Chinese economy slowing down growth
- Softened energy prices influencing the dynamics of key manufacturing industries in several developing countries
- Reconstruction of the trade policies as a result of Brexit and other separationist demands

The changes in consumption patterns might be a positive factor for us, for instance we have discovered that it is becoming more usual to purchase aids personally instead of through government. Regarding China, they are slowing down growth is a positive, as we could not compete with their pricing if they decided to focus on Europe, but as of now we have not seen their products on the market, most likely because of trust issues towards the quality. Lastly, the reconstruction of trade policies after Brexit might make it harder to expand to certain countries.

2.1.2 Segments

Here the segmentation by type, application, and end-user from the ADO market is presented [Intelligence, 2017], as it gives a good understanding how the market is formed. In addition, our current plans for segmenting will be introduced, based on our previous discoveries. [Hansen, 2017]

By Type

Researchers divide the global ADO market into different types of doors, which are folding-, revolving-, swing- and sliding doors. In our case we only focus on low energy swing doors, as it is the most common choice for interior doors. The reason for this is that low energy swing doors opens and closes the door at reduced speed to limit the kinetic energy of the moving door, simplifying the process for people both with and without disabilities.

By Application

Concerning where the types of ADO's are applied, the market are classified into Residential, Public Administration, Commercial and Industrial. Also, further subdivision for these

three is presented in figure 2.2. Moreover, we have discovered that the sales volume of the residential segment has increased over the years, and will continue to grow. It is expected to reach 1.7 million units sold by 2022 [BusinessWire, 2017]. Furthermore, nursing homes are another segment that we acknowledge to be a favourable place to start selling products. Both segments have proved sales growth and will give value to the end-users.

End-User

The end-users in this market are the people utilizing the ADO's, which depends on where the device is installed, see figure 2.2. On the basis of this project, a huge influence has been to help people with reduced mobility, which are individuals that are of old age, have gotten into accidents or have a disease that reduces mobility. Moreover, as a result, people often end up with different medical aids such as wheelchairs, walking sticks and other types of supporting aids. In our case, we are trying to enhance their everyday life, by creating solutions suited for their household, which is why we choose to focus on residential and nursing home segments. In addition we have been granted opportunities within schools, more specifically ADO's for their toilets.

Segmentation	Sub-Segmentation	Definition
By Type	Sliding doors	
	Swinging doors	
	Revolving doors	
	Folding doors	
By Application	Residential	• Apartments • Houses • Garages • Etc.
	Public Administration	• Schools • Nursing homes • Etc.
	Commercial	• Hospitals • Hotels • Malls • Public infrastructure • Offices
	Industrial	• Laboratories • Factories • Etc.
By End user	Residential	• Common People (Smart homes) • People with reduced mobility (elderly, wheelchair users, other medical aids) • Visitors (Friends, family, etc.)
	Public Administration	• Workers (Teachers, students, nurses, doctors, etc.) • Visitors (Patients, business people, etc.)
	Commercial	• Consumers (Shoppers, renters, workers, travelers, etc.)
	Industrial	• Workers (craftsmen, engineers, etc.)

Figure 2.2. Segmentation table for the ADO market

2.1.3 Customer Journey

For end-users, the process usually begins with sending an application to the municipality. Thereafter, an investigation of the person and its home will be performed, to disclose if there is a need for the requested aid. This must be done in accordance to the Danish social service law. The municipalities job is to help the people with reduced mobility, in the most in-expensive way possible. On the other hand, in public building prospects like schools and nursing homes, tenders are used for buying the ADO's. The contractors winning a tender thereafter delegate tasks to the different specialists like carpenters, installers or his own crew. When the municipality has accepted the single individual or the contractor has won a tender, an installer company is contacted. In both processes they work as a central joint, by receiving money from the government to buy ADO's and thereafter install them at its planned place. In addition, they perform a yearly maintenance visit to make sure everything holds the standard. Moreover, the manufacturer's job in the process is to develop, produce and distribute products, systems and applications, to the installer. Underneath, in Figure 2.3, one can see how we picture the end-user journey.

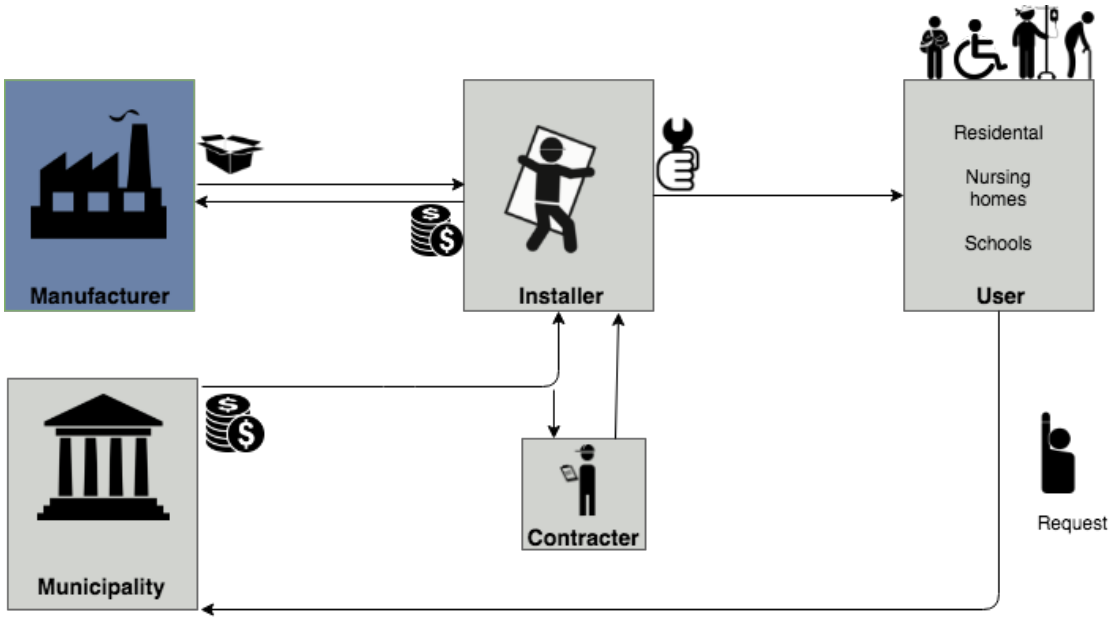

Figure 2.3. End-user journey from request to installation

2.1.4 Reflection of Section

Firstly, we are fully aware of the strict rules and long processes within governmental efforts in this market. On the other hand, we have recognized that if a company manages to enter the market with support from them as customers or stakeholders, it has an excellent chance for becoming a sustainable business. Another possibility that was discussed was making the end-users our costumers. Furthermore, we consider the business to be in the relevant market area regarding segmentation by type, application and end-users. The reason why we are confident that these fields have potential are all the issues we have found regarding the products and lack of focus toward the needs of mobility impaired individuals. We will therefore further inspect these potential customers and evaluate which path to continue with. Moreover, at this point we address Adoore as a manufacturing company, but should

we rather partner up with existing ones, sell the concept or will we find another gap in the market? These question needs to be answered along the way.

2.2 RESEARCH PLAN

Companies are spending large amounts of money on marketing research, but there are ways smaller companies with low budgets can conduct research. We try to utilize the six steps provided by Kotler and Keller in section 1.4.7.

Step 1: The first step consists of finding information about current solutions and how we can make them better. We know that there is a need for these solutions, but often they are expensive and users are having a hard time getting funding for them. To do this we will take an exploratory approach to the problem the end-users face.

Step 2: The data sources will consists of both primary and secondary data. To get a better understand of the problems our end-users experience we need to perform observational research by visiting the users and see, first hand, how they interact with their current solutions. We should also try to talk face to face with potential customers who does not have a door opener yet, to try to establish why they haven't made the purchase. For this Ethnographic research is used to try to gain a deeper understanding of the consumer, there might be other reasons besides price and esthetics behind this.

For secondary data we should seek to explore similar solutions and competitors on the market to see if we can do it differently and gain an edge but also try to find information about the current market and how it is developing. Ideally this would be done by purchasing studies about the automatic door industry but these are usually very expensive. For this reason we will have to conduct our own.

Looking at the sampling plan in step 2 of section 1.4.7 we need to establish whom we should try to reach, how many and how should we choose them.

Whom:

- Wheelchair users
- General mobility impaired individuals
- Leaders or project managers of institutions who help or facilitate the elderly and disabled

How many:

Since we already have a lot of secondary data from a previous project we should aim for primary participants. This also means that we won't have time to interview as many as we would like, but the aim is to get at least five participants

How to choose:

- If they are or have been users of current solutions they qualify
- If they are part of the decisions making process at the institutes
- If they qualify for disability aids

Contact methods

The contact methods that we will use are; mail, personal and online contacts. We will use them to make it easy for us to get information when needed. This enables us to gather new information if something were to come up after the initial market research is done. The most important method for us is personal contact since this type of contact gives us the opportunity to ask more questions and record observations about the respondents. This can also prove beneficial in the sense that it can lead to new relationships that can be further used in the business venture.

Step 3: When collecting the information we need to be careful when interpreting the answers. This step is the most error prone according to Kotler and Keller. When talking with participants we plan to take as many notes a possible and have our own meeting right after to discuss and review the findings. Here we have the opportunity to discuss the findings while they are fresh in our minds and combine our notes for better documentation.

Step 4: will mostly be applied to our secondary research findings. We should try to illustrate our findings to see if we can confirm our assumptions or perhaps discover new findings.

Step 5: In the second last step we present our findings in the report so it is understandable by the reader. The presentation should give a good overview that makes it easier to make a decision in step 6. To do this we present our findings through graphs, figures and complimentary text and we should seek to create personas that describes the different type of users we expect to encounter.

- Buyer for nursing homes
- Mobility impaired individual
- Through government
- By themselves
- Family to a mobility impaired

Step 6: During this step a decision is made based on the findings. Should we further pursue the venture with the given market segment? Is there a need for a innovation in this field? Is that market big enough? Who are the customers? etc. The decision is present in the form of a reflection upon the market segment.

2.3 B2B SEGMENTS

In this section we explore two of the business to business (B2B) segments that we think has potential for us as a company. We analyse their current situation, how our business fits the market and the size of the markets to see if it is possible to start a business profitable business with the opportunities to grow.

2.3.1 Nursing Homes

From previous interactions with potential markets, it was discovered that a project exists where the goal is to create *The Nursing Home of the Future*. The project focuses on well-being and technology. The project leader and Chairman of the steering committee is a guy named Lars Nøhr. Through Lars Nøhr it was discovered that they tried to implement automatic door operators into their vision but they were too expensive. Their original plan

was to install ADO's on the exterior doors, but we believe that an ADO can be a great addition on the interior doors as well, since there are many different possible end-users whom can benefit from the solution. End-users such as; the employees who take care of the residents, the elderly, physical handicapped, and others who might be struggling with opening doors.

Nursing Home of the Future

Nursing homes of the future is a project that started in 2009 by Aalborgs Municipality's Elderly and Disability Management. Their visions is to offer the best possible conditions when it comes to individuals in need of care, also in the future. The reason behind this is that the Danish statistics analysis is expecting a raise in elderly who need assistance in 2035. Furthermore, they expect the future generation to have higher demands to their senior life due to the current economic progress and security that the Danish welfare system has contributed towards. To achieve this, the goal is to build new and modern nursing homes with welfare and health technology as a central role. This is done by ensuring a high degree of well-being and an automation of routine tasks [Fremtidens Plejehjem, 2018b]. The first *Nursing Home of the Future* was finished in 2013, located at, Carl Klitgaards vej at the harbor in Aalborg. Some of the technological implementations they have made are:

- Lift system for bedrooms and bathrooms
- Well-being monitors for Skype conversations, calender feature, ordering of food, remote control of tv's, control of heat and control of windows.
- Intelligent toilets with automatic wash and wipe
- Guide system for residents so they have an easier time navigating inside the facility
- Censoring in the flooring so employees can see if someone has fallen

How Adoore fits

We think we can help *The Nursing Home of the Future* with their vision by providing them with ADO's for their interior doors. By installing an ADO in the residents home, the facility can come closer to the high standard demanded by the future residents. It can assist the individuals with reduced mobility or motor function so they require less help, from the employees and thereby directly improve their quality of life.

Figure 2.4 shows a proposal for a home designed for *Fremtidens Plejehjem*. As seen in the figure there are four doors in total, one for entering the home, one to enter the depot, one for the bedroom and one for the toilet. A problem for us with the current design, is the use of slide doors. Our product is only designed for swing doors, but we have found that slide doors are considerably more expensive than swing doors. So by changing the design to swing doors they can free up resources to spend on other solutions, like our product.

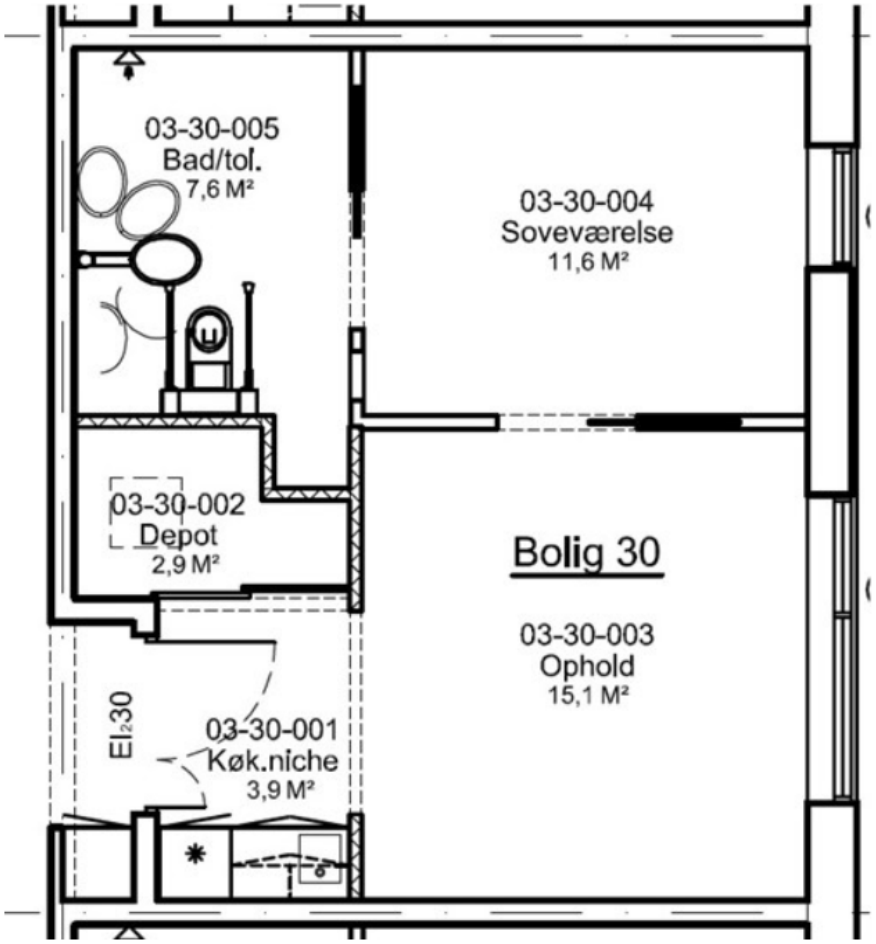

Figure 2.4. Accommodation suggesting for Fremtidens plejehjem [Fremtidens Plejehjem, 2018a]

Market Size

To get an estimate of the potential market size, if the product were to be installed at interior doors at nursing homes, we did some desktop research on nursing homes in Denmark and made some assumptions based on our findings. Through the Danish statistics bank we learned that in 2014 there were about 81.000 nursing home apartments divided into four segments; residential care home, protected homes, care home - elderly and general elderly homes. An illustration of the above findings is shown in figure 2.5

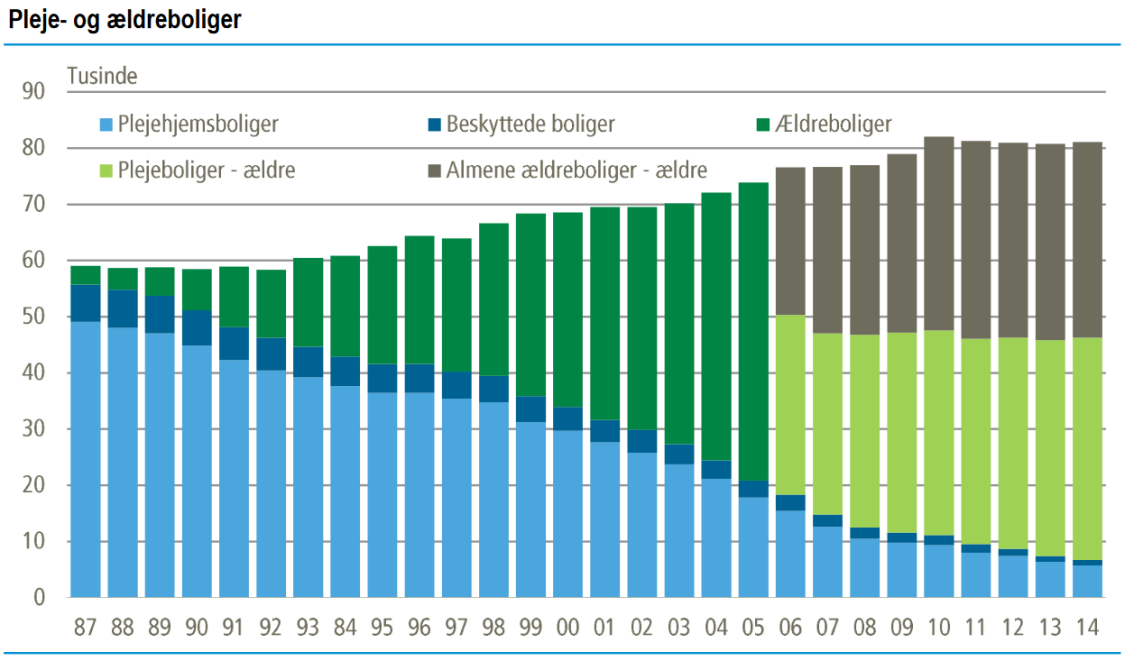

Figure 2.5. Amount of care and elderly homes in Denmark. [Statistik, 2018]

We assume that every resident has at least two doors where our ADO can be installed, the entrance to the room/apartment and to a toilet door. This gives us a market volume of about 162.000 thousand installations in Denmark.

2.3.2 Schools

From earlier interactions with people of interest, it was discovered through Life Science Innovation that there is an ongoing project about improving the hygiene at public schools in Europe. The theme of the project is to develop a fully touch-less concept for school toilets so that students do not come in contact with bacteria on the soap dispenser, wash, hand dryer and the door.

Research behind the project shows that there is a need for better toilet facilities in the Danish schools. Studies from Copenhagen living lab [Hansen, 2014] suggests that many students do not visit the toilets, for a variety of reasons and instead hold back. This has consequences on their health, learning ability and concentration. In 2017 a mass experienced about the correlation between children's bladder and gut problems was conducted. In total the experiment had 252 schools and 19.577 students participating. The results shows that students has a bladder and gut problem. Roughly 12.4% has incontinence at least once a month, but more frequent with younger students. The experiment also reveals that over 50% of the students asked are unsatisfied or very unsatisfied with the toilet conditions. It also showed that 25% of the participants answered that they did not visit the toilets during a day of class.

How Adoore fits

Through Life Science Innovation it was discussed how we could help them improve school toilets with our product. The main theme of making them touch-less was something where

we saw an opportunity. We have the capabilities to add a touch-less opening feature to the product and thereby improve the hygiene for those who follow the correct procedure. The problem right now is that people who follow correct washing procedures get exposed to bacteria when having to open the door to get out, making the whole process less effective. By introducing touch-less door's this factor can be eliminated.

A concept of the future school toilets can be seen in figure 2.6. It was discussed that our product should be installed at each of the three toilet stalls, but upon further inspection it seems unnecessary to have them elsewhere than the entrance of the bathroom.

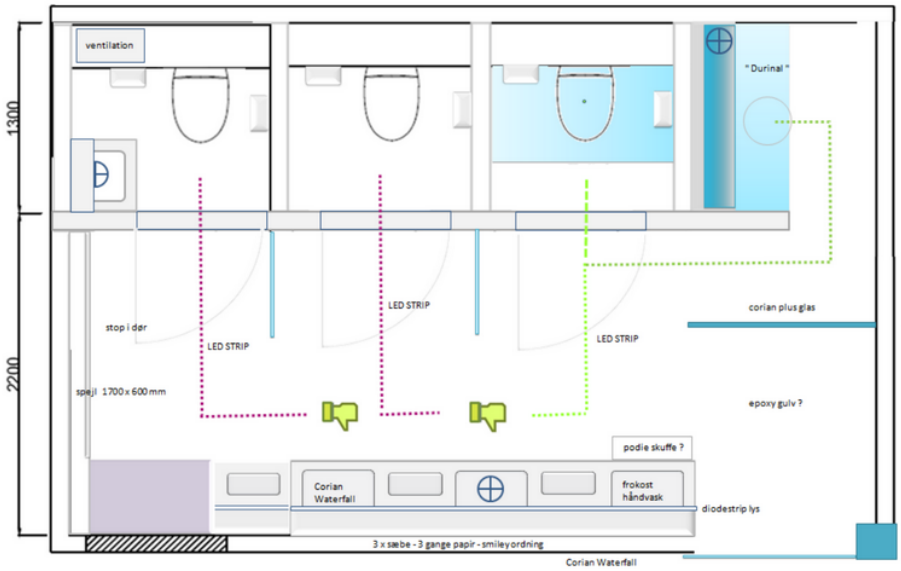

Figure 2.6. Concept for school toilet of the future [Kommune, 2014]

Market Size

To get a better view of the potential market size for school toilets we looked at the experiment from *natur videnskabens festival* [Kamperis, 2017]. Based on their finding they estimate that there are between 17-25 students pr. toilet in Denmark, with the highest number in the capital region. as seen in figure 2.7. From *Undervisnings Ministeriet* we found that there are in total 712.927 students in elementary school across all types of schools in Denmark 2017 [Ministeriet, 2017]. If we average 21 students pr. toilet, that gives us 33.949 school toilets where our product can be installed. If we assume that the product only needs to be installed at the entrance of the toilet, the number will go down considerably.

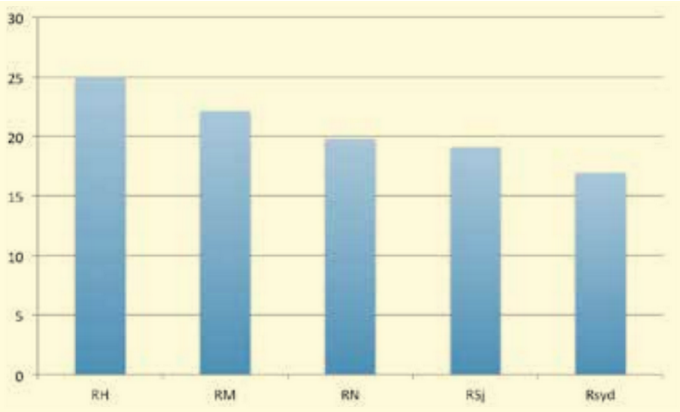

Figure 2.7. Amount of students pr. school toilet. RH(Region Hovedstaden), RM(Region Midtjylland), RN(Region Nordjylland), RSj(Region Sjælland), Rsyd(Region Syddanmark) [Kamperis, 2017]

2.3.3 Reflection of Section

The outcome of the research shows that our ADO solution has applicability in the business to business segment and that nursing homes might be a good place to start. Looking at *Nursing Home of The Future* we see great potential since they are focused on technological solutions and are spending more resources on their building compared to less advanced nursing homes. This might be something unique to this project and something that we have to keep in mind. Other nursing homes might not have the available funds to buy ADO's for their residents and instead will have to rely on the resident to acquire the product. Looking at the statistics in 2.5, an increasing number in nursing home residents from 1987 to 2014 and coupled with the report of a raise in elderly who is expected to need assistance in 2035, shows that preparations should be made. The size of the market might not be as big as other markets, but it is large enough for a new business to focus on and we believe it easier to enter based on our network, but it is not sustainable by itself, even though the market it is growing.

When looking at schools, the potential might be smaller than first anticipated. This is due to the amount of students pr. toilet being so high, and that the only relevant place to install the ADO is on the entrance to the toilet area. Additionally, there are many ways to circumvent the issues so it might be difficult to persuade a school to spend funds on our product if they trying to minimize spending. The data shows that there is a big problem with school toilets and they need to be improved. If it is not possible to keep up the standard that is required, solutions such as touchless toilets might help but we believe it will require a lot of effort to enter this market.

Working with and selling to governmental entities might be difficult for the inexperienced, but as of now the benefits of dealing with the government seems to outweigh the negatives. It is important when moving forward that we understand the process of doing this type of business and how it might affect us.

2.4 B2C SEGMENTS

Looking into the residential market, there are many segments where there are use for an ADO. Segments such as wheelchair users, elderly, people with reduced motor abilities, and many others. It is our belief that the product can assist all segments with the right add-ons, but to get a better view of the customer segment we divide private customers into niche segments.

2.4.1 Elderly

When it comes to the elderly, we think the solution has the potential to improve their daily lives by making it easier to move around in the house. Less elderly receive home care compared to just a few years ago and in figure 2.8 we can see the decline in each municipality. Some municipalities see a decline up to 35% while the majority are between 20% to 35% [Ældre sagen, 2018].

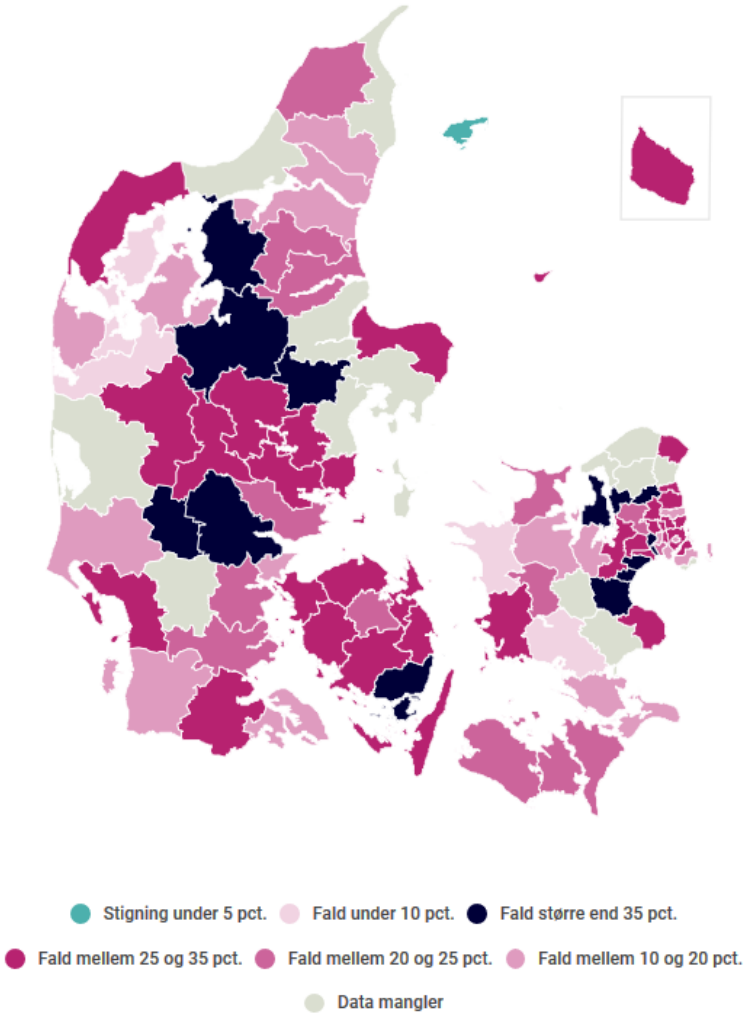

Figure 2.8. Shows the decline in elderly above 80 years of age, receiving home care [Ældre sagen, 2018]

Based on analysis done by *ældre sagen*, the reason for this decline is not because of an improved quality of life, but due to the financial crisis in 2008. Although the elderly are better in terms of health, there is still a period of their life where they are in need of home care, and currently that need is not being fulfilled [Ældre sagen, 2018]. The analysis also excludes nursing homes as the cause of this decline. It is clear that an improvement is needed and that there is an increase in elderly living in their own homes.

2.4.2 Wheelchair Users And Mobility Impared Individuals

From earlier interactions with Mads Bendiksen, a Norwegian wheelchair user, it was discovered that he was unhappy with his current solution and were looking for something better. Through Mads Bendiksen the problems a wheelchair user experience when interacting with standard doors, were found. In figure 2.9 we can see a wheelchair users process of going through a door. As illustrated it is a longer process that can create frustration for the user, especially if it is in a tight space.

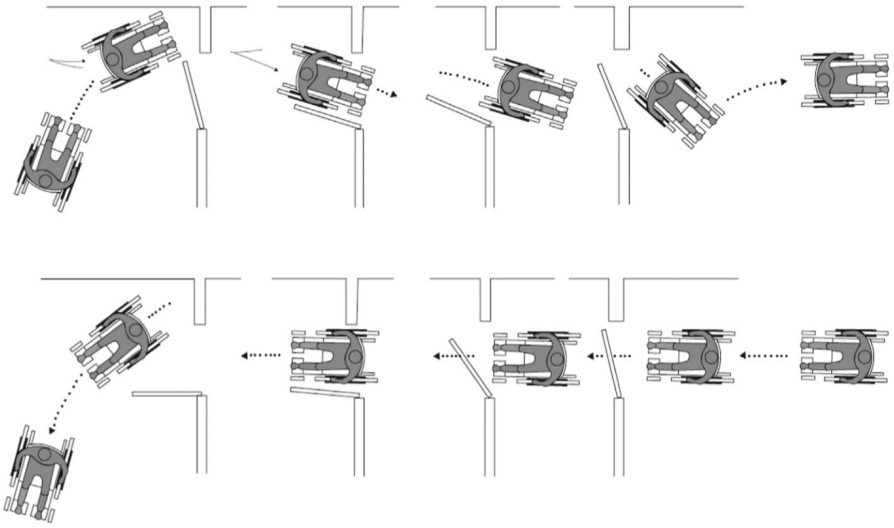

Figure 2.9. Entering and exiting a door.

Research done on Norwegian wheelchair users during a bachelor project [David Lampe, 2016], shows that 66% were less satisfied with their current solution. Some of the points that they felt should be improved were:

- Often it locks and makes a lot of noise. This makes the user think that they bother their neighbour
- No battery in case of power outage, so they can not open the door or it is very hard
- They have to point the remote directly at the door for it to work
- They cant close the door from the remote
- It is very big and is mounted on an unpainted veneer
- Does not close the door properly
- Sometimes it wont open, and closes very fast

The respondents were also asked to explain how they thought the product could be improved and some of the points were:

- Controlling through application
- Battery for power outage
- Smaller design
- It could be hidden
- That the closing mechanism is not based on time but manually controlled
- Able to lock the door through the application, so they do not have to use a key

The same survery was done on Danish wheelchair users and all had the same suggestions [Hansen, 2017]. Some of these concerns and improvements are something that our product already solves and others can be addressed in the final design. We also believe that these issues can be found in the global market as well, the challenges a wheelchair users faces are not unique to Norway.

Mobility Impaired Individuals

Another segment where the solution can be beneficial for are mobility impaired individuals. We assume that they face similar problems as wheelchair users. Individuals with diseases such as Muscular Dystrophy, Cerebral Palsy or just people who have been in an accident and need temporary aid. The solution can help these individuals by making it easier to move around in their own homes without compromising their self image.

Market Size

Finding the correct market size is difficult due the metrics which are used to classify individuals as disabled but from the *Center for Ligebehandling af Handicappede* we fund that there are between 30.000 and 50.000 wheelchair users in Denmark, in 1997 [Wiederholt, 1997]. They are categorized as motion disabled but this category also includes a very large but unknown number of other forms of motion disability. A report about mobility aids made by Soicialstyrelsen [Socialstyrelsen, 2014] estimates that roughly 750.000 Danish citizen in the age of 16 to 64 reports a physical disability. They also present some of the aids that were approved for citizens in 2006, the numbers and aids is listed in table 2.1.

Walkers	70.800
Manuel wheelchairs	53.600
Electric scooters	17.800
Walking sticks	9.400
Electric wheelchairs	5.100
Walkers	2.800
Mobility walking frame	2.000

Table 2.1. List of approved mobility aids in 2006 [Socialstyrelsen, 2014]

Besides the 161.500 approved mobility aids, we were told that it is becoming more usual for individuals to purchase their own mobility aids due to the process sometimes being difficult.

Needs of the customers

When looking at the needs described in section 1.3.1 we know from interacting with the end users that the *stated needs* are an automatic door opener that is cheaper, smaller

and aesthetically pleasing to look at. We assume the *real needs* are a cheap alternative to current ADO and blends in with the living room. The *unstated needs* are a good and reliable product that is easy to use, both in operation and functionality. When it comes to *delight needs* we imagine the customer would like us to install it as well. For the *secret needs* we believe that many do not want to be perceived as too weak to open a door, and current products give this perception.

Therefore, by building a product that is cheap enough for the customer to buy, blends in with the surroundings so it is not the first thing one see when entering, and is good, reliable and easy to use, we believe that we can gain an advantage over the competitors and reach the customers easier.

2.4.3 Reflection of Section

The findings in the section shows that there is a large segment of potential end-users for ADO's, especially for mobility impaired individuals. Looking at the elderly it is not easy to see how big the market is since there are no real metric to look for, but we can see a decline in home care which is a problem according to *ældre sagen*. An ADO is not going to cause an increase in home care, but it might be able to help the elderly perform certain task easier and increase their quality of life.

For wheelchair users the problem they face with standard doors are more straightforward. As presented in section 2.4.2 the process of going through a door can be tedious, especially in a tight area. Furthermore, earlier research showed that 66% of the respondents were less satisfied with their current ADO and had many suggestions on how to improve it. This indicated that there is a customer segment we can capture since the improvements are relatively easy for us to address and applies to other segments as well. Looking at the market size it is hard to find concrete data since mobility impairment can mean a great number of things, but looking at data from [Socialstyrelsen, 2014] the amount of reported physical disabilities amongst 16 to 64 year old are roughly 750.000 Danish citizens. From the list of approved mobility aids in 2006 we can also see that 161.500 aids were approved which indicates a large segment of possible customers. But at this stage it is important to reach these end-users to get a better understanding of their needs and wants.

2.5 COMPETITOR ANALYSIS

To gain greater market insight and find ways of differentiating ourselves, we conducted a competitor analysis. It starts with reviewing six manufacturing competitors producing ADO's. Thereafter, Dormakaba's supply chain is interpreted, whilst also giving early thoughts on our own. Next step included a product comparison from the various companies, where the solution most similar to our own, were investigated. Additionally, an analysis of our strengths, weaknesses, opportunities and threats was analysed. Then ending it with a study of the competitive environment, using Porter's five forces.

2.5.1 Competitors

Below is a brief description of various manufacturing competitors, where we present what they do, their offerings, focus areas, size, etc. The reason for including this information is

to get a sense of how our potential rivals operate.

ASSA ABLOY is the largest global supplier of door opening solutions [ASSA-ABLOY, 2018]. Furthermore, in the fast growing security segment, they have a leading position in fields such as access control, identification technology, entrance automation and hotel security. The companies global expansion has taken place through organic growth and acquisitions. For several years Assa Abloy have focused on increasing its market presence in emerging markets. Their world-leading market presence is based on three strategies, which are exploiting the brand portfolios strength, increase growth in core business and expand into new markets and segments. The product most comparable ADO solution for interior doors are Besam SW150.

DORMAKABA are the second biggest company market for access and security solutions [DORMAKABA, 2018]. Their solutions involve door closers, door automatics, electronic access and data, locking systems, hotel systems and glass fittings. According to Dormakaba they provide reliable access and security solutions to hotels, shops, sports centers, airports, hospitals, at home or in the office with great service. Also, they claim to utilize responsible business practices and environmentally-friendly products for the building industry, customers, partners, legislators and end-users.

GEZE is also one of the four leading developers and manufacturers of systems for doors, windows and safety technology [GEZE, 2018a]. They offer an extensive range of products within door automatics, glass systems, smoke and heat extraction systems, safety technology in addition to window and ventilation technology.

The FAAC Group focuses on all kinds of automation and their vision is to design, build, and market safe and reliable solutions for all pedestrian and vehicle needs [FAAC-Group, 2018]. Hence, their customers include most residential, commercial and industrial segments. They portfolio offer a variety of automatic gates, barriers, bollards, awnings, parking technologies and access controls. The company puts quality and safety highly, claiming one is essential to the other, and claim that both are continuously nourished with research and development.

MBM and MAB although a smaller organization, they offer a world of movement in the form of a comprehensive product range within door, gate and window automation [MBM&MAB, 2018]. They specialize in enterprise-level solutions, to always ensure optimal products and services. The company claim to have Denmark's widest range of window automation, natural ventilation, ABDL, ABV, gate automation, door automation, rubber seals, brush seals, high quality grips, door closers and other quality products.

OLIDE CHINEN TECH is a Chinese manufacturer of automatic doors, engaged in design, production, sales and installation of automatic door systems [Olide-Chinen, 2018]. Their automatic entrance systems are directed at all kinds of buildings, such as offices, shopping malls, hospitals, hotels, restaurants, retail business, etc. We have not been able to find the product on the Scandinavian market, and we assume this is due to it not being sold and is perceived as low quality. Although, in return they offer their products at a significantly reduced priced compared to the other manufacturers.

2.5.2 Supply Chain

As stated in section 1.4.4 a way for companies to make a bigger profit, is to expand upstream or downstream in the supply chain, by doing the operations themselves. Looking at Dormakaba, potentially one of our biggest competitors, we can see that they execute most steps on their own. They have several sales departments, which primarily sells to businesses and governments. When a company has resources to do most actions on their own, it tend to result in cheaper operations and products. An illustration of how we understand their supply chain to work, can be viewed in figure 2.10.

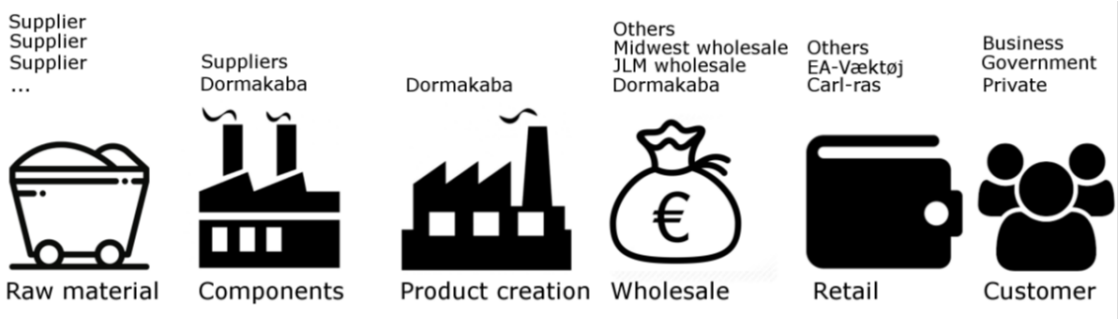

Figure 2.10. Dormakaba supply chain

These factors makes it very hard to compete with Dormakaba, but since the amount of parts we use are quite low, we can hopefully still compete in regards to pricing. Selling the product will be more difficult since we will try to do it ourselves. If we manage to buy motors in such a large quantity that we can get a reduced price, we can think about hiring sales personnel or outside it to a wholesaler. Our current thoughts for the companies supply chain is illustrated in figure 2.11. By selling and installing the products ourselves, the pricing can be significantly reduces, although it requires a well planned business model and validated markets.

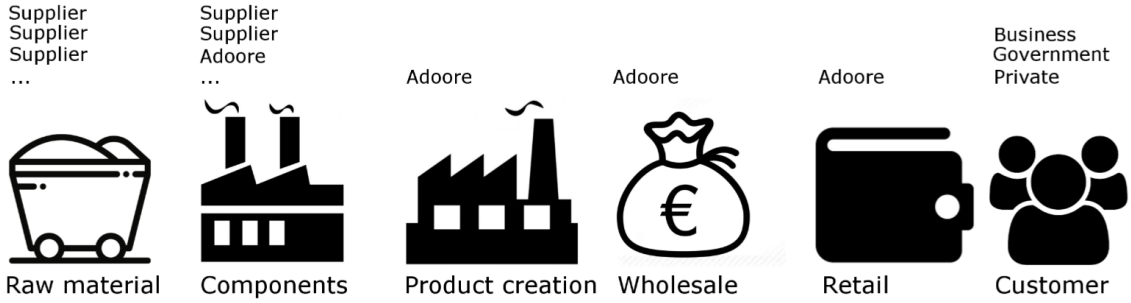

Figure 2.11. Adoore's supply chain

The only components we will produce ourselves are the product's cover, sliding rail and arm. Most of the manufacturing will most likely involve the assembly of *Printed Circuit Boards* (PCB) and the product itself. Other parts such as the motor, PCB pieces, buttons, controllers, will be bought from external suppliers.

2.5.3 Product Comparison

In addition to analyzing what the competitors do and focus on, it is also important to look into their products in more detail to get a better understanding of prices and product specifications. All the solutions exist on a danish website called *hjælpemiddelbasen.dk*, except the Olide product, and is therefore available on the market. In table 2.2 the most relevant device from each competitors is compared. These solutions are the ones most similar to our own concept and the metrics we focus on are: Price, dimensions of the ADO, maximum door weight for operating and max width of the door. In Figure 2.12 a picture of the different door operators are shown.

Figure 2.12. The different ADO's compared [GEZE, 2018b], [Dormakaba, 2018], [MBM, 2018], [Amazon, 2018], [Openers, 2018], [Olide-Chinen, 2018]

Product name	Price (DKK)	Size (mm)	Max. weight (kg)	Max width (mm)
ECturn	10.000	460x100x100	100	1100
SW150	12.000	840x70x148	150	unknown
ED100	10.000	685x70x130	100	1100
950 BM	7.500	530x100x104	150	1400
SL12	12.000	545x120x110	120	1400
Olide	3.000	460x120x200	120	1200

Table 2.2. Comparison of competitors solutions

It can be seen that most products cost about 10 thousand DKK, while the Olide product is worth a lot less. This is most likely not being much used in Denmark, and it has many big flaws, but it shows how cheap it is possible to create it if using Chinese suppliers. The 950 BM product is produced by FAAC, and is probably cheaper because it is a very old (about 15 years) and therefore has old technology and poor operations. In regards to the remaining four devices we assume to be capable of creating a product that is significantly cheaper and more aesthetically pleasing. Additionally, during our research we have yet to find interior doors weighing over 50 kg, thereby making these products unnecessarily powerful, which makes it easier for us to decrease price, power and size. When considering the door width, we should be able to have the maximum width of 1400 mm, because there are cases where interior doors are of this size.

2.5.4 SWOT

Next, we have utilized the SWOT analysis with inspiration from the book "Principles of Marketing" [Phillip Kotler, 2010], but was created by Albert Humphrey, to identify the crucial strengths, weaknesses, opportunities, and threats concerning our startup and the first product. This is carried out to frame our idea, get an overview of our strategic situation and evaluate the different directions we could take.

Strengths

- *Innovative product* - By removing unnecessary components and add wanted features for our specific customer segments, we can build an improved design for the end-users. Our concept also include ease of production, making it effortless to assemble, repair and upgrade.
- *Pricing* - In addition to the innovative product design, we presume the solution can be made with noticeable lower pricing than the competitors.
- *Quantities* - It might be a strength for us to be a startup, and be able to earn money even tough we sell in lower quantities.
- *Niche Market* - Additionally, there is a chance that we will be perceived as more trustworthy, since we are focusing on a specific niche.

Weaknesses

- *Branding* - We have no brand recognition, and it will be difficult to build it.
- *Existing Partnerships* - There already exists partnerships between the municipality and installers, as well amongst installer companies and manufacturers.
- *Early Manufacturing* - The assembly of all devices will be done manually to start with and components will be bought in low quantities, which also increases the cost of materials.
- *Limited Service* - In the beginning, we will have a limited working force, making it difficult to offer reparation services, personal meetings, etc, outside of North Jutland.

Opportunities

- *Governmental Supplier Lists* - The government currently use more resources than necessary on door automatics, much because there is no door operators adapted towards interior doors. It is possible to get our products into their supplier lists, where they commercialize our solution on websites for the mobility impaired.

- *First to Market* - Another essential opportunity is that we can be the first company to offer products that are especially made for interior doors and thereby gain a strong footing in that specific market.
- *Increasing Demand* - On the basis of earlier interactions and during the market research we have found that there is an increasing demand within this segment in the ADO market.

Threats

- *Competition* - The competitors are big established companies that can easily decide to build a similar product to ours if it is not protected, or lower their earlier price. Hopefully, the niche market is to small for them to be worth intruding.
- *Government* - The governmental processes often take a lot of time and require a lot of patience that we might not have time for.
- *Suppliers* - If our chosen supplier understand that they have the upper hand, they can easily raise prices, which would end up with us struggling to find similar ones.

2.5.5 Porter's Five Forces

Porter's five forces [Porter, 1980] was also used, which focus on environmental forces that will impact our startups competitive capabilities in the ADO market. Where we analyzed the principal competitive pressures in the market and assess how strong and important each one is. The five forces include threat of new entrance, buyer power, threat of substitution, supplier power and competitive rivalry. Furthermore, our result is narrowed down to the Danish market, with the focus on mobility impaired individuals.

Threat of new entrance - Low/Medium:

On the basis of our discoveries and own experience, it requires a lot of knowledge to intrude this market, as it involve governmental efforts, contractors and installers that depends on relationships. There already exist contracts between municipalities, contractors and installer companies in Denmark, and new entrance will have to win them over. Furthermore, every actor besides private users are mostly concerned with price and functionality, although governmental efforts pay some attention to user experience. It is possible to sell directly to private consumers, but this is not done very often because current solution have high prices. Additionally, there are many concerns within laws and regulations such as safety standards and building requirements. One example is the safety factor for amount of force to open the door. Moreover, current products tend to be nearly identical, but if having an unique idea the possibilities of being copied by established companies can be high, depending on the size of ones target market. These businesses have built strong trustworthy brands, which can be difficult to compete with, it has therefore become very common with mergers and acquisitions. To conclude, the threat of new entrance is quite low if one chose to compete over bigger segments, but regarding the smaller ones concerning both geographic location and users, we are unsure if it is financially beneficial for them. Hence, we qualify the threat of new entrance as low to medium.

Buyer Power - Medium:

In this market the volume of current products depends on end-user demand, building prospect and renovation project requests. The buyer, for a manufacturer are various installation companies, which function as retailers, who further sell to businesses, government and private users. Most likely the prices are more flexible when selling multiple products, as the installers have to win vendors, which focus on getting the cheapest price possible. These projects are often controlled and influenced by government and/or contractors, thereby increasing their power when buying from retailers. On the other hand, when businesses buy from manufacturers there are many companies to consider, and each installer company wants the best deal possible. Then again, there are a numerous amounts of these firms and they can acquire partnerships with more than one manufacturer. The logical conclusion here is that they buy products that will easily sell, and therefore it also depends on what other influencers prefer. If a product is appreciated and wanted, the power can quickly turn. Additionally, there are other retailer websites, such as governmental and handicap ones for assistance devices. However, as mentioned they have partnerships with installers. On the basis of these factors we will describe the installer companies buying power as medium.

Threat of Substitution - High:

There are several available alternatives on the market, but the big four (Assa Abloy, Boon Edam, Dorma+Kaba Holdings, Geze) own most of the shares, and the products all tend to be very similar. In addition, there are many other inferior vendors. We have found that it is possible to bring something new to the market in many ways, for example within aesthetics, lower pricing and application control. Also, the products perform an easy task, but are still often overly powered, lacking relevant user friendly features and are not following the newest smart-technology trends. In brief, we have found multiple ways of improving todays solutions, but the difficult task is again not to be copied by established businesses. As a result of these factors we consider the threat of substitution to be high.

Supplier Power - Medium:

Emphasis regarding supplier power is that the bigger companies create most of their own supplies spread in multiple countries, and there are no extraordinary materials or electrical components included in the products. It seems easy to get suppliers for all components both from Europe and China, except when it comes to the motors. If a new entrant do not have the financial capacity to build their own motors, the upcoming supplier will have a high amount of power. Moreover, the motor is definitely the most costly component, and the supplier power is therefore split between low and high, which is why we interprets it as medium.

Competitive Rivalry - High:

As already described, there are multiple established businesses in the ADO market, hereby also existing rivalry between them. It can be difficult to become profitable as a new entrant in these environments, and we assume one should either differentiate the business or have a strong financial foundation. That aside, the ADO market is increasing greatly, which could make it easier to enter via smaller segments. Our focuses covers a very small part

of the industry, while other companies are most likely fighting over bigger segments. Still, they are powerful and always looking to expand their market share.

2.5.6 Reflection of Section

When looking at the other companies, one can see that all of them offer a wide range of products within security and access solutions. A big uncertainty for our venture is how to start off only having one product, and how to eventually develop the portfolio. Another crucial factor is how to sell, as we see it there are four alternatives. They include selling directly to private customers, sell to these end-users via government granting, partnering up with installer companies or directly compete for vendors. This represents two opportunities for us as a business, either just being a manufacturer or additionally sell the products ourselves. In brief, the optimal operation is to do both, because then we can earn more on each product and cut a joint in the supply chain. However, the big question concerns if this is possible. If none of these alternatives shows potential there is also a last opportunity, which is exit-strategies, where we sell the business/concept or enter into a merger or acquisition. Furthermore, by comparing the physical products we have further validated that current solutions are overly powered, expensive, large in size, but also often include old technology. Again it is shown that there are potential for improvements. Next, the competitive environment brings up further uncertainties where the most crucial ones involve being copied and become out competed by larger establishments, not achieving partnerships with relevant actors or being extorted by motor suppliers. Hopefully, it is possible for us start out by focusing on our strengths and sell innovative solutions in lower quantities for a niche market, without being bothered. Hereafter we will have greater chances for upscaling the business geographically, develop a larger product portfolio and connect with further segments.

2.6 INTERACTIONS

As earlier mentioned, we needed to acquire more validation on potential customers, and thereby evaluate which target to fully concentrate on. Numerous interactions with relevant actors has been conducted, and those we consider as most important can be read in this section. It sums up the conversations we have had with two separate governmental projects and with the leader of *Danish Handicap Association* (DHA) in Aalborg. Additionally, prior discoveries and validation from last project [Hansen, 2017] will be taken into consideration in the reflection.

2.6.1 School Toilets of the Future

Meeting One, Expectations

Before the semester started, we planned to partner up with the "Future of School Toilets" project. Therefore we had a meeting with Bo Christensen from Life Science Innovation and Carsten Christensen from Vesthimmerland Municipality, discussing the expectations we have from each other during the next couple of months. For our own sake, our group decided that we have to make sure that something positive comes out of cooperation, as described in the effectuation methodology.

Their expectations of us:

- Complete touchless system
- Connection between sensor and lock
- Manual solution available, in case of emergency
- A prototype as soon as possible
- A time schedule for the coming months
- A budget of product development

Our expectations of "Future of School toilets":

- Funding for product development
- Access to users and a facility for our testing phase
- Access to a larger network (knowledge sharing and collaborators)
- Data from their previous projects
- A non-disclosure contract
- A tour of Toppedal elementary school, with a presentation of the current prototype
- A workshop with several relevant companies and actors involved in the project

According to them, the project will be fully implemented at Toppedal elementary school in August or September 2018, and they are working on getting other schools to get on board with their project. Additionally, it is an EU-project, so they have dialog with other countries such as Norway, Sweden, Poland and more. This shows that if successful the scope could potentially include numerous products sold. Regarding their cooperators, many companies are involved in the proposal, amongst them are SWEdoors, Nordjysk låseteknikk, Bunker43 and more. Bo Christensen recommend early on that we should expand our portfolio, in case their projects takes longer than expected and other opportunities arise. Regarding our requirements, they hoped to make them all happen, but that there were limited resources regarding the funding. Finally, their most important factors and expectations regarding our product was low price, better aesthetics and a full system working as one.

Meeting Two, Visit

Our group had a second meeting with both Christensen's, at Toppedal elementary school. In addition, Kristian Maul were brought in on the meeting, who is the director of a company called Bunker 43. Together they presented the current state of the "future school toilets" project and the concepts involved in it, such as automatic toilet flushing, a video and sound system controlling the washing of hands and so on. The school toilets at Toppedal function as a working prototype, it has been operative since October 2017 and it is the only place this concept is installed. They hope to additionally add the "touchless door" concept to the complete solution, and eventually implement the whole approach to more schools across the country. In addition, the project are planning to design 25 toilets in a similar manner for students in 4-10 grade, were both boys and girls are to use the toilets.

At this location a slide door operator was utilized for accessing the toilets, which cost about 20 000 DKK. In most cases to come, there are already swing doors being used for entering, and a lot of money can be saved applying ADO's for these doors instead of refurbishing the wall. Furthermore, they mentioned that the touchless doors should have a

backup solution in situations where the device will not operate. Another relevant subject they had, is that the traffic in and out of school bathrooms are quite high, and how we can secure good durability standard. Moreover, Bunker 43 specialize in internet security, and could possibly help us with it at some point. Kristian Maul explained that they also collect data from all their sensors in the concept, which have countless possibilities, it could for example somehow measure sickness regarding length of bathroom visit and so on. He also gave us some tips regarding which suppliers to use, and recommended to use an European one, so that components bought have greater quality and the business providing them are trustworthy. In addition, he already have a network within hospitals and nursing homes that he offered to share with us, giving us the opportunity to perform tests and gain validation from a new potential segment. Lastly, we were recommended to get our prototype out in actions as soon as possible, so that we can promote the product and gain new experiences.

Figure 2.13. Sensor on Toppendal skolens sliding door to the toilet

Figure 2.14. Entrance door to the individual toilets at Toppendal Skolen

Figure 2.15. Smart touchless handwashing system at Toppendal Skolen

2.6.2 Nursing Homes of the future

Meeting One: Business

We also reconnected with an earlier acquaintance, which is Lars Nøhr, the leader of a governmental project called "The Nursing Home of The Future" and his colleague Bent Sørensen. Although this time, our group was hoping for a cooperation, and planned to show how far in the process our venture has come and how we can potentially revolutionize door opening at nursing homes.

Inside the *The Nursing Home of The Future* apartments they usually utilize sliding doors, because it creates more space in the apartment, and this argument is enough for them to pay almost twice as much. The reason is that there are many disadvantages of having a swing door in small apartment. It causes problems with the staff when dealing with patients and certain situations. This made them quite skeptical about the market for interior doors in nursing homes to begin with, because swing door operators are most commonly used for exterior. However, after discussing for a while we figured out that the exterior doors enters a corridor and are thereby in theory interior doors. In addition, the doors are only about 30-40 kilos heavy, which makes them a perfect match to our concept. Hereafter they got very interested, and demonstrated that it also could be possible to install the ADO's inside the wall, in addition to recommending us speak to LT automation about this. Lars Nøhr also explained that they was supposed to have ADO's on the exterior doors on their current apartments, but failed to do so because todays devices were too expensive. As a result of this, the most important factors they wanted from our product concerned price and functionality. Moreover, Sørensen pointed out that all new nursing homes are built so that people can live there for the rest of their life, and get help if becoming very disabled or senile. He also offered to explore how to grant an ADO, and get in touch with the right people at the governments building institute, which are the ones setting up rules and guidelines for these apartments. Lastly, in short, we were offered a tour at the "Future

nursing home" in Aalborg city, and possibly a chance of installing and testing out our product at one of the apartments.

Figure 2.16. Nursing home meeting

Meeting Two: Visit

For the second meeting we went to *The Nursing Home of The Future located* at Carl Klitgaards Vej 5, 9400 Nørresundby. Here we got a tour of the facility and some insight into how it is designed, what considerations they made when designing the apartments and we got to meet some of the residents and potential end-users. Based on conversations with them, we gained more insight into some of the struggles that they face, both with and without ADO's.

Looking at the design of the apartments an immediate problem was discovered. For example, the use of sliding doors was well documented, and we can see that using swing doors instead would not be an option. But the entrance door was well suited for out solution and one resident already had an existing ADO installed. Furthermore, the apartment design was made so that it is easier for the residents to navigate, especially for disabled individuals. By this we mean that the number of surfaces applicable for activation buttons were limited and would require lengthy connections from the button to the device. An example of the entrance can be seen in figure 2.17.

Figure 2.17. Design of entrance and first room for nursing home apartments [Fremtidens Plejehjem, 2018a]

We also learned from that earlier decisions about not installing ADO's had been reconsidered. The initial reason for not implementing them was the price and that the apartment designs were suppose to resemble a natural home. Furthermore, they had already started to implement solutions helping residents who are struggling to reach certain buttons, by installing new ones. These solutions were now placed in a height more suitable wheelchair users. Lars Nøhr also admitted that if he could go back in time, he would have implemented ADO's in the apartments.

The most important information came through interactions with two of the residents. First we talked to a wheelchair user that had previous experience with ADO's, which was approved for her old apartment. We noticed that the lady had created a homemade solution for opening her door as seen in figure 2.18. According to her, this type of solution is not uncommon to see since its cheap and improves the opening process. It was further explained that due to her condition it was very hard to open the door, and this solution gave her more options when doing so.

Figure 2.18. Homemade solution for opening an entrance door to an apartment

Figure 2.19. GEZE product installed for one of the apartments.

She also provided us with validation to a problem we had already assumed current ADO solutions could have. It was explained that this individuals device got worse over time, as a result of non-disabled people treating the door as regular ones, pushing it open instead of using the button. This creates stress to the ADO and can end up ruining the mechanism. In addition, a button had to be used for opening the door, which was difficulty at times. However, the ADO had been essential and an enhancement to this persons everyday life. Furthermore, she has agreed to become a test user and try out our solution in her apartment, although we had to make it accessible for her.

Another resident we talked with were also restricted to a wheel chair, and already acquired an ADO from GEZE, which is shown in Figure 2.19. She was very pleased to have one, but

the current solution had many issues according to herself. Firstly, the amount of time it stayed open varied depending on which button was pressed. If she pushed it whilst being outside the apartment it would stay open for about 3-5 seconds, whereas if she opened it from the inside it would stay open for 25 seconds. Additionally, she expressed that both time intervals was not optimal for her and that she would like to have something in-between. However, to change this they would have to call a technician, which is expensive. Secondly, the ADO had another problem, if put on step 2 it would malfunction and get stuck in the middle of the opening sequence. Fortunately, this could be reset by unplugging the device. She was also dissatisfied that the only options she had with the door, was to keep it closed due to the ADO. Furthermore, the woman also expressed that sometimes it would be nice if they could leave the door open to improve the social aspects of the nursing home. When asked about her controller, she expressed that it was a bit annoying that she had to carry it around all the time, but it was not a big problem. When suggested that it could be done from a smart phone she stated that it would be preferable. Overall, she was happy with her solution since it solved her problems with getting in and out of the apartment, but aside from that she did not have any positive things to say about the ADO.

2.6.3 Residental

Danish Handicap Association

In an earlier phase of this project, we had a meeting with Peter Klitgaard, head of DHA in Aalborg. Our group decided to meet with him again, to show him the progress we have made with our prototype and to get some help regarding getting people for user tests. The conversation took place in one of the associations social locations, therefor several people came over and showed interest during meeting.

Through peter we discovered new aspects of the venture that we need to think about when moving forward. One of them is that we need to consider that elderly has a tendency to push the door until it moves, even though it is automatic. He also said it might be smart to get a device number at the Danish aid base, which is a website many people visit to see which products are available. Another factor to be aware of are situations where disabled people use the toilet and get help from assistant. They often request the helper to stand outside, in many cases hereafter the ADO takes a while to close, and it ends up with the person being exposed while using the toilet. Peter Klitgaard also came up with an idea to add to our product, which was to install smoke alarms into the solution. Additionally, according to him, in larger building projects, the government put out tenders for companies to bid on, and through this, companies sell their products. The process of making such a bid or tender is very complicated and requires a lot of paperwork. Peter also thought that the people in most need of our product are probably individuals in electronic wheelchairs, since they are the ones who are having most trouble opening doors by themselves. Another discovery, was that people like Peter, who still have some motor function, prefer to be independent from technology. Klitgaard explained that he would not like a our solution in his home for this reason. Next, we were told that there are stores with the sole purpose of selling products for disabled people, such as Actiumplus and Senior Shoppen. In addition, Peter offered to help with getting people for user testing, through

one of many facebook groups for people with a disabilities that he administrate. We have also recognized that he is very designed minded and suggested that the best solution for the sliding rail, would be to have it on top of the door so it's not too visible.

Figure 2.20. Meeting with Peter from the Danish Handicap Association

2.6.4 Reflection of Section

To sum up our thoughts regarding the governmental school project, they did not fulfill the expectations we had from them. After the second meeting there has been limited contact, which is also our fault as we realized that the project moves slow and was unlikely to be a success in the next few years. Furthermore, our technical team wasted some time to developing the touchless activation system, but we have now learned to get higher rewards in return before developing anything. However, some benefits came with the cooperation, we got contact information and the possibility of meeting potential partners like Bunker43 and Swedoors. At some point in time it might be relevant to get help from Bunker43 with IoT and data development, while Swedoors could be a potential partner for creating a solution where the door has a device on the inside.

Regarding our conversations with the *The Nursing Home of The Future*, we quickly got something in return, which was a test user. This experiment has potential to become a good commercialization for our company both through word of mouth amongst the residents and relevant people visiting the nursing home. Additionally, it might give us much needed feedback and validation regarding our prototype. Another essential point was seeing some of the residents struggling with current solutions and creating homemade ones. In addition, they confirmed some of our earlier assumptions, such as the current devices being worn out, having varying behavior, poor activation solutions and the residents explaining features they would like that we had already created. However, some uncertainties we have concerning this cooperation are based on the previous one that went poorly. Are door operators some of their top priority? Also, we assume few nursing homes have the same financial resources as this one. Will facilities with less economic strength even consider our solutions?

During the talk we had with Peter Klitgaard, it was again clarified that there are problems with current solutions manual operation and that they get worn out. As this problem keeps coming up, it will become more prioritized when creating the prototypes. Another interesting point was to sell through social aid websites and stores, which would put us directly in contact with the target group. Additionally, Klitgaard pointed out opportunities within winning vendors from contractors, which is another customer we must highly consider. Furthermore, time after time people request the regulations of speed, door angle, opening time and the possibility to keep the door open. We view these features to bring something extra, and it is positive that we can already show that we are able to do it through a phone. Lastly, we started planning a call to action strategy using his network, as he offered to help us out.

PRODUCT DEVELOPMENT 3

This phase displays a summary of the product development process, how we plan to gradually legalize it and our actions during an alpha testing phase. Firstly, our research regarding how to legalize this project is shown and discussed. It examines freedom to operate, certification and industry standards. Then, the process is summarized from building a testing platform to the final version of the prototype, which is supposed to be utilized for user-testing. Lastly, the operational testing phase is briefly explained, showing our experience trying to fulfill the industry standards and developing a product.

3.1 LEGALIZING PRODUCT

3.1.1 Freedom to Operate

Freedom to operate (FTO) is to establish whether a distinct action, for example commercializing or testing a product, is possible to perform without breaching valid intellectual property (IP) rights of other companies or people [Bios, 2018]. These rights are different to various jurisdictions, and a FTO analysis should empathize on the specific countries we want to operate. If we at one point of time reveal a patent application or patent similar to our concept, the companies chance of FTO practice is not necessarily ruined. The reason is that there are a range of cases where existing patent can be available to use [Bios, 2018], such as:

- In some cases, a patent application might not cover the countries where another company would like to apply for FTO.
- Next, it is possible that the application have not been granted in various countries, because the laws regarding what is patentable differ depending on the nation.
- Another situation is that the patentee has not payed the standard fees in time, and thereby it stops counting.
- Furthermore, patents can expire, although some countries have exemptions for particular activities.
- Lastly, when patents are issued in various countries, there might be differences in the scope of their claims. It is therefor crucial to look at these.

There are also circumstances where the claims in a patent are invalid. Prior art is one of them, it is when there exists a publication or a public presentation about the matter before being granted the patent, which happens quite often. Additionally, it is possible to get FTO for valid IP rights by negotiating with the owner and thereby obtain a license of them. Although, this does not give a company the rights to any other IP's, and there might be many valid patents including the actions it wants to follow. Therefor being granted with FTO can require a lot of resources, when obtaining several licenses from different parties.

3.1.2 Certification

There exists a massive amount of certification, which are applied to the products we connect with on a daily basis. They are implemented to ensure that manufacturers and suppliers follow governmental regulations, and to establish safety for future customers. As a result of these regulations and norms, all actors have certain expectations from each other, when buying or importing products. In regards to this project, the area of CE-marking and European norms are explored.

CE-marking

The use of CE-marking(*Conformité Européenne*) was first introduced in 1985, to protect the European market from risky and destructive products. Hence, many regulations were made, which all new products had to comply with before launching them. All regulations are gathered, simplified and presented in *European Norms(EN)* and if a product fulfill these terms, it is one step closer to a CE-mark. This mark illustrates that the specific company assure that their device satisfy the standard procedure. Furthermore, there are six stages to follow in order to achieve CE-marking stated by the Danish Standards [DanskStandard, 2018].

1. Firstly, establish if the new product actually need CE-marking.

2. Figure out if the product complies with necessary regulations. Where the *European Norms(EN)* can be utilized, as it is a simplified version of the regulations and thereby easier to understand.

3. Usually, the company itself can document whether a new product comply with the rules, and use the CE-mark. Although, for products evaluated as higher risk, professional assistance must be utilize during the procedure.

4. Some products require specific types of testing, to ensure its certification. Proving that the product does not only comply with these rules in theory, but also physically.

5. All the documentation proving that the product satisfy all given regulations, are to be placed in a physical *Technical File*. Hereafter, the company can always prove that the product comply with EU-norms and regulations.

6. Lastly, the company are to sign a *conformity assessment*, which legally allows the use of CE-markings on products.

As mentioned, to CE-mark a product, the required documentation must be physically available in a Technical File. In our case, when creating a new product within the category of machinery, this file must consist of further crucial elements. These elements are briefly described underneath.

- Conformity assessment, including company data, machine description and a list of applicable directives and norms.
- Technical description, consisting of circuit diagrams, drawings, invoice of materials and photos.
- A Photo of the *rating plate* located on the product, showing specifications, serial number and the actual CE-mark, see Figure 3.1.
- Details regarding design calculations, which illustrate compliance with regulations and norms, if needed.
- Documentation of executed tests, if required.
- A Copy of the user- and mounting manual.
- Sheet presenting risk assessments for the product.

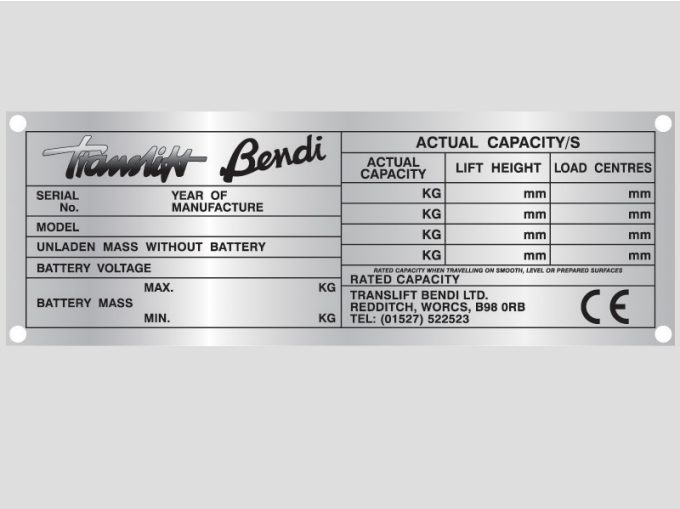

Figure 3.1. Example of a rating plate with the CE mark. [Nameplates365, 2018]

3.1.3 Industry Standards

Essentially, standards are a confirmed way of doing something. They cover a vast range of actions preformed by organizations and their customers. It can concern creating products, managing processes, delivering a service or supplying materials. Furthermore, standards cover all sorts of subjects, and they can be quite detailed, such as to a distinct type of product, or general such as management practices. A standards objective is to provide a dependable basis for people to share the same expectations about a product or service. Below is a short list of what standards help with [bsigroup, 2018].

- Facilitating trade.
- Providing a framework for achieving economies, efficiencies and interoperability.
- Enhancing consumer protection and confidence.

EN 16005 - Power Operated Pedestrian Door Sets

For our project, we started exploring which standards to fulfill in order to sell and produce ADO's. Eventually, the European Standard EN 16005 was found, which is called power operated pedestrian door sets. Requirements, regulations and testing methods ensuring product safety for swing door operators are included, which fits perfectly to our product. Additionally, following this standard will fulfill all CE-marking demands, giving a company the right to apply it onto their product. Furthermore, the standard involve ADO's utilized for both normal access and escape routes. In addition, it considers all serious risky situations and potential accidents related to these devices. Moreover, it also covers conditions of misuse, because these actions often occur sooner or later. One checkpoint the EN 16005 does not take into account, are wireless operations of the devices, which mean an additional standard regarding this field should be included in our product. Additionally, noise requirements are not considered, as it is not an important risk. Along with the device, an instruction handbook should be provided, which include information about installation, operation, maintenance, inspection and user instruction.

3.1.4 Reflection of Section

In the early phase of this project, we thought the only way to start a business with hardware products was having a patent on the devices. Nevertheless, we found other ways around it and presented them in this section, instead of potentially spend hundreds of thousands DKK and waste up to several years before launching. Our discoveries show that if obtain a FTO, in addition to meet the EN 16005 standard, we could legally sell our products and put a CE-mark on them. However, this standard does not include noise and some other factors, but it fits to what are required within our target segments. Perhaps we should look into more standards gradually as we develop and sell the devices. Furthermore, regarding the FTO, our team has very little experience within this aspect of business creation. We started doing a search for patents that could interfere with our design, where we still have not found any directly similar patents. However, we acknowledge that the startup should hire a lawyer to fully investigate the case at some point, to avoid potential lawsuits after launching. To sum up, this process is quite time demanding and frustrating, while also being extremely important, considering that no one should develop a product that is not possible to sell in the aftermath. We have now gotten a great starting point and an understanding of how to legalize our products before launching.

3.2 PROCESS

This section presents a summary of the product development process, where we built three prototype versions with several iterations, as described in section 1.1.2, where each one solve identified problems. Our startup's technical team concentrated on the engineering, while we analysed earlier discoveries, data and provided new feedback through interactions and research in chapter 2, thereby involving the whole team in the development process. Moreover, the focal points of the prototypes will be functionality and price, because we know this is the most crucial aspects before eventually moving on to user-testing. Furthermore, the process has been conducted by our startups technical team. Therefore, parts of this chapter is referable to their report [David Lampe and Schjoldager, 2018].

3.2.1 Testing Platform

For us to build accurate and authentic tests for the prototypes, a platform similar to a realistic door had to be made. Furthermore, to make it this way, the stand had to be solid and durable. We ended up with the result in Figure 3.2 and 3.3, which has standard door dimensions and weigh about 45 Kg. Whereas, it presented close to the maximum range for interior doors. It ended up fulfilling the robust standard we hoped for during the testing period, besides having to tighten the hinges a couple of times for more stability. We also had to implement an electric door lock and connect it to the ADO.

Figure 3.2. Front of our home made door setup

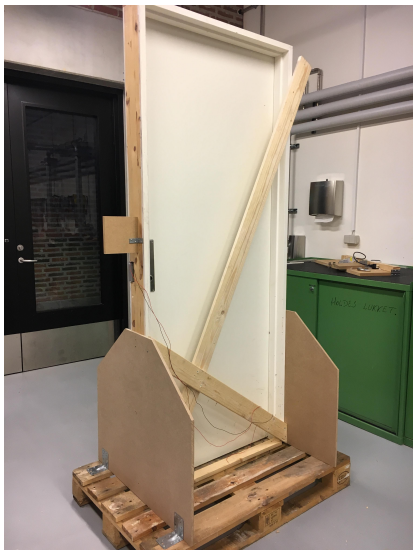

Figure 3.3. Back of our home made door setup

Before we built the testing platform we went out researching how much interior doors usually weigh and their standard dimensions, as well as looking into various possibilities of mobile door setups. This was done so that we could test close to maximum capacity, which would demonstrate our ADO's capacities.

3.2.2 First Version

On the basis of prior MVP's that can be seen in Appendix A, the very first prototype was constructed. It uses the same motor and Arduino-based micro-controller, but with several new additions, and was installed onto the testing platform. Furthermore, the new implementations were a sliding rail with an arm, a door lock connect to the motor, a power supply based on the motors current, an early design of an encoder system for adjusting the doors opening angle, as well as a new activation design for opening the door. Additionally, for us to apply the ADO to our new set up, a basic baseplate with cover was created, with early *Design For Manufacturing and Assembly* (DFMA) designs, to ease the production, installation and to hide the components. Figure 3.4 and 3.5 shows the first version with and without cover. The full cost of the creation ended up being 1065 DKK, but it would be a bit more costly considering the help provided by AAU when producing the sliding rail and arm.

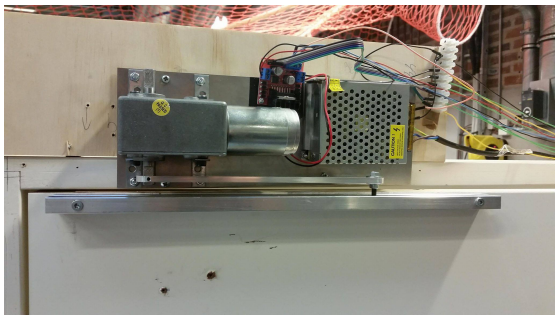

Figure 3.4. Insides of first version.

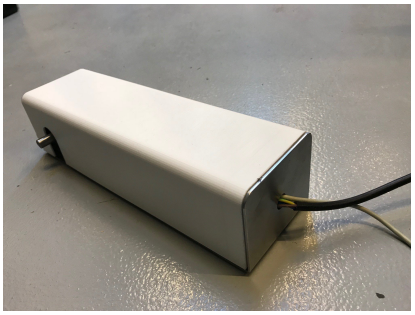

Figure 3.5. First version with cover.

At this point in time, the focal point was to partner up with a governmental school project, and provide them with a cheaper, functional and new touchless activation method device for their toilets as described in section 2.3.2. Therefore, we payed much attention to their feedback in this phase, while the other features and attributes where based on earlier findings from last semester [Hansen, 2017].

3.2.3 Second Version

In brief, the first prototype version provided vital information concerning both good and bad elements at that current state. It should be noted that this was an early version used for funding presentations, and that most components were in need of enhancements in reliability and function, which is why improvements for version two focused on this. In addition, we started to explore more suitable motors for our case, as it was missing a feature for manual opening and had great potential to be decreased in size. Also, there were actions made towards creating a printed circuit board (PCB), which could significantly minify the electrical components. Finally, another focal point was to further develop the DFMA design principles, for increasing assembly efficiency of the product.

Early module designs for the components were implemented, through snap-fits, which are easy to assemble both manually and automatically. This also gives us opportunities for creating a larger product portfolio or a customization service by changing the modules. Furthermore, collision prevention, speed regulations, smoother opening operation and enhancements in liability of earlier features were added to the device. Partly because we bought a PCB, where all earlier electrical components became decreased in size with improved function. The Arduino-based micro-controller was still controlling the motor and its features, but now through the PCB. Additionally, we utilized a new motor with improved features for manual opening and smaller size, but unfortunately the gearing was to weak. Lastly, a new cover with the company logo was added. In Figures 3.6 and 3.7 shows the outcome of the second version.

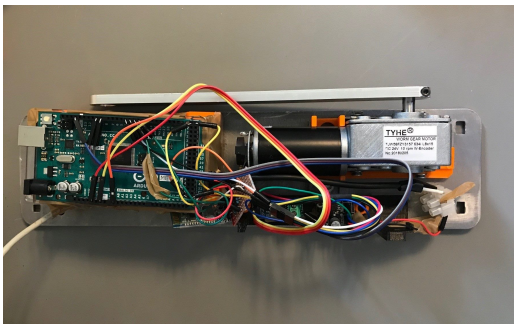

Figure 3.6. Insides of second version.

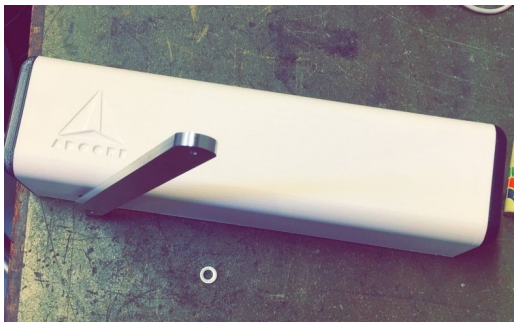

Figure 3.7. Second version with cover.

When starting version two, we had already pivoted away from school toilets towards nursing homes and private consumers. Since then, there has been a good dialog between us and a new project called "The Nursing Home of the Future", further info can be viewed in section 2.3.1 and 2.6.2. Based on these interactions, it was again established that we should mostly focus on functionality and price, not getting too experimental with additional functions. Then again, there has been some complications in regards to our and the technical team's school reports, where it is important for their grade to include some advanced technology. Furthermore, throughout the process we have also attempted to get a wider network within the private users for more validation and feedback from the actual end-users, through CTA strategies and interactions. This process is explained in 4.2.

3.2.4 Final Version

During the two versions, the ADO has shown to operate the functionalities we have evaluated as needed, such as the opening and closing of a door with numerous different activation methods. Furthermore, we have gradually involved more advanced sensors and components for additional safety, features and user experience. However, for us to obtain a CE-mark on the devices, a EN 16005 standard presented in the previous section has to be met. Also, there must be a functional manual operation in case of malfunctions according to the same standard.

In short, we bought a new DC motor, that operates manually and is satisfactory to the standard and our discovered specification. In addition, a collision control feature was now made to be fully functional, regulation settings improved because of the new motor elements and a push-and-go function was added. These factors hereafter made us consider the device as safe to use. Moreover, a new baseplate was developed, providing the structure with greater strength and an even easier assembly design. Also, we had to make a new cover to suit the baseplate, which looks quite similar to the prior one. Hence, the final version can be observed in Figures 3.8 and 3.9. Furthermore, an android application was completed and can be seen in Figure 3.10, it connects to the device via bluetooth, where you can operate the door. It is possible to regulate speed, opening angle and time, in addition to keeping the door in an open position, until you choose to close it again. As already mentioned, it is also possible to use other activation methods such as buttons, switches, touch-less sensors and remote controls.

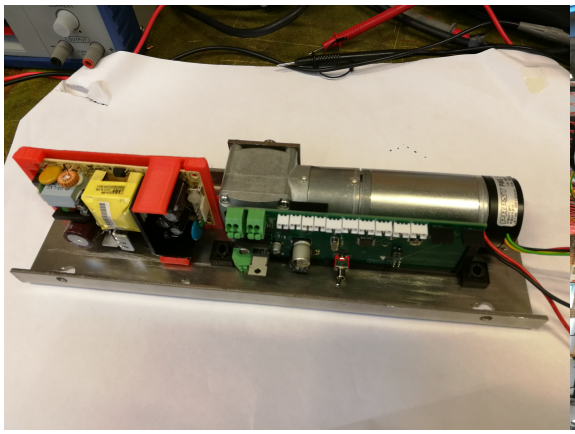

Figure 3.8. Insides of final version.

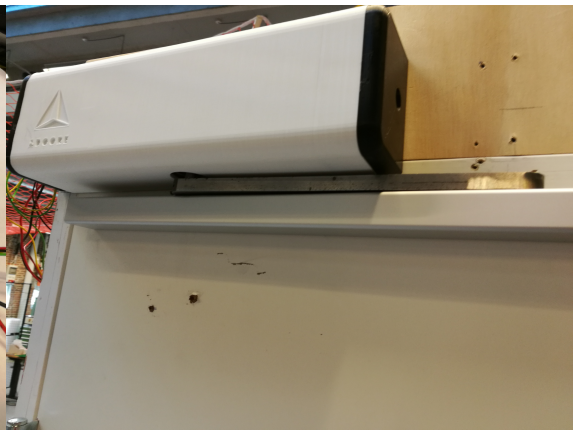

Figure 3.9. Final version with cover.

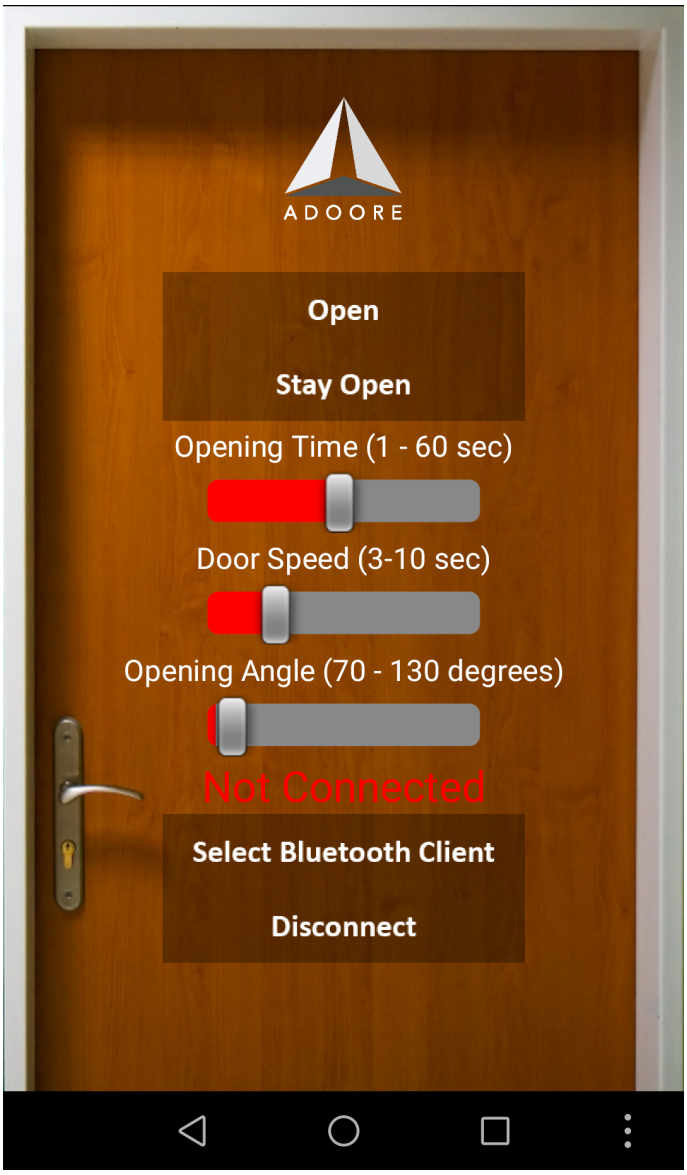

Figure 3.10. Adoore application.

In regards to the different features, they are based on earlier discoveries from surveys and interactions with the end-users, which can be viewed in the report prior to this one [Hansen, 2017]. Firstly, the different regulation settings were mentioned by numerous people as a wanted feature, they complained about their ADO being too fast or slow, it staying in the open position for a short time and not being able to change the opening angle. Additionally, a many criticized the manual operation, that the door became heavy and that the device eventually was ruined by wear and tear. Next, there is the push-and-go feature, which is existing in some of the current devices, we found that people were pleased with it and therefore added it to our solution. However, there are also several features that is a must concerning the standard and European norms for users and facilities. Collision control is one of them, so that people or other living things get hurt by the ADO. There were also other factors that was important to cover, such as maximum speed, but this will be further explained in the next section.

3.2.5 Reflection of Section

As the final version was finished, the last step will consist of making the product legal and safe for us to perform user tests with. As we have created multiple versions of the product, the tests in section 3.3 have been performed along the way. This development process has not followed the lean startup BML theory fully, since these type of devices (ADO) already exists and people know how they operate. All steps have been followed except testing on relevant actors. Moreover, we have chosen to focus on gaining the same functionality, at a much lower price, with additional features and user friendliness. At a later stage in the startup venture, during the devices aesthetic designing, it will be more important to get inputs and fully follow the methodology. However, we have created the product a lot smaller, which facilitates for a better aesthetic look, as the optimal visuals would be to make it invisible. Furthermore, the DFMA principles simplify the assembly of the product and gives us customizable opportunities later in the course of our business. This could perhaps help us to offer products with different prizing, features and suitable for various situations. Also, with regards to our feedback, there are different opinions about the mobile application. Most people like the opportunity of regulation settings, but many would not like to operate the door with it, which is why we also would like to offer different activation methods.

3.3 ALPHA TESTING

In our case the alpha testing phase considers the evaluation of product quality and ensuring that the device is ready for Beta testing. In this stage the product was nearly completed, but still lacked further customer validation and other possible discoveries which beta testing can provide. This section explains the tests conducted throughout the development process, where our focus is directed towards making the product work functionally and see if it is legal to start selling it.

3.3.1 Pre-Testing

Required Torque

To create this product we had to find the required torque for opening a door. Earlier we found a scientific paper named *Design of the force measuring system for the hinged door* [Wang and Wu, 2015] and have used this as the only validation. To further validate the torque we conducted our own experiment, to make sure that the most appropriate motor was selected. Moving away from excessive dimensions, power and costs was some of the early factors leading us to start this venture, and it is therefore important not to buy these types of components.

After the experiment was performed, the results showed an apparent difference, which might been because of two separate testing platforms and measuring equipment. Our results showed that a much lower torque was needed for opening, which got us the reconsider which motors to use. However, our experiment had less resources and a weaker testing platform, so our conclusion is that it might be a bit less than the mentioned scientific paper.

Arrangement

Next, we had to test if our former motor, sliding rail, arm, door lock and testing platform was functionally complementary for further use. Power was put directly into the motor and door lock to see if it opened and closed in a satisfying way. The results were very good, as the motor had no problem with the operation, and the rest of the construction was strong and reliable.

Functionality of Components and Features

Hereafter numerous tests and several implementation attempts were performed during the iterations for each version. Below is a list of them all, where some parts of the development process will be repeated:

- Control of motor direction.
- Implementation of an ideal power supply.
- Selection of baseplate material and design.
- Development of activation methods.
- Test of rotary encoders, to increase the movement accuracy.
- Utilization of Arduino, for controlling the device.
- 3D printing of cover.
- Designing modules for each components.
- Collision Control experimentation.
- Development of Bluetooth and Wi-Fi features.
- Regulation of speed, angle and time in open position.
- Early durability setup.

3.3.2 Validation of Certification

In section 3.1.2, the field of CE-marking and European Norms was explored. We created a technical file consisting of all the needed information, which can be seen in Appendix B.

It includes conformity assessment, technical description, rating plate, design calculations, documentations of compliance with standard EN 16005, user and mounting manual, as well as risk assessment. To be in compliance with the standard, we also performed relevant tests according to it. This concerned the amount of force to open manually, in addition to collision control force, where both was passed with excellent margins. In regards to durability, the EN standard does not require any tests for low-energy swing door operators. However the American version, A156.19, require at least 300 000 testing cycles [ANSI/BHMA, 2013]. We will execute this test in early June, when there is time.

3.3.3 Reflection of Section

Throughout the process we found critical and severe issues that needed to be solved. Features and components were changed or added as a result of the tests. Furthermore, we have thoroughly evaluated our product to fulfil the EN standard, CE-mark and is now legal to sell. However, there is still a possibility that our solution is copied or our company is sued by other patent holders. Nevertheless, we acknowledge the final version of the prototype to be more than ready for beta testing.

GO-TO-MARKET 4

In this phase we explore different methods of marketing to figure out our go-to-market strategy. We discuss how others have used Beta testing as a possible method for generating additional marketing material and how it could be applied to us, how Call to Action tests can help us improve our online platform and how innovation accounting can help us steer in the right direction. We try to utilize the principles behind lean startup and apply the framework to this phase so we can develop a good basis for launching the product once it is time. Furthermore we look into the Holistic marketing concept and how we plan to use it when selling our product to private customers. We also discuss some of the problems we can run into when selling to businesses and government.

4.1 BETA TEST DESIGN AND MANGEMENT

As mentioned in Section 1.3.1, beta testing can be used for more than just testing the product. In our case, which does not include something radically new, most of the functionality was tested in the alpha phase, which can be viewed in section 3.3. Furthermore, for the beta phase our research focus on inspecting earlier discoveries from potential end-users interactions, to further learn about their wants, needs and how to sell them our solutions. Hence, we want to perform a beta test to confirm that the product is wanted by end-users, and that our value propositions and ADO improvements is favorable. Moreover, we incorporated some elements from the "beta test purposes" in figure 1.5 from section 1.3.1. Since this is the first product that we are making, it was difficult to find a user testing process that fitted our situation. We eventually ended up with the model in figure 4.1, which shows the process at Edit Software. All other processes that was examined, which are illustrated by Dolan and Matthews [Dolan and Matthews, 1993], can be seen in appendix C.

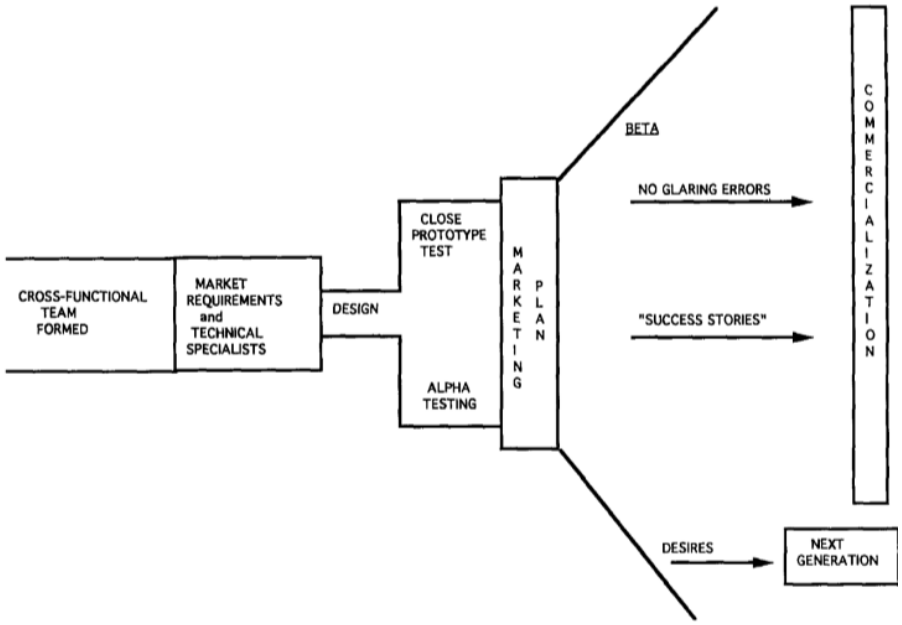

Figure 4.1. Product development process at Edit Software [Dolan and Matthews, 1993]

First Edit Software forms a cross-functional team to work on the product. Next, they figure out the market requirements and technical specifications. From here the design is made while they perform closed prototype tests and alpha testing. Based on this they form a marketing plan for the product. It is from this marketing plan that the beta test is designed and if there are no glaring errors they use the success stories for commercialization and address the new desires found in the beta test in the next generation of products. The selected beta sites should be performed based on how broad the portfolio they represent are, their likelihood of delivering influential testimonials, and on previous positive experience from beta testers [Dolan and Matthews, 1993].

We should seek to follow the same process as Edit Software, but with fewer beta sites and users since the cost is to high for us. The product is not revolutionary innovation, although for us it is something new and we need to understand the limits of the product before we can install it for customers.

4.1.1 Pre-Beta Testing

As a part of the testing plan we visited *Nuring Home of the Future* again, to talk with our new test user and early innovator Anne-Mette, to make sure that she understands what testing the product includes and to see if she had any suggestions towards the product. During this visit we also spoke with Lars Nøhr about the requirements, safety measures, installation, etc. to get a better understanding of expectations and to align both our demands.

From the talk with Anne-Mette we got some more specific product specification that she would like to include. She would be satisfied if we could add both a button and remote control for opening and closing the device. A smart-phone solution was not preferred, but would be nice for adjusting the ADO's settings. Furthermore, it was very important to her

that the door was able to be locked, both from the inside and outside. Another resident at the location are also using a similar activation solution to this. Moreover, we discussed what to do if an accidents would happen and agreed to create a manual-safety function, where the door would work normally if the product malfunctions.

4.1.2 Beta Test at Nursing Home of the Future

As stated earlier, we have a good relationship with Lars Nørh which have provided us with the opportunity to test the product at Nursing Home of the Future. Here Anne-mette, has agreed to be a test user and have the product installed in her apartment. The objectives of test are:

- Test the functionality of the product.
- Test if features should be added to the standard product.
- Test if the design makes you forget about the product.
- Gather feedback from personnel at the Nursing Home to see how it affects their daily work.
- Measure customer satisfaction.
- Generate success stories that can be used for marketing.
- Use the site for sales promotion.
- Show Lars Nøhr that our product improves the lives of our users.
- Create buzz in the nursing homes, in hope that the other residents might request the product for their apartments.

Environment, Set-up and Duration

The test environment is the apartment of Anne-Mette, and we are going to install the door assistant on the entrance door to her apartment. Together with Anne-Mette the settings of the product will be decided (opening speed, time stays open and closing speed). The product will come with two forms of control, two buttons (Inside and outside) and a remote control, requested by Anne-Mette. We have planned for the test to last for a month with 4-5 meetings during the period. This duration is set to allow the user to get comfortable with the device and to collect as much data as possible.

Collecting Data

Anne-Mette will be instructed to write down her thoughts during the daily use of the product. Furthermore she is encouraged to discuss the product with her visitors to see how they perceive the product. We will meet with Anne-Mette once a week to discuss how the products functions and review what she has written down. She will be asked to rate the product from 1-7 on various parameters. An exmaple is shown in table 4.1

Questions:	Score (1-7):	Reason:	Solution:
How good is the opening mechanism?			
How good are the buttons?			
How good is the Remote Control?			
How would you rate the quality of the product?			
How much have the product improved your daily life?			
How likely are you to recommend the product to others?			
How good is the design? (estetics)			
How did the door function when used manually?			
...			

Table 4.1. Questions for beta test

4.1.3 Reflection of Section

Unfortunately we were not able to perform the desired test before the hand-in date of this report. Unexpected problems occurred with the delivery of the new motor component and we had to redo the assembly design to fit it properly. The positive aspects is that once the new product is built we are ready to start testing and collect data. Furthermore, we have some extra time to include Lars Nøhr in the test and try to attract some kind of marketing material in the forms of news articles, pictures, video and word of mouth since so many residents are located in the same building.

4.2 Online Marketing / Facebook

As described in section 1.4.5 times are changing and business are able to reach their customers easier than ever. For this reason we will try to utilize social media as much as possible to generate a following. In this section we try to market ourselves and our product to the private costumers. This will involve going through Call to Action strategies, why we do them and try to establish which marketing channels from section 1.4.3 that we should use. During the process we utilize Eric Ries's lean principles, innovation accounting and build measure learn loop from section 1.1.2.

Goals

Since our experience with website development is severely limited, we have no real sense of which numbers are acceptable. Since we try to connect with the elderly and disabled users of Facebook we hope to have a higher conversion rate, compared with advertising to the masses. Therefore our goals are relatively high:

- 10% of the viewers of the Facebook add go to the website
- 10% of the website visitors sign up to our e-mail system

4.2.1 First Call to Action

The reason for performing Call to Action tests is to get further validation, concerning if people are interested in our product and to find individuals for user-testing, preferable private customers. We planned to create a video advertisement that people would exposed to through online media, such as Facebook. We will use paid advertisement through Facebook to see if we can generate views from customers without help from our network.

We made two videos for this experiment, one short video that quickly described what we do and how we will help our customers, and a longer video going into more detail. The purpose of the short video was to use it on various social media to attract attention and it serves as a CTA to get the customer into our website. The longer video was for individuals who seeks more information about the product and the company, and was only available on the website. It is also where customers sign up to get more info via email-letters or to become a test person. The design of the website at this current time was filled with information about the team and processes we had gone through. Furthermore, we concluded that the site needed to be redesigned to better reflect our company as a business and guide the viewer to our sign-up. Moreover, we wanted to figure out which methods/texts/colors works best for generating the highest conversion rate. For this purpose, we are also wanted to use A/B split testing as described earlier in section 1.4.8. We planned to make two versions of our sign-up site with different messages to see which works best for converting viewers into testers. The website of our first iteration is shown in figure 4.2.

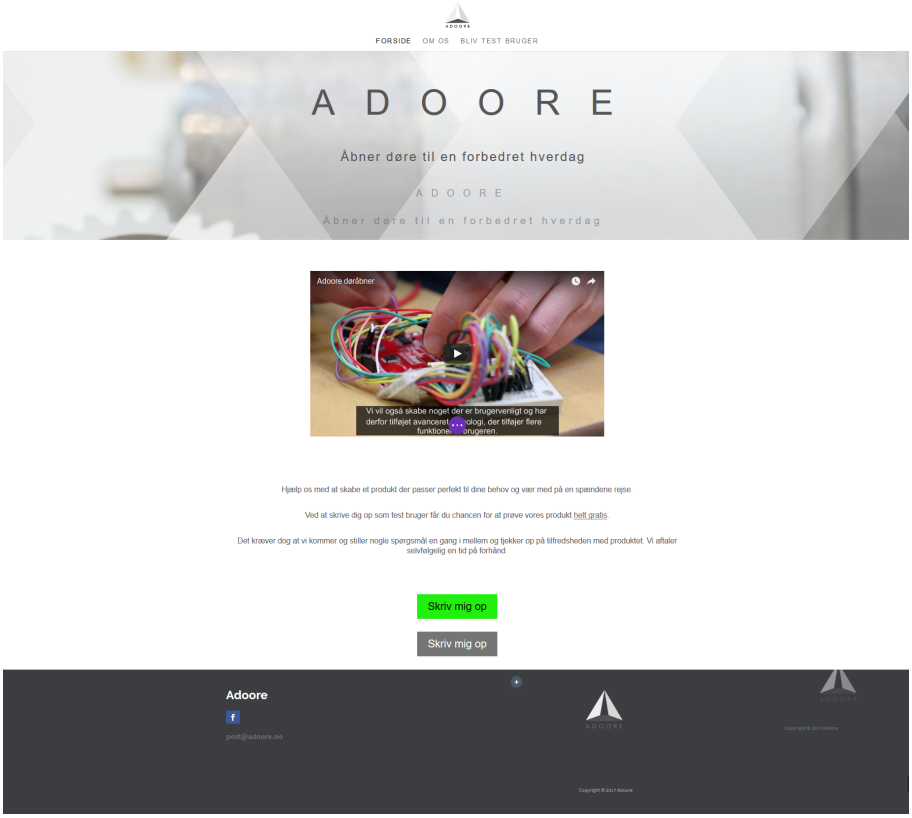

Figure 4.2. Design of www.adoore.no first iteration

Results and Reflection

Over it's lifetime the Facebook advertisement were able to reach 951 users and 590 video views, which led to 80 unique website visits. This result therefore showed that 8.41% of the viewers went to the website. Unfortunately none of the visits converted into test users. From the website panel we can see that none went past the first page, and that the overall test failed to deliver what we hoped for. On the other hand, it gave some insight in regards to further develop the test phase. The numbers can be seen in figure 4.3

Milestone	Iteration 1	Iteration 2	Iteration 3	Iteration 4
Facebook views:	951			
Website views:	158			
Unique website views:	80			
% Converted (goal: 10%):	8,41			
Sign-up's:	0			
% Converted (goal: 10%):	0			
Customers:	0			
% Converted:	0			

Figure 4.3. Call to Action data of the first iteration

Firstly, the test showed that Facebook can be a good way of reaching potential customers, but it might not be the place to reach early adopters. There is a questions to be made about the segment and that it might be to small for such a short term advertisement campaign. Although, since the conversion rate meets our goals, it is worth further investigating. Since we weren't able to get any sign-ups we need to further test the landing page of the website. Furthermore, leading to a video that explains our vision might lack the incentive for users to consider interacting with our page. Overall the video is very descriptive and does not call for much action. For the video to generate interest we think the product needs to be in a finished state ready to sell and not displaying the prototype stage. It is worth considering to perform a simpler approach, for example in the form of posts or flyers, including phone and email for our company, as it might be more suitable for our audience. Moreover, we acknowledge that whoever helps the target user with purchases, should also have a way of contacting us. Additionally, the website and Facebook ad needed further improvements, which lead us to these questions:

1. What if the users don't want to commit to a 2 video?
2. What if they loose interest before they scroll down to the sign-up button?
3. What if clicking on the sign-up button, in order to go to the sign-up page is to much?

Since we had a conversion rate from Facebook to the website close to our target, it was decided to focus on question 2 and 3 instead of finding a new medium. Lastly, we developed a new layout for the website that should improve uncertainties regarding questions 2 and 3, the website is presented in figure 4.6 in the section below.

4.2.2 Second Call To Action

For the second call to action test we aimed to reach out to target end users with a different approach. We were still including the video on our website, but did not do any paid promotion. Instead we tried to use our network to see if people have an interest in our product. The network consisted of *Jeanette Nørregaard Strøm*, a girl from our education with a network in the disabled communities, and Peter Klitgaard who is the leader of DDA in Aalborg. They both agreed to help us by posting our ad in various Facebook groups that they are members of. By doing this we assumed a higher chance of reaching our target end users.

We were looking for users who was ready to help us test the finished product and give us a review. Moreover, we hoped for users to sign up to an email newsletter where they would get updates about the product, information about our progress, releases and eventually prices. Not only would it show us that the users were interested, but also give us an opportunity to start generating a database for e-mail marketing.

The website was re-designed to provide the visitors with a simple message that stated what we do and who we are looking for. The sign-up form is placed right next to a message, for them to more easily see the sign-up box as shown in 4.4. The design is heavily inspired from www.evernote.com, which is shown in figure 4.5, with the placement of the text and sign-up section, the grey background of the sign-up boxes, and the green send button.

Figure 4.4. Design of www.adoore.no sign-up section

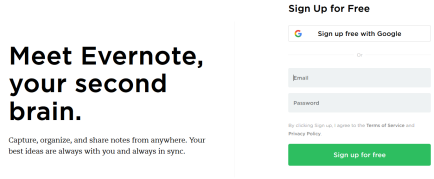

Figure 4.5. Design of www.evernote.com sign-up section

We hoped that the new design would provide a better message than just showing the video, and by having the sign-up beside it would increase the probability of visitors converting to sign-up's. The full website can be seen in figure 4.6.

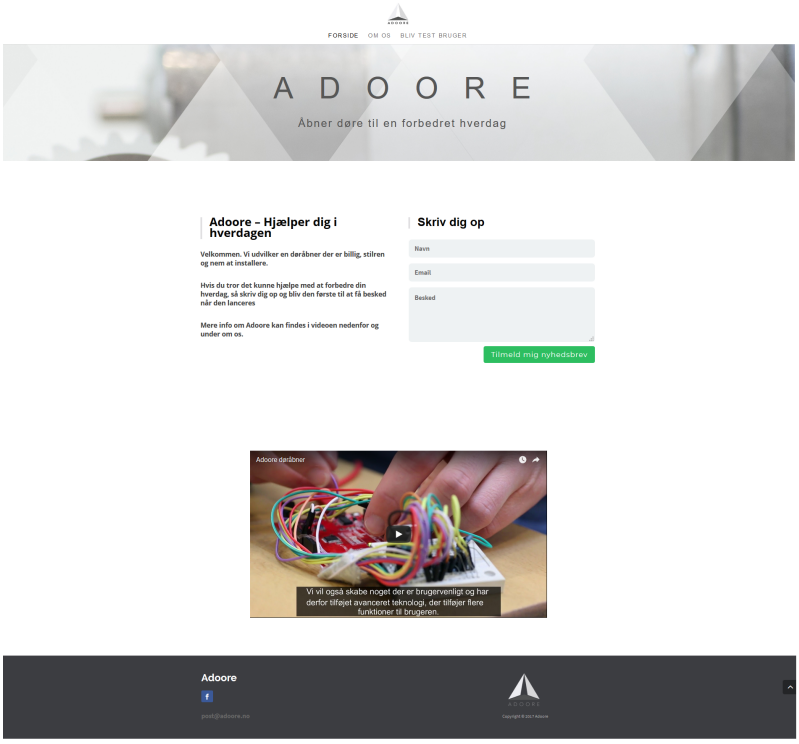

Figure 4.6. Design of www.adoore.no second iteration

Results and Reflection

Before we look at the numbers it is important to get an overview of the differences between the tests:

- We made a new shorter text for the Facebook post
- We used our network to share the post in groups related to disabilities instead of paid advertisement
- We changed the website layout

Compared to the last test, the improvements made where an increase in unique visitor, which were better than previous numbers, but only slightly. Furthermore, the sign-up rate went up, so it looks like we are moving in the right direction in some areas. In figure 4.7, one can see the visitor rate has increased by 0.08% and we managed to get a conversion sign-up rate of 4.17%.

Milestone	Iteration 1	Iteration 2	Iteration 3	Iteration 4
Facebook views:	951	1131		
Website views:	158	148		
Unique website views:	80	96		
% Converted (goal: 10%):	8,41	8,49		
Sign-up's:	0	4		
% Converted (goal: 10%):	0	4,17		
Customers:	0	0		
% Converted:	0	0		

Figure 4.7. Call to Action data of the second iteration

These number are still below our target so improvements needs to be made. Starting with the conversion rate from Facebook to our website, we need to try something else than a video. Taking our own experience into account, watching a video requires that you give your full attention to the used device (Mobile, Tablet, Computer), that you have the time it takes to watch it, and that it attracts your attention in the first couple of seconds before you keep watching it. Taking a different approach by using images might be more beneficial. The test raises the same question as the first:

- What if the users don't want to commit to a video?

Regarding our sign-up rate, it is considerable better than the previous, it went from 0% to 4.17% which shows that the changes made was effective. It is still below our desired target and this might be due to the Facebook post or the website texts. Questions that can be asked about the sign-up rate are:

- Is the sign-up rate better because of more focus on the correct target group?

The first objective should be trying to improve the conversion rate from Facebook to the website while also measuring if it has an impact on the sign-up rate. Once the conversion rate is above 10% can we start to improve the call to action section of the website.

4.2.3 Sign-up Feedback

From the Online Marketing / Facebook test we also got some unexpected results in the form of messages from the users who signed up. Initially we only thought they write their name and E-mail but all included a message of why they wanted to test the product. This also opened up for a new way of communicating with our users by E-mail. Below are their initial messages that they sent us, shortened and translated to English:

Tonny: I have a regular big door openor to our entrance door / apartment door which we got from the municipality. Unfortunately they will not provide me with a second one for our terrace so i am very interested in becoming a test user for your door opener. I am a chronic pain patient and right leg amputee, i do not have prosthetics so I am tied to an electric wheelchair.

Thorvald: We have an ADO on our front door but it would be interesting to have one on the other doors of the house

Lucas: Hello, my name is Lucas, I'm 15 years old and totally reliable on help from my dedicated helpers. I could be cool to try your solution so i can feel less dependant on others.

Ingrid: I would very much like to test your ADO. I have a very old system which is ugly and not up to today's design. Furthermore the door locks when there is a power outage.

We used this opportunity to ask them about their current solutions and what problems they experienced. But only Ingrid and Thorval gave us detailed answers. We asked Ingrid how she got her solution, how it worked and which features she felt a new one should have. We also took the opportunity to ask her about our price point, since she mentioned it should not be too expensive. A summarize of her responses is presented below:

- She got the device through the municipality
- She is a wheelchair user
- The municipality would not grant her a backup battery
- In case of fire, she is afraid she can't get out
- She does not think 7000,- DKK is that expensive
- She is willing to pay if it works as we say it does
- Her current solution is very hard to open without the controller

From Thorvald we gathered:

- He built his own device so he could control the door from a mobile phone or web browser
- It should work so the door can be partly opened
- It should work just as a regular door

4.3 B2B and B2G

Business to Business and Business to Government marketing requires a different focus and strategy compared to the private market and as we learned from our funding process in section 5.1.2, we underestimate the complexity of these processes. However, by having the beta test at *The Nursing Home of The Future* we hope to generate some marketing since the nursing home is well known, frequently visited and referenced too in the health sector. On the other hand, we also need to market the product ourselves and start this process by contacting other nursing homes near us, so we can get a personal meeting where we can present our product and our vision. This is especially important in the beginning of our venture where we need to build trust and awareness. We also need to conduct more research on the buying process and not assume that every nursing is the same. Different nursing homes might have different budgets or procurement procedures. To do this we should utilize our network to find companies that are willing to tell us their story and share their experiences. Another way of generation product and brand awareness are events aimed for health & Rehab sector. For example, a recent event in Copenhagen called *Health & Rehab Scandinavia 2018* [Scandinavia, 2018] could have been a good place to start. What we need to remember when looking into the B2B and B2G market is that the decision process can be very long and maybe too long for a startup.

4.4 Holistic marketing concept

As mentioned in section 1.4.6, relationship marketing is something any business should look into. Throughout our journey we try to build relationships with governmental entities that can help market our product. Furthermore we try to utilize the Incubator where we are located, and establish connections through its network. By the use of Call to Action tests we have also establish some customer relationships which can benefit us by providing us with a chance to test the product in a different environment on a different customer segment than the government can. They also have potential to become early innovators and buy our product before anyone else. They can also help us in marketing by telling others about the product through groups which they are members of. This ties in with an *integrated marketing* plan which is about making a plan that creates, communicate and delivers value for the customer. We will try to create a marketing plan that communicates the same message across all mediums. The message will focus on the vision, that we try to help our customers achieve a better everyday life. We are here to help individuals who are struggling with their doors and we want to deliver a product that is affordable and aesthetically pleasing to look at. To increase the chance of a successful integrated marketing plan, smartinsights has created a integrated lifecycle marketing diagram shown in figure 4.8 [Allen, 2017].

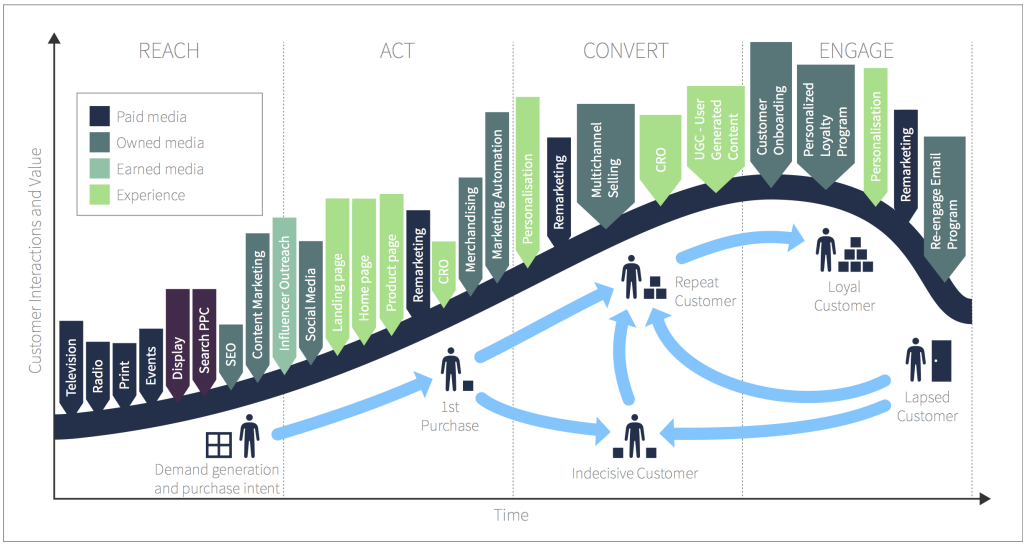

Figure 4.8. Customer lifecycle and touchpoints [Allen, 2017]

From this diagram we will try to address the touchpoints that we think we capable of delivering upon. In the first stage *demand generation and purchase intent* we will try to utilize events, seo and content marketing. Other touch points might be more efficient but also considerably more expensive. Once the customers has been reached we need to target the *first purchasers / early adapters*. In this stage we will still use social media for communicating, but also put more focus on the website, mainly the landing page, front page and product page. In this stage we also need to consider remarketing. Remarketing is about tracking down customers, for example the ones from section 4.2.3, and target them again through advertisement. For *repeat customers* and *indecisive customers* we need to use all touch points available. We need to create a personalized shopping experience for our customers, remarket the products again, use multichannel selling, conversion rate optimization, and user generated content if possible. In the last stage interacting with *loyal customers* and *lapsed customers* we need to further use personalization and remarketing.

4.5 REFLECTION OF CHAPTER

Unfortunately we did not manage to perform the planned beta test but we set the foundation for the test so it can be performed once the new prototype is finished. We still feel that utilizing the beta testing method proposed by Dolan and Matthews in section 4.1 is a good approach since it leads to more than just product improvements and validation. Combined with Lean start-up we believe this is the best way of making and measuring progress.

Looking at the online marketing / Facebook strategy in section 4.2 and disregarding the small sample size, this way of improving marketing efforts has been a great success. By using innovation accounting we were able to see where we are making progress and where we need to work differently. Initially we thought the second Facebook post had more success than the first, based on the amount of unique visitors, sign-up rate, views of the video and no money spent. However, when looking at the data presented we are not able to determine if the sudden increase is because we used a different method of advertising

or the new website design. We need to approach our ways of improving our marketing efforts by making fewer changes so they become measurable. Split testing was not used to its fullest potential and did not show anything during the first iteration of the test, but trying it gave us a feeling of how it works and now we understand the potential it can have on making progress. There is also an argument to be made that we started the split testing process to early. We need some kind of data to measure against and gain traction. For a future test it might be a good idea to perform a split test on Facebook to measure two different advertisements instead of one, the same concept applies to the website. If we manage to utilize split testing and innovation accounting, not only can we make progress faster, but also measure our engine of growth properly, for a higher chance of creating a sustainable business. The content created for this test is also something that should have been thought about a bit more in-depth. The making of the videos required a lot of time, which might had been better used elsewhere. It could have been more beneficial to design good marketing pictures that could be used for posters, brochures, online marketing, etc. Other ways of marketing ourselves could be to try and reach our customers through their friends and family. By using Facebook as the advertisement channel and use raffles, we can get family to the elderly/disabled to interact with us and hopefully get more exposure. Furthermore, with the globalization that is happening, we have a greater chance of reaching other countries than Denmark, but this would most likely be far out in the process. We think this is going to be very important in the future since the market is relative small compared to many others products we have seen. We can start preparing for this by thinking globally, focusing our marketing efforts in way that speaks to a broader audience. But the first focus should be to be established in Denmark. Something unexpected also came through the launch of the website and Facebook advertisement. We were able to find early innovators, the users who are interested in trying a product before it is fully developed. They were able to further validate the features that we are trying to implement and has become great subjects for beta testing once ready and potentially be our first customers.

After looking further into marketing strategies we recognize that its a difficult task to sell the product and we need to focus on the strengths that we have, our network and partnerships. We should try to continue to use our network to meet other actors in the market so we can learn as much as possible from others and simultaneously share our product. Additionally, we need to represent ourselves as a business that exists to help people in need to help build our brand. When looking further into the B2B and B2G segment there are many uncertainties such as on how to sell the product to this segment, are they willing to change their current ADO providers for us and do other less technological nursing homes have the money for the product. It requires a lot of knowledge to create a plan for how to capture this segment. As a startup we should focus on the private market to begin with and throughout the venture try to gain as much knowledge and experience in the B2B and B2G market through our network and personal meetings.

BUSINESS 5

In this phase we present the actions made to frame the business. Where we introduce a summary of the funding programs we have attended, in order to grow the business. Additionally, we present how our Business Model was developed, innovated and its result. Lastly, we looked into financial projections of the company and how to sell our first product, where we explore the market size and value, different revenue models and present the financial project result.

5.1 FUNDING

Continuously through the advancement of this project, we have applied for various funding opportunities. We acknowledge that at one point the startup will need resources for legal and accounting counseling, operations, salary and more for us to upscale it. This section present the competitions and programs we have attended in, the results and our thoughts in regards to outcome and Adoore's future.

5.1.1 AAU Startup Program

The AAU Start-Up Program is created for students with an idea that shows promise, and can possibly one day be turned into a new company. The program help with exploring if the idea is good, tips to how the business should look and which steps to take. Their program is heavily influenced by the D-I-A model [O'Connor, 2008], considering the three phases a startup goes through before the company can stand on its own, which are discovery, incubation and acceleration. For each step in the program, the team is offered an increase in benefits and guidance. The reason for utilizing this model in their work is to help groups in various stages of the startup process. Some do not have an idea, but know they want build a new venture, while others have already started a company and need help to accelerate their profits. Underneath is an explanation of each step in the process.

Discovery Phase

The first phase of the program deal with discovering the business venture, and offering an office as well as 10 thousand DKK to do so. Discovery is the stage where potential new companies concentrate on opportunity elaboration and the conceptualization of those opportunities. Our business idea were accepted into this stage in the early fall of 2017.

Startup Phase

The startup phase is very similar to incubation, here the business venture deal with reducing uncertainties early on, so that the success rate advance. We were accepted into this step in January 2018, the program now granted us 20 thousand DKK in funding, as well as 2 thousand DKK per team member for us to fully focus on the project.

Acceleration Phase

Lastly, there is an acceleration phase, focusing on moving the concept forward and creating a gentle progress into the world of risk. We have not yet applied for this step, as the team acknowledge that we are not ready.

5.1.2 STUD-ENT Funding Program

STUD-ENT is a funding program for students who have a business idea, giving them a chance of winning up to 1 million NOK. Moreover, the program has a planned budget of 20 million NOK, where each project can receive up to 1 million in funding. To apply, the project has to be supported by a Norwegian University or University College, and it should also help strengthen the entrepreneurship culture in the institution. Therefore, we got in touch with WNUAS (Western Norway University of Applied Sciences), which is where two people in our group finished their bachelor degree. Fortunately, the school agreed to support us, and also helped with the application and other guidance.

The project was evaluated based on these topics:

- Is the application within the scope and frames of the announcement?
- Customer understanding and involvement.
- Market understanding and commercial potential.
- Realization of the business idea.
- The team's ability to realize the project.
- Quality of the project.

Application

The first step of the program was to send in a comprehensive application, where both detailed and concise questions were asked. Amongst these, they requested answers to the project's main goals and sub-goals, a full summary, budget, market knowledge, milestones, team, resources and much more. A total of 29 projects moved on to the next round, and we were one of them.

Presentation

In the second and last stage, we presented the project for an expert panel of 8-10 people, followed by a questioning session. Moreover, this time we demonstrated version 2 of the prototype. 2-3 of the panel experts had assessed the project in advance and acquired specific skills related to the field and industry. Besides this the panel consisted of externals and had different backgrounds as investors, business developers, technology developers and as entrepreneurs. Representatives from the Research Council's administration was also present.

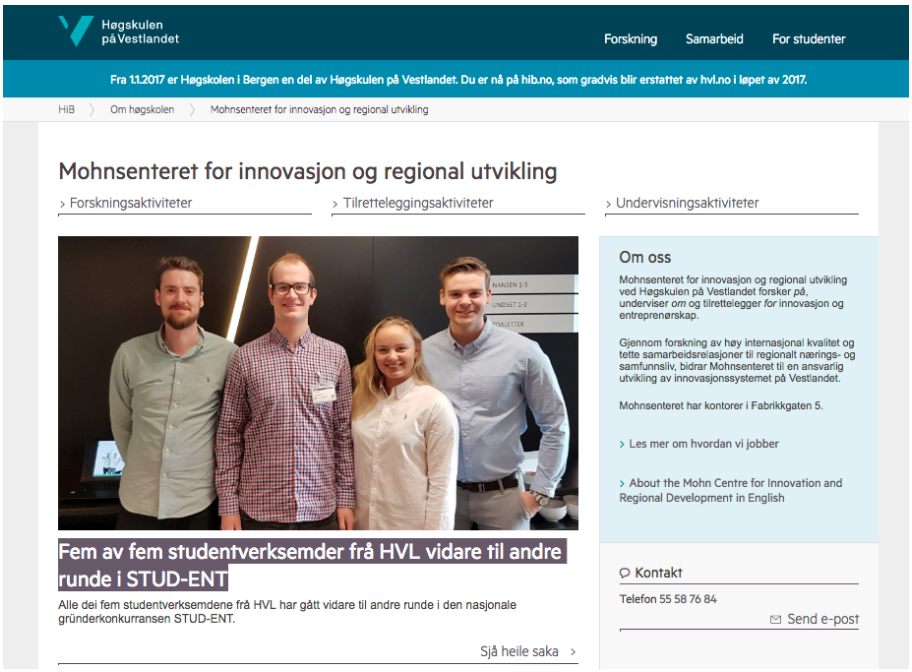

Figure 5.1. An article about the team moving on to the next round from the WNUAS school paper. [WNUAS, 2018]

The Outcome

In short, 13 out of the groups was granted the resources. Unfortunately, they replied that our project was not ready to receive funding from the program. Although not being approved, we acquired a lot of valuable feedback, both positive and negative. The whole application was evaluated through a score sheet, where our project got a total score of 21/35.

One the crucial factors for them not granting us the funding was that all of us both lived and studied in Denmark, and where no longer associated with WNUAS, which actually has nothing to do with the quality of our business idea. However, regarding customer understanding and commercial potential, they were negative about us focusing on municipal projects as our first customers. According to the panel, we were lacking knowledge about them and underestimating the complexity these processes. Hereby, they advised us to get a mentor with practical experience within sales to government prospects. In addition, the panel argued that these markets will quickly be saturated, and think that we should carry out a more systematic analysis also involving other application areas, especially when it comes to customer segments in the private consumer market. Furthermore, one of the panel members brings out the lack in insight regarding freedom to operate. This person explain that we should gain more knowledge regarding patents and industry standards, and advice us to perhaps get guidance from a patent attorney as this is critical for the project. Additionally, there were comments on how the team is set up, most of our members have similar backgrounds, and there is an absence in expertise within finance, marketing and sales.

On the other hand, we also got some positive feedback. First of all, they were very pleased with our presentation, and claimed that it improved the overall score of the application.

Moreover, they had no doubts about the teams technical competencies, as they believed that we where fully capable to deliver the product as we described it. In addition, they thought we showed promising ability as a startup team when pivoting from schools to nursing and residential homes based on our feedback. Lastly, the panel also acknowledged that we have found a need with our business idea, and hope that we continue pursuing the project.

5.1.3 Reflection of Section

To sum up our own thoughts, we must acknowledge that the project is immature at the current state. Firstly, we have to put more resources into planning a better strategy on how to positioning our company, focusing on how to handle the competitive market and becoming a sustainable business. To do this a reasonable start will be to continue exploring the market and other customers, increase finance focus and plan further ahead how to establish the company. On the other hand, we also have to continue being eager and motivated to pursue the project for it to succeed. After all, the panel still thought there were potential, by agreeing that we have found a need and also believing in the teams technical expertise.

5.2 DEVELOPING A BUSINESS MODEL

Startup companies often focus on offering better products, lower prices or both, including ourself, and therefore end up in a red ocean with loads of competition [Lackey, 2012]. However, by using BMI, the business model itself can be the element making a company unique and sustainable. We have chosen to utilize a framework based on the article *Business model configurations: a five-V framework to map out potential innovation routes* [Yariv Taran et al., 2016], to build our own innovative BM. The first step of the structure is suppose to involve an interpretation of the as-is BM, but we will leave this out considering that our business does not have an established structure. In addition, we will omit step 4, which is a detailed suggestion of implementation. For our project the two steps in-between will be applied, which contains the development of a new BM, prioritizing and selecting the correct value drivers, assessing the risks and setting future milestones through an action plan. A more detailed explanation about business modelling and the framework is presented in section 1.2.4, while the illustration of our process can be seen in Figure 5.2.

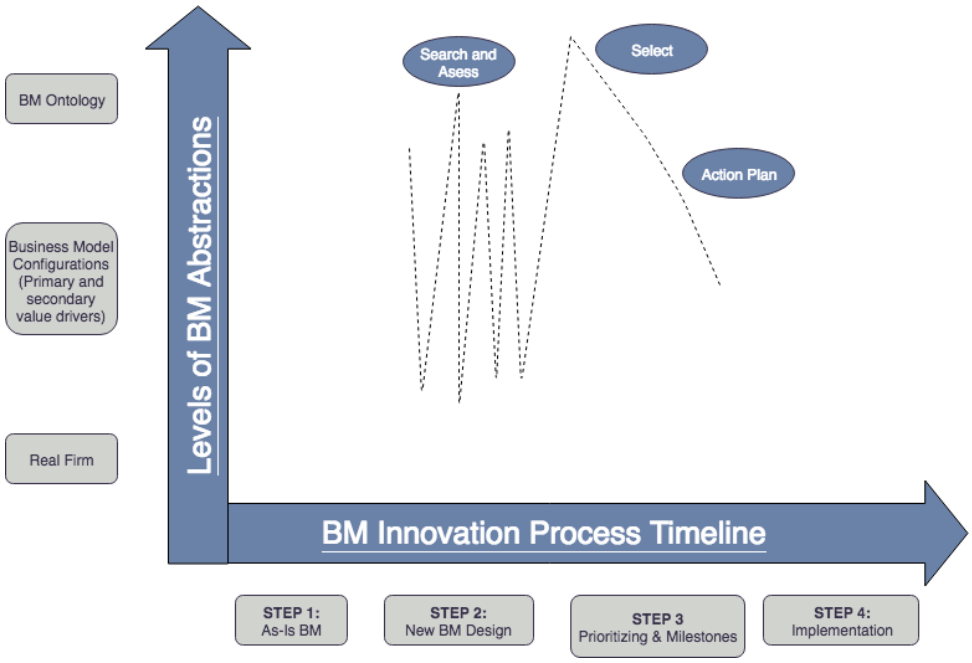

Figure 5.2. Our version of the five-V framework.

5.2.1 Searching

To begin with, we started a searching process to find different options that could fit into our BM, while considering the SWOT-analysis and Porter's five forces analysis in section 2.5. Our strategy was to create value and differentiate ourself from the competitive environment, by focusing on our strengths and opportunities. This stage is a non-linear process, where we went through different levels of BM abstractions. At this point we used the general configurations system from the article, striving to be creative and experiment with every possible option, and discover if it could become suitable to our BM. We ended up with 34 value drivers that had potential to be utilized, these can be viewed in Appendix D.

5.2.2 Assessing

For the assessment process, we chose to apply a risk management analysis to evaluate the various uncertainties of outcome, and to help identify the most fitting BMCo's. There are many types of risk that businesses will encounter, some have minimal impact and can be managed easily, while others may threaten the existence of a company. Furthermore, risk exposure changes, but the greatest amount of risk must be assumed in a company's early-stages [Lackey, 2012]. A template from our course in *Applied Business Modeling* was used both to evaluate and make early plans for reducing the risks. It involves a qualitative risk analysis, a short plan of action and a post-hoc evaluation. In figure 5.3, one can see what we recognize as the most crucial risks of our startup venture, and set into four categories, which are strategic risks, operational and cultural risks, financial risks and hazard risks.

Qualitative risk analysis				Action Plan		Post-hoc evaluation		
Strategic risks								
Meidum and high risks identified	**Likelihood (1-5)**	**Impact (1-5)**	**Inherent risk**	**Risk treatment**	**Milestones**	**Residual risk**	**Fit to the companies risk appetite?**	**Further action planned**
S1 Not acquiring Freedom to Operate	**2**	**4**	**Medium**	We have to explore all existing patents, so that we can start selling without worrying about lawsuits from existing patents.	• Do our own research to present to lawyer. • Hire a lawyer to further perform an European search.	**Medium**	**Fit**	• **Obtain FOT certification.**
S2 Short-term Competition	**1**	**5**	**Low**					• **No further actions needed**
S3 Long-term Competition	**4**	**5**	**High**	Dependent on the company having a defense strategy in case competition copy or create a similar product.	• Creating a long-term competitive strategy	**Medium**	**Fit**	• **Monitor the industry on a monthly basis.** • **Adjust to changes.**
S4 Lack of Demand	**2**	**5**	**Medium**	Need to perform several tests to validate if there are enough customers to become a successful business.	• Beta testing • More call-to-action iterations • Other interactions & observations	**Low**	**Fit**	• **Continue to analyze the demand during early sales period.**
Operational & Cultural Risks								
O2 Team Competence	**2**	**5**	**Medium**	Lacking knowledge within marketing and finance.	• Get funding • Hire finance worker • Partner up with marketing firm	**Low**	**Fit**	• **No further actions needed.**
C1 Information Access	**2**	**5**	**Medium**	Already found market reports with needed information, but it costs.	• Get funding • Buy relevant reports	**Low**	**Fit**	• **No further actions needed.**
Financial Risks								
F1 Investments	**3**	**4**	**Medium**	Look for potential investors / business angels. Have already lost a couple scholarships at the final stages, because our business was to immature. Also need some sale numbers to present.	• Arrange meetings • Present a more mature business plan • Gain Partners • Sales	**Low**	**Fit**	• **No further actions needed.**
Hazard Risks								
H1 Human errors	**5**	**3**	**High**	Wear and tear caused by human errors, reducing the lifetime of the products.	• Implement a non-locking motor. • Another alternative is implementing a clutch.	**Low**	**Fit**	• **No further actions needed.**

Figure 5.3. Risk analysis

In brief, the strategic risks we view as crucial include FTO, long and short-term competitive strategy, as well as the amount of demand in this specific market. Some of the plans have already been initiated, but it will take some time before they are completed. Furthermore, the operational and cultural risks consisted of how governmental efforts will fit in our business model, the team's lack of financial and marketing competencies, in addition to our lack of access to information. Before moving on to prevent these risks our team has decided to first evaluate if there is a market for our product. In regards to financial risks, we assume that getting investments will be essential to upscale our business. For now we have found our business proposal immature, but have a lot of potential, so therefore other areas must be in place before pursuing these partnerships. Lastly, there are hazard risks, and the biggest one in our case are human errors. We have found that people do use the devices manually, which tend to cause wear and tear. However, we are almost certain that our non-locking motor will reduce this risk significantly.

5.2.3 Selection

The third stage, prioritizing and milestones, firstly consisted of choosing the best applicable configurations for our new innovated BM. To summarize, six satisfactory primary value drivers were chosen. More information about the configurations and a full description of

why these exact drivers were selected is displayed below:

1. **Value Proposition 6: Fast follower** - *"Under-pricing competitors and leverage marketing to persuade customers that our offering is equivalent".* A big influence for starting this project was the immense price of current ADO products, and that is also what governmental efforts are dissatisfied with. By offering lower prices with the same functionality spectres, municipalities all over Denmark can finally provide those devices for everybody who needs one.
2. **Value Proposition 19: Trusted product/service leadership** - *"Ensuring long-lasting customer relationships through a platform with a continuous upgrade path".* If we hope to be involved in these complex and time-consuming governmental efforts, it is important to create long-lasting customer relationships. Therefore, we recognize that having a high quality service that provides reparations, upgrades and continuous communication.
3. **Value Segment 2: Customer focused** - *"Focusing on the customer needs and decentralize the infrastructure management and the product innovation activities".* An important differentiation in our business, is that we focus on specific end-users. For that reason, an essential part of our business model will involve us being customer-focused both considering customer and end-user.
4. **Value Configuration 4: Disintermediation** - *Delivering a product or service directly to the customer rather than through intermediary channels.* We have found that our product can be made so that you do not need a certified installer to install the device. For that reason, we will be able to install the products ourselves thereby skipping one link in the supply chain, which also will significantly reduce costs.
5. **Value Network 10: Outside-in** - *Gathering value (e.g. information) from external sources, such as innovation partners and research communities.* The business model now already concerns manufacturing, R & D, installing, maintenance and so on. It is apparent that some fields need external operations, for example within law, finance and marketing.
6. **Value Capture 16: Upfront payment** - *have the customer pay up front and generate high profits by maintaining low inventory.* This revenue method is quite simple, but we consider it to be the most reasonable way for us to sell our products and quickly get the money into our account.

Additionally, there are further effects based on the selections of primary value drivers, they also function on a secondary level spreading to one of four remaining categories. Secondary value drivers was also identified, and the result can be seen in Appendix E. The outcome shows that they mostly effect value configuration and Value segment, while non of them impacted value capture. This makes sense, as we want our customer segments and how to deliver our value proposition to be focal points. Hereafter, key value drivers amongst the primary ones were chosen. Where our essential value ended up focusing on value proposition, and says "Gaining fast followers through customer focused products". We acknowledge that our picks can potentially help our business bring new values to the automatic door market and differentiate ourselves. Hence, a BMC suggestion were made based on the value drivers and earlier findings, and is shown in Figure 5.4. It should be mentioned that this will be the operations in our company's starting phase, and that areas will change if we scale it up.

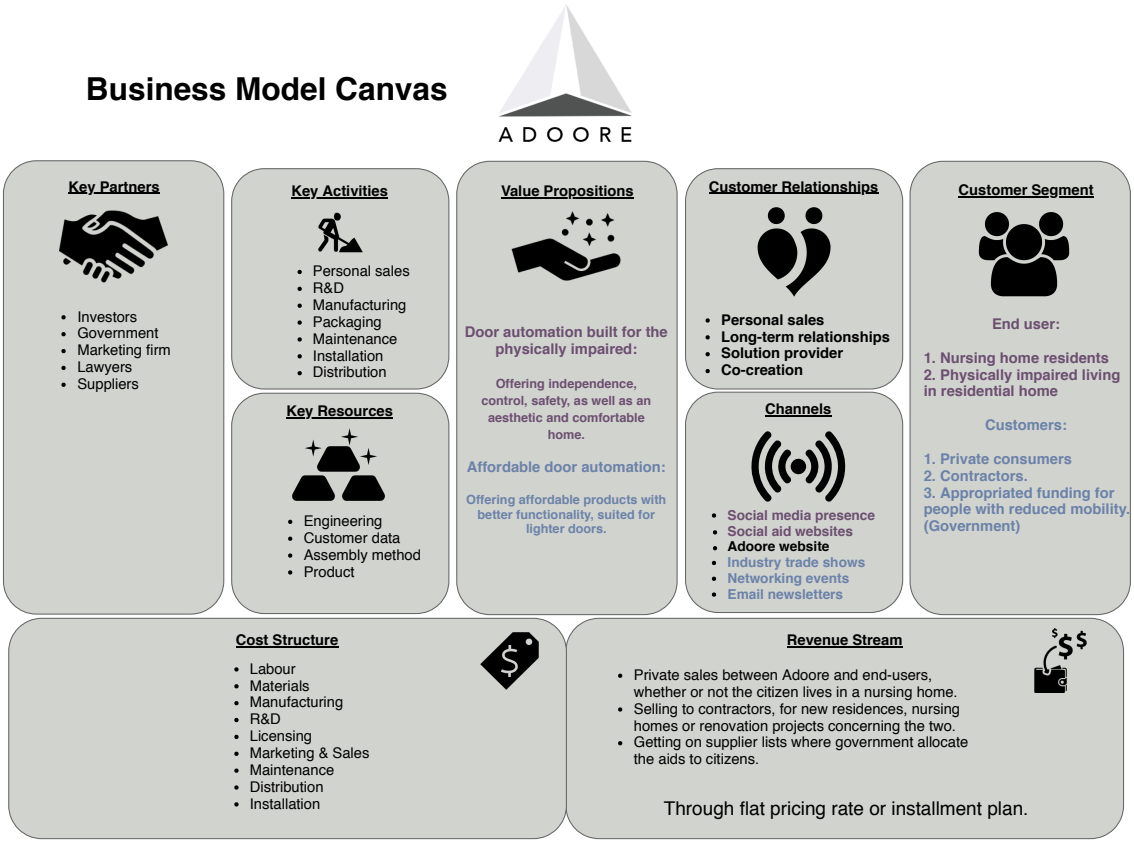

Figure 5.4. Business Model Canvas of Adoore

In summary, the venture will start off focusing on the mobility impaired as both customers and end-users, but it is also possible to sell through government and contractors. During the CTA iterations in section 4.2 it was discovered that it will most likely require a personal touch when selling to private consumers, and it will be crucial to reach them through websites, an email newsletter and physical sale visits. In regards to government it will involve long-term relationships, as they can grant resources to end-users, influence contractors to buy from us and help with resources and development of the business. When eventually moving into contractor vendors the price of our devices must be lower than competitors. Our relationship with government will hopefully start with us joining Aalborg Municipalities quality and innovation unit for elderly and handicapped, where they give out resources and test users through their network. Contractors will eventually be reached via industry trade shows and networking events. Furthermore, for us to deliver these values the key activities are many, but since it starts out small we assume it will be possible. Additionally, the business model shows that there are external key partners that helps out with other areas of the operation, such as marketing, law issues and more. With regard to key operations, we acknowledge to have great capabilities within engineering, and the innovative product itself has potential to get us into the market. In addition, customer data can also be a vital resource later on in the process.

5.2.4 Action Plan

Lastly, we formed an action plan for the upcoming months after this semester is finished, to reduce the most crucial risks found during the risk analyses. Figure 5.5 shows the plan, concerning objectives, responsible workers, deadline, necessary resources and potential challenges. By performing these tasks we hope to gain a better stand point for evaluating our new BM suggestion offers.

Objectives	Responsible Person	Deadline	Necessary Resources	Potential Challenges
Beta testing phase.	All team members	10. July	• Door lock	• Hazards • Human errors • High quality service
Start selling and installing our products.	All team member	15. July	• Marketing • Help from market experts	• High demand of products • Limited service
Form a partnership with Aalborg Municipality.	Jakob Bjørn	1. August	• Supportive data • Sales	• Prove functionality • Prove low pricing
Acquire Freedom to Operate.	David Mads Oda	30. August	• Lawyer	• Time-consuming • Finding an existing patent
Explore potential business angels for funding.	Jakob Bjørn	30. August	• Supportive data • Information in place	• Business being to immature • Governmental involvement
Marketing strategy, with help from exterior company.	Jakob Bjørn	15. September	• Funding	• No network with marketing companies • Dependent on having enough money
Hire part-time finance worker.	Jakob	15. September	• Funding	• Low salary
Fix forthcoming product errors.	David Mads Oda	Continously	• New components or materials	• Difficult to anticipate which challenges could occure.

Figure 5.5. Action Plan

Firstly, we plan to perform a beta testing phase, to discover any last product errors, to further validate the need and hopefully get some "word of mouth" marketing. Hereafter it is time to moderately start selling the product, finally gaining some sales numbers plus further validation. The next objective is to get into Aalborg Municipality's quality and innovation program for elderly and handicapped people, where we would be granted resources and a larger network. The next step is to make sure that we are selling the products with FTO, so that we do not get sued by any patent holders. Furthermore, an exploration phase for finding potential business angels are taken into account, although if we gain a governmental partnership it might not be necessary. Then we will try to establish a partnership with a marketing firm and hire a finance worker, to escalate sales and bring someone with a needed skill into the team. Continuously during the beta test and early sales the last product development errors will be fixed.

5.2.5 Reflection of Section

This process has been complex from start to finish, but provided a pleasing result. During the exploration of value drivers we thoroughly analyzed our current situation by utilizing risk management, which gave us a greater overview when selecting value drivers and

mapping out the BMC. Furthermore, we recognize that it might be difficult to operate sales, installments and manufacturing. However, the process will start in small quantities, selling to private consumers and when we get much needed validation through sales it will be easier to evaluate the business potential. Eventually we might move in a direction where we become manufacturers and rather gain partnerships with installer companies and sell to them. Another promising direction is to eventually focus on contractors, and sell in higher quantities through tenders. Also, besides creating better and cheaper solutions, we believe that being customer focused, whilst gathering value from external sources and creating long-lasting relationships with them will help to further differentiate us. Another essential point for us, is to attempt to create a do-it-yourself product, so that we do not need to install ourselves or partner up with installers, which would also make it easier to sell to contractors. If we at one point become successful we are also fully aware that the product portfolio and segments should be expanded gradually.

5.3 FINANCIAL PROJECTIONS

5.3.1 Estimating Market Volume & Value

When estimating the market volume & value, the artice *How to estimate market size: Business and marketing planning for startups* [MaRS, 2009] was utilized as a guide. For our situation the market size include all end-users that can likely benefit from our devices. Then again, the end-users are individuals with mobility disabilities, living at home or in nursing homes. Previously, from the table in section 2.4.2, we found that there are about 161.500 thousand registered mobility aids in Denmark, where we can see ADO's helping the users with their everyday lives. Moreover, we have found that the Norwegian government has spent roughly 50 million NOK on ADO's for their segment over a period of three years (2013-2016) [NorgesHandicapforbund, 2015]. The quantity of ADO's purchased by the state during these years were about five thousand. It is impossible to get an exact number on how many individuals that needs these devices. Therefore we have chosen to calculate market volume and value using the number of registered mobility aids in Denmark, and thereafter determine market value in the other Scandinavian countries based on the same percentage of the population as found with Denmark. Next, we refined our volume by assuming a penetration rate of 70%. For ease of calculation based on population we round up, showing that 2% of the Danish one have been granted mobility aids at some point. The refinement is based on both positive and negative factors for our situation:

1. Some individuals might have more than one mobility aid.
2. The numbers are from 2006, while there has been a great increase in elderly within the Danish population.
3. It is not a must have device, and several people might not see a need in obtaining the products.
4. The government has to consider their budget, and give the devices to those who need it the most.
5. Based on previous interactions, we have been told that there has been a significant increase in allocating ADO's.

Calculations

$$Number\ of\ customer\ targets * Penetration\ rate = Market\ Volume \tag{5.1}$$

$$Market\ Volume * Average\ Value = Market\ Value \tag{5.2}$$

Scandinavia

Country	Population	Market Volume	Market Value
Denmark	5.731 million	114620	0.802 Billion DKK
Norway	5.233 million	104660	0.732 Billion DKK
Sweden	9.909 million	198180	1.387 Billion DKK
Finland	5.495 million	109900	0.769 Billion DKK
Iceland	0.334 million	6680	0.046 Billion DKK
Total	26,70 million	534040	3.727 Billion DKK

Table 5.1. Market volume & value in Scandinavia

Reflection

The market volume and value might be somewhat lower, as the 70% penetration rate is just an assumption based on the factors. However, we are confident concerning the selection of geographic target. The reason for choosing Scandinavia is the cultures are similar and that they are relatively wealthy countries. We already know that the government spend a lot of money on people with mobility issues in Norway and Denmark, while we assume the same situation in the other countries as well. With regards to the culture in Scandinavia, we have a social-democratic government also called the Nordic model, which refers to the economic and social policies. This helps to ensure that as many as possible are living a good life, and that the state helps if that is not the case. Therefore we have evaluated this as the best market for providing ADO's to everyday people, and help enhance their living situation.

5.3.2 Revenue Models

Here we look into different possible revenue models that can be used for our business and try to analyze the positives and negatives of each. One thing that we need to keep in mind is that the government finance money for people with mobility issues, to grant them with free ADO's. We know this is true for at least Denmark, Norway and Sweden. Furthermore, after the device is bought by the government, it is given to the individual who applied for it and that person have the full responsibility for the product. This means if a user for some reason get unlucky and breaks the device, it will not get a new one. Initially we want to establish an operation where we produce the product and directly sell it to the private consumers and eventually contractors. Therefore the revenue models are created with these factors in mind.

Renting/Leasing

One way to solve this problem could be with a leasing plan for the government. There are many benefits with such a model [Alexander, 2018], which is shown below. The only negative factor for the buyers are that they will end up paying more in the long run.

1. It keeps the equipment up-to-date.
2. High quality service, regarding maintenance and other eventual problems.
3. Predictable expenses, the buyer have an already determined monthly expense, which helps with efficient budgeting.
4. Leasing can enable nursing homes to acquire sophisticated technology, such as a advanced entrance equipment for demented patients, that might be otherwise not affordable.
5. Asset flexibility is another leasing advantage. For example, if one of the elderly at a nursing home dies, they can simply return the device and stop paying.

This also means that there are many downsides for the business offering the lease. First they a have to provide updates when available, spend resources on service and maintenance, long time until profits are being made and the chance of losing a leaser before profits are made.

Fixed and Dynamic pricing

Another model that we have discussed is having the customers pay a fixed price for our product, but also have the option of negotiating with the business customers. There are certain advantages and disadvantages with both. Fixed pricing can help attract customers because they can see right away what they are expected to pay for a given service/product. It is also consistent which means that when customers are referring others to our product they can do so with great confidence that the price will be the same. Furthermore it enables a purchase now option rather than having to start a conversation with us. More steps on the buying process also creates more scenarios where the customer might decide not to buy. Having a fixed prices also carries certain disadvantages, it might deter customers from buying your product because they perceive the price to high compared to the value it offers. Having the customers contact you for information allows you to better explain the benefits of the product and can improve the chances of a sale if they are uncertain.

With dynamic pricing we can try to maximize the profits with each sale. It opens up for negotiations where you can try to judge the customer and base you price on whether you think they can afford to pay more than your desired price or lower. For example, if 7000 DKK is too much, 6000 DKK might be acceptable, and you have a chance to lower the price and still make a profit of the sale. However, this tactic also carries disadvantages. There is a chance to alienate the customers if they realize they paid a higher price than others. This can cause them to give bad reviews, spread negative messages and they most likely won't recommend your product to others. There is also the chance of turning customers away who expect to see a fixed price like many private customers are used to.

Joint venture/Partnership

There is also the option of a joint venture or partnership. Joint ventures can provide access to new markets, larger capacity, share of risk and access to specialists and technology. It can help a great deal when trying to launch a new product, especially if you are dependent on a product your partner is providing. The disadvantages are that it can complicated and requires a lot of time and effort to establish the relationship you desire. There is the chance that goals a not 100% clarified, the balance is not equal, different work culture or company structure and partners does not provide the effort and engagement as promised.

Reflection

There are many ways of generating revenue, but as a start-up we think some are more suited than others. A leasing or renting revenue model might not be the best way to start. Mainly because it is expensive to get started and it takes a long time before any profits are made. It also requires a lot from the company in terms of service and maintenance so its likely that it requires a larger workforce to be able to provide this. For these reasons we do not think it is viable to start a business based on leasing, but rather focus on fixed or dynamic pricing. When dealing with private customers we think the easiest approach would be to have fixed pricing. We assume it makes it easier for private customers to purchase the product if they already know the price compared to dynamic pricing where they have to contact us beforehand. It could be an idea to include a way for them to contact us if they want a package deal for the whole house, but for single door purchase a fixed price is the easiest way to conduct business. By having a fixed price we also reduce the amount of work that is required for a sale to go through and allows us to focus on other aspects of the business. This is especially important in the early stages of the venture where we want to provide a higher degree of service when it comes to installation and setting up the product. If we had to be in personal contact with each potential buyer, we would likely have to hire additional personnel. If we are unable to make the sales by ourselves, it could be a good idea to try and establish partnerships or joint ventures with other companies in the same business area. This could mean a partnership with the electrical companies that currently sells the same type of products, but offer it to them at a reduced price, allowing them to earn more on each sale. There is a certain amount of risk involved when we have to buy motors in large quantities because it is not something that we can re-sell to others. If we move the product to the electrical companies, then we can avoid this issue. It could also be an idea to create a joint venture with a door manufacturing company and sell complete solutions where the ADO is integrated in the door. This would mean that our primary job is the delivery of the ADO solution while the door manufacturer stores and sells the product.

5.3.3 Sale Price Analysis

In the starting phase of establishing our company, the quantities of orders will be lower, which makes our product more expensive. For the business to be successful we need to buy a minimum of 50 complete solutions at a time. Based on this we calculated the cost of producing a single product in this quantity of 50 and the maximum delivery time, which can be seen in table 5.2.

Component	Price (DKK)	Delivery Time (Days)
Motor	1430	10-14
Encoder	224	10-14
PCB (Board)	12	3-5
PCB (Assembly)	61	25-60
PCB (Components)	150	10
Baseplate	50	1-5
Power Supply	65	1-7
Power Cable	25	3-10
3D Print Material	65	5-7
Rail & Arm	225	2-7
Activation Button	10	3-10
Total:	2318	Max. 60

Table 5.2. Calculating material cost of one device.

Hereafter we created a model inspired by Dragoninnovation [Thornton, 2018], to further present one product's cost of goods sold (COGS), sales price as a manufacturer and sales price if we were to both sell and manufacture the products ourselves. Furthermore, as only manufacturers we would expect circa 50% company gross for Adoore to get successful, thereby selling the product to retailers for about 5270 DKK. Moreover, if we also decide to sell the products ourselves we added a retail gross margin of 25%, which is about the same price we would expect installer companies to sell our product for. The complete result is shown in Figure 5.6.

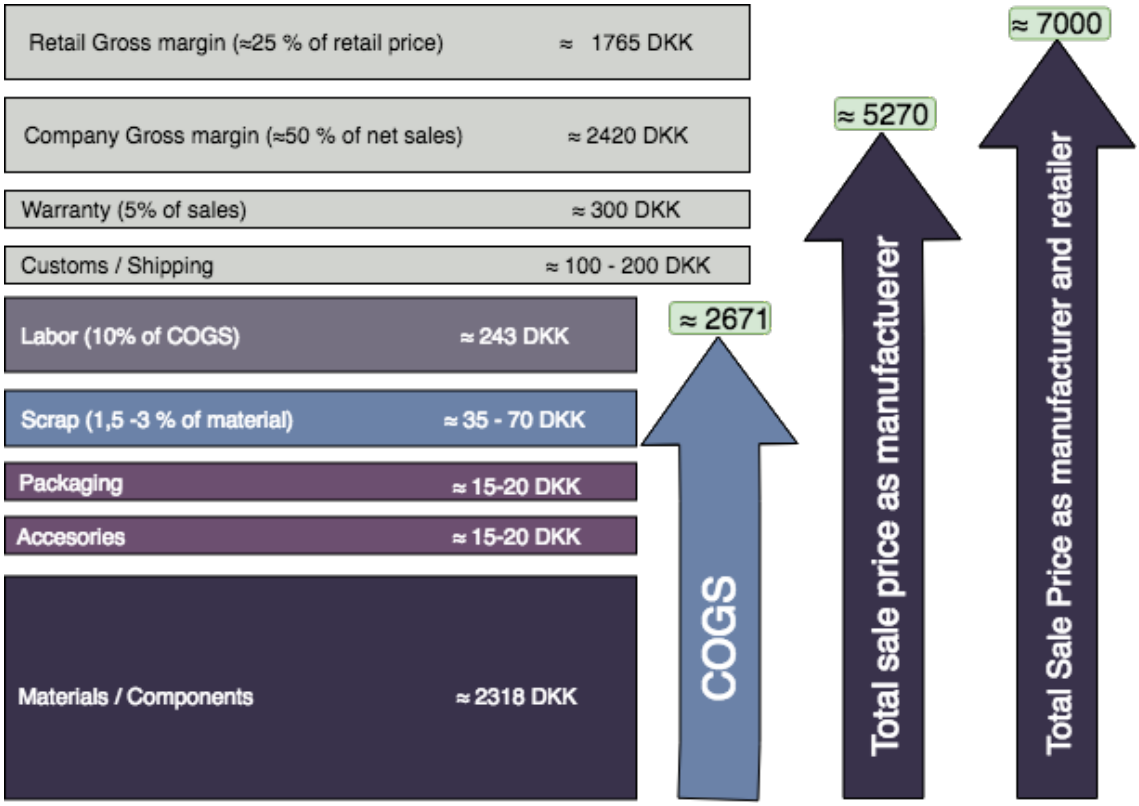

Figure 5.6. Sales price analysis.

Reflection

Firstly, we will try to sell the products ourselves to private consumers, and thereafter focus on the next step. If we get some positive sales numbers and further validation it will be easier to get other options like installer companies, contractors, governmental efforts and aid websites on board. The big question is to focus on all of them, two or just one. Furthermore, at this state the delivery time is quite long, because we have chinese supplier that create the PCB's. We will have to find a more trustworthy and time efficient source when the sales quantity increase. Furthermore, the COGS price will most likely gradually be reduced as we get more fitting suppliers, components and start buying in higher quantities.

5.3.4 Sales Forecast

Based on the previous sections a sales forecast has been made where we try take a look at how future sales predictions could look like for Adoore. The result can be viewed in Figure 5.7. The first year we will sell, install, manufacture and distribute the products ourselves. Moreover, the sales will mainly be locally so that we have time and opportunity to do it all. In year two and three it is impossible to say which direction we will go in, but these projections assume a do-it-yourself product is developed by this time. Thereby making it easy for customers to get friends, family or installers to install it to the wall, and we will just have to send the device to them. Also making it easier to reach larger parts of Denmark and other Scandinavian countries.

2018		2019		2020	
Number of sales	Turnover (in DKK)	Number of sales	Turnover (in DKK)	Number of sales	Turnover (in DKK)
186	1.302.000	735	5.145.000	1.456	10.192.000

Figure 5.7. Sales forecast

5.3.5 Budget and result

Before starting sales it is a reality that we need to invest around 150.000 to purchase components in a profitable quantity. We found that the most logical amount of devices to start out with are 50, which will cost around 116.000 DKK. By investing 150.000 we have some extra funds for unexpected expenses. This is not mentioned in the budget, it is included in cost pr. product. The first year is a bit pessimistic, as a result of our lack in experience regarding sales and marketing. It also gives us a milestone that we consider achievable and something we can measure against. Each month the sales are increased by about 3%, and with such low numbers, the increase of sales rise with only one device sold each month during the first year. From researching the competitor prices, talking with potential customers and the COGS analysis, we expect to sell the products for 7000 DKK. However, we can go as low as 5270 DKK and still make a reasonable profits as a manufacturer only. The budget is further based on two people running the company with no salaries the first six months. Rent is expected to be relatively cheap since we only need

space for two and a table for assembly. Advertising will take up 3% of the total sales each month for the first year and in year two it will increase to 10% and stay at 10% so the business can grow. In the expense tab we have made room for a car since we need that to travel the country, and a 3D printer for printing the ADO covers. One of them is enough for the first two year, while another one has to be bought in year three. Furthermore, once we have more sales we will have to hire legal help and acquire a freedom to operate license, which we expect to be cost 60.000 DKK. The reasoning behind this is that we read on a legal forum that it takes about 40-60 hours to of time in executing this type of search [ipnexus, 2018], and a danish lawyer's hourly salary is about 1000-2500 DKK [juf, 2018]. Additionally, we will need an accountant to overview our budget once a month, as we lack these skills in the team. A summary of the first year's budget can be seen in figure 5.8, while the full budget for each year can be found in Appendix F.

Sales	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**Total**
Sales	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	186.00
Price	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	
Total Sales	70,000	77,000	84,000	91,000	98,000	105,000	112,000	119,000	126,000	133,000	140,000	147,000	1,302,000
Cost of Sales													
Purchases													
Total Cost of Sales	25,597	28,157	30,716	33,276	35,836	38,396	40,955	43,515	46,075	48,634	51,194	53,754	476,104
Gross Profit before Labour	44,403	48,843	53,284	57,724	62,164	66,605	71,045	75,485	79,925	84,366	88,806	93,246	825,896
Labour Costs													
Total Labour Cost	0	0	0	0	0	0	45,000	45,000	45,000	45,000	45,000	45,000	270,000
Gross Profit	44,403	48,843	53,284	57,724	62,164	66,605	26,045	30,485	34,925	39,366	43,806	48,246	555,896
	May	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	
Gross Profit	**44,403**	**48,843**	**53,284**	**57,724**	**62,164**	**66,605**	**26,045**	**30,485**	**34,925**	**39,366**	**43,806**	**48,246**	555,896
Expenses													
Total Expenses	91,649	30,709	15,919	76,129	16,339	16,549	16,759	16,969	17,179	17,389	17,599	17,809	350,998
Net Profit/Loss	(47,246)	18,134	37,365	(18,405)	45,825	50,056	9,286	13,516	17,746	21,977	26,207	30,437	**204,898**
Accumilated Net Profit/Loss	(47,246)	(29,112)	8,253	(10,152)	35,673	85,729	95,014	108,530	126,277	148,254	174,461	204,898	
Quarter Net Profit/Loss			8,253			77,476			40,548			78,621	

Figure 5.8. Sales forecast for year one

Hereafter we created a graph showing the accumulated net profit or loss during these three years, which can be viewed in Figure 5.9.

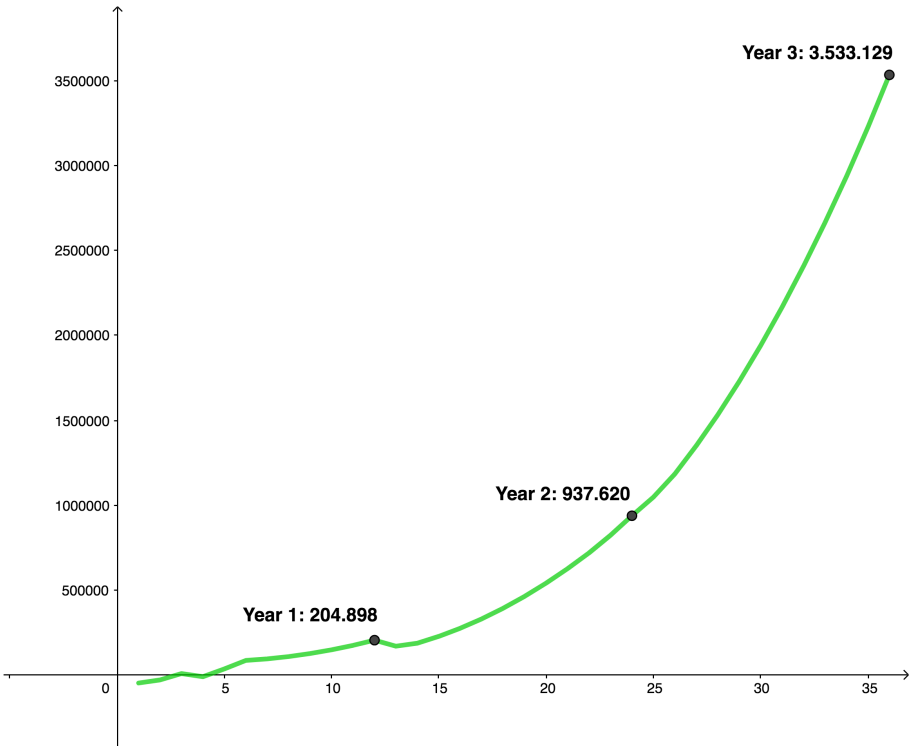

Figure 5.9. Overview of accumulated net profit

5.3.6 Reflection of Section

As market volume and value, revenue model and sales price analyzes were conducted, it created a stronger foundation for creating some financial projections. However, when performing them it is very complicated to anticipate how the numbers are going to look like, especially for a start-up that has no previous record to calculate from. Hence, the result is based on speculations that we assume to be somewhat realistic. During the three year period we assume it is possible to produce the devices manually, but during year three some early manufacturing initiatives for automating the process should be considered. Furthermore, these projections are dependent on us being able to create the product with do-it-yourself installation after the first year, we would not be able to install the amount of sales in year two and three. During the sales of the last two years we have also anticipated to win some smaller vendors, which is parts of the reason for selling that many products. It is still an reasonable amount of sales concerning the market volume, and at one point in year three an expansion to Sweden and Norway should be considered. As we have small amounts of experience with financial projections there is probably several unexpected expenses that are not included in the budget, but at least it gives us a foundation for further planning. The next time we present our company for business angels or various startup programs the budget should definitely be looked through and be further developed by someone with an economic degree. Furthermore, if the result turns out to be realistic, it shows early profits and potential for a sustainable business. In addition, there are not much risks for us to pursue this business, but the biggest one is that we need to purchase components for 50 devices to achieve the discount we need to make profits. Moreover, if our analyzes are wrong and we are not able to sell, it will be very hard to reclaim the money spent.

CLOSURE 6

In the final phase we conclude on the problem statement and subgoals that we made in the beginning of the semester. Where we discuss if they have been met, what we learned and future work. Additionally, we reflect on the methods and theories that we have worked with and discuss the knowledge gained.

6.1 CONCLUSION

This report has considered the continuation of starting a business in the automatic door market, with an innovative product for the homes of people with reduced mobility. The main goal during the process was to create a proposal of how to differentiate the company and develop the device simultaneously. Additionally, a list of goals were established to measure the project's success.

In short, the first success factor included to determine which target customers to pursue. There have been a lot of pivots during the process, but ended up acknowledging that private consumers would be the simplest and most rational way start selling our devices. The reasoning behind it is that the other alternatives, such as government, contractors and installer companies requires much more time and resources, which we do not have. Moreover, these potential customers might require sales numbers and further validation before buying into the concept, at least make the process easier. However, they should be evaluated as directions to go in a later stage of the venture, to scale up the sales and business. Another goal we set as crucial point was to develop a 0-series, which is the first version of a product that is legal to sell and safe to use. This was achieved by building three prototype versions with numerous iterations. In the end of the semester we managed to build a product that works exactly like our research shows it should. It is now complying to the necessary standard and has gotten a CE-mark, which is more than we hoped for. Now we can pursue a beta testing phase without any big concerns, and slowly start selling the devices very soon. Furthermore, the third success criteria was with regards to building an innovative business model. A business model canvas was created showing all the building blocks of our operations and what we offer our customers and end-users. There are still uncertainties, but the result offer a good foundation for the beginning of our venture and we offer a more customer focused experience than our competitors. The biggest uncertainty is if we can figure out how to do everything from manufacturing, selling, installing and distributing on our own, as later in the business development process we plan to move in a more sustainable direction. Hopefully the product will include a do-it-yourself version that lets us skip the installation aspects, and create a more simple way of selling to consumers, contractors and government. Another essential goal was to create a

go-to-market strategy, which we did not manage to accomplish. On the other hand, we were able to gain much insight on how to reach private consumers through research, CTA tests and interactions. Working towards the goal also taught us how much it takes to create a successful marketing strategy and the most essential point is to continiously develop it. Additionally, we gained a better understanding concerning governmental operations and how to approach them through our partnership with *the Nursing Homes of the Future*. Marketing strategy will be one of our top priorities in forthcoming times. In regards to the ambition of receiving funding from an educational program, we discovered that the business proposal was too immature at the time. However, we learned a lot about which aspects to give most attention, and now have more knowledge concerning what investors expect. Lastly, we recognized a sale to be a success factor, which we also did not achieve. Although we have a product that is ready for early adapters, we still want to perform a beta test beforehand. If the first one goes well, we hope to sell to early adapters for a lower sum and simultaneously use them as beta testers.

To review, it is evident that we have planned for a differentiated business in the automatic door market, and we have created a 0-series ready for beta testing and possibly also sales. The big question is if we are able to carry out our intentions. We consider the results as promising and if the next upcoming actions turn out to be successful, we have a fair chance of becoming a profitable company. However, it will most likely be a long and relentless journey with several changes along the way

6.2 FINAL REFLECTION

Looking back at the process, it has been an eventful semester with lots of new discoveries and additional factors to consider, that have turned out to be very educational. With regards to the methodological considerations, we have gained much positive experiences from utilizing them. On the other hand, it was not always easy to perform them with exact science. Furthermore, the business modeling, user-test and marketing management tools and theories were more straightforward, and easier to follow.

Firstly, effectuation in entrepreneurship brought us many new things to consider along the way, although we acknowledged some of the methodology to be obvious. However, it thought us to always take the opportunities that we can make happen and use our network for support when we need help. Especially the AAU incubator and teachers has proven to bring vital feedback, and if they did not have suggestions, we were sent to someone in their network. Secondly, we have continuously attempted to use the smallest amount of money possible with the highest output of new learning. Despite trying to follow this principle, we did make some mistakes. There were two situations, the first one we purchased motors that had to weak gearing and did not offer any significant knowledge. The other case was similar, but concerned PCB's, where we purchased ten of them without having finished the product, and ended up not using them. Furthermore, we have also put in an effort to not act on our own opinions, and rather base our actions on feedback and validation from others, especially with regards to product development. Although we did get a bit carried away with the idea of selling to nursing homes. Throughout the project we have been told it is very difficult and we dont have enough knowledge. We should have focused more on the private market. Next, we have learned the value of network and partnerships. Everytime

we have had a meeting with someone new it has provided us with new information and contacts, also ending up with new means towards potential partnerships and additional goals on what to do with the current situation. Now, we have chosen to focus on private consumers to begin with, because it will give us easier access and shorter processes. If we chose to focus on contractors and government the business might have ended before it started, but we assume that we will focus on these later in a later stage to scale up. However, even though we do not view the partnership we have with the Nursing Home of the Future as the first customer, it have provided us with testing facilities, access to potential customers and more. Creating a physical product is not an easy task if you do not have any previous experience or network in the field. There are many regulations and certifications that you need to live up to in order to be able to sell a product such as an automatic door operator. With continuous use of our obtained network we were able to discover many aspects before they became a problem. For example with regards to CE-marking, we were unaware of the regulations that was needed to be in order when creating physical products, but we discovered this in a meeting with an expert of patent and law, who also happened to be a mechanical engineer. Additionally, Life Science Innovation was not a complete waste, we still explored a market that can have potential in the future, and they have given us validation and a larger network. It also gives us an opportunity for reviving the partnership once they are ready to implement our product.

Unfortunately we did not get to utilize Lean Startup in correct science during product development, mainly because the alpha testing and preparing for beta testing did not require much feedback from relevant actors in the market. But we did use it during the marketing chapter, where Lean Startup showed great potential and something that we should keep using moving forward. During the CTA experiments, while developing the website and gathering important data, we learned how much innovation accounting can help with the measuring progress and analyzing data, and we quickly saw the benefits of continuously making improvements and testing them on potential customers and other visitors. This also provided us with some new and unexpected feedback from end-users in Denmark who described their problems and why they wanted to test our product. Unfortunately, we finished the 0-series to late, so we were never in a good position to start selling it, and we need more iterations in the CTA strategy and discover other marketing tactics. Looking back it could have been a possibility to try to sell it with a very long delivery time, but with the motor issues and finding a new supplier for a different one, we could not estimate the delivery time or price of the new product. When moving into the beta testing phase where we want to install the product at Anne-Marie's apartment at The Nursing Home of The Future, we should continue to apply Lean Startup and run tests of wanted features found in our research. Here we have a really great opportunity to get continuous feedback, both from her, other residents and the personnel at the facility who try it.

Working with the marketing aspects of the business and exploring marketing principles has given us great insight into how complex it can be to sell a product. It requires a lot of effort to sell these types of devices, mainly because the target customers is a relatively small segment and hard to reach. To reach a large scope we are in need of partnerships within government or aid companies to use their network. Additionally, many of the private consumers might be more into old mediums such as magazines or commercials whereas

the new generation is more focused on social media and webshops. We therefore need to further research how other businesses get in contact with target customers. However, we believe the right approach is to focus on the vision and values of Adoore, which simply put is to enhance their everyday life. Also, we should have included marketing principles and concepts from the very beginning of the venture, as we saw from the CTA tests we were able to find early adopters very quickly, which could have been potential customers and test users. Marketing might be one of our teams biggest weaknesses and there are still many uncertainties that we are facing. What is most crucial is that we keep trying new things and measure the effects, but it is likely that we need to get help or pay for expertise.

Working on the business aspects such as funding, the business model and financial projections helped show us how difficult it is to differentiate ourselves from others and how much it takes to convince others of your idea. Trying to get funding at the stage we did was in hindsight not the best use of our time, as we were still in an early stage of the venture. However, it gave us great experience within writing funding applications, pitching and knowledge about what investors seek. Our trip to Norway for the STUD-ENT fund gave us some great feedback in the form of a written document of why the judges decided not to give us the 1 million. It also helped us in recognizing that we might not have the required knowledge to focus on the B2B market as a start and rather focus on selling to private customer and gradually move towards B2B. This made us look into how we could create an innovative business model that would further differentiate ourselves from the competitors and help us deliver something of great value to the private customers. Using the business model theory presented in section 1.2 was a long process but we believe that it has helped us create a business model that is bringing something new to the customers, that other companies are not, and in combination with our product it has potential of success if marketed correctly. The projections made in the financial forecast also illustrates that if we are able to reach the sales within the first year we have a good basis to grow from. But it is very hard to predict the future and we are still unsure if we can do all the steps in the value chain that we want. However, it should be possible to begin with. What is important is that we continue to review the business model to see if it is still up to date during the venture, and make necessary changes or pivots if required.

With regards to our reports relation to the study curriculum, we acknowledge to have accounted most topics. It has involved business development, innovation, entrepreneurship, agile processes, prototyping, early design thinking, creative work and marketing. In addition, we have used the aspects for real life problems, targeted what we acknowledge as appropriate target customers and are currently trying to implement our work and form a real business. Moreover, we have utilized scientific methods, tools and attempted other types of actions concerning other professions such as accounting and law.

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PRIOR MVP's A

FIRST MVP

Our first MVP were finalized in 2016, as one of the bachelor thesis results. It consisted of a geared motor, which were attached to a shaft, and further welded directly to the hinge of a regular swing door, see Figure A.1 and A.2.

Figure A.1. First prototype seen in relation to the door.

Figure A.2. Close-up of the first prototype.

This operator was able to open the door, but after several openings the internal gearing malfunctioned and the device was ineffective. A simple electrical circuit made the operator active, when a button was pressed. A simple electrical circuit were constructed with a H-brdige, making the motor go both ways, when a button was clicked. The first prototype were significantly smaller than any existing solution and did not have an arm pointing outwards in the room. It was able to open doors, however, it did not last for long. The door hinge also needed to be replaced with a custom made hinge designed for this device. The findings of this project showed that the design were not optimal due to a maximum torque of 6 Nm and speed of 12 RPM, resulting in a broken gearbox. The concept with connecting the operator directly to the hinge, should also be reconsidered. However with the dimensions of $100 \times 100 \times 75mm$ this project showed that smaller operators for interior doors are within reach.

SECOND MVP

In spring 2017, a continuation of the former project was started. A better market research was conducted, surveying 80 users, interviewing federal institutes and organizations for disabled people. The outcome was similar to the former project, where they had different problems with door operators.

The concept is possible to attach on both sides of a regular swing door and if needed above a door on the wall. The concept uses a stronger geared DC motor, that is attached to an arm, which is connected to a sliding rail. The rail is fastened to the opposite side of the operator, on either the door or the top of a door frame. A sliding rail was milled with a CNC machine. The DC motor and sliding rail was attached to a plank with a hinge on the end, which was used to simulate a door setup. This was used to measure if the motor was able to open doors up to 45 kg and to investigate the required amount of current. The goal for opening doors up to 45 kg, were set because of this includes most interior doors. The full setup can be viewed in Figure A clutch function that ensures the door is easy to operate manually, was also investigated. The clutch function was tested in the experimental setup, to examine its functionality on doors up to 45 kg. This experiment showed issues with the clutch function, due to the high torques involved in this operation. The clutch did not manage to hold the weight of doors over 15 kg. The need for a bigger and more expensive clutch are therefore necessary, which contradicts the idea that the door operator should be small and inexpensive. As a result of this experiment, a different design had to be developed. A.3

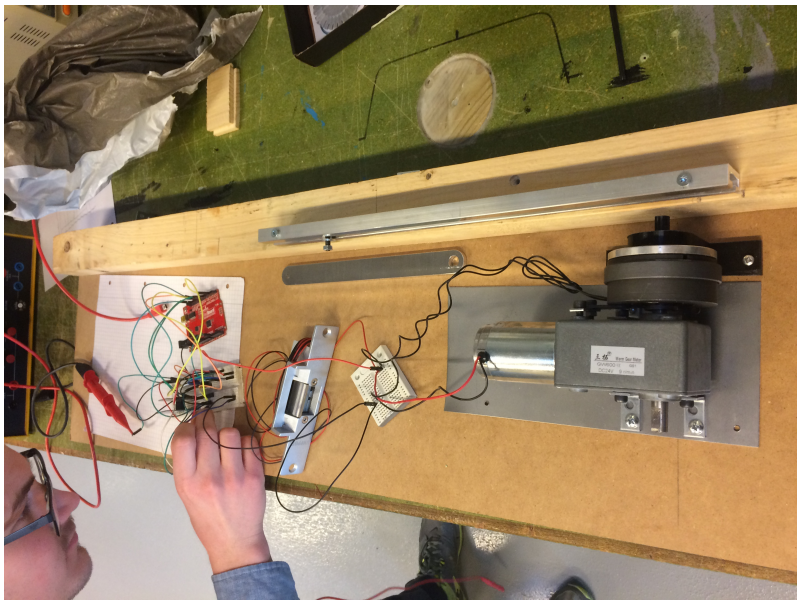

Figure A.3. Second prototype.

CERTIFICATION DOCUMENTS B

CONFORMITY ASSESSMENT

We have created a product that complies with European Norms. The declaration of conformity can be viewed in Figure B.1.

Declaration of Conformity

Directive 2006/42/EC (Machinery Directive)

Product:	Automatic Door Operator
Type Designation:	Adoore V3.01
Serial Number:	V3.01
Manufacturer:	Aalborg Universitet
	Fibigerstræde 14
	9220 Aalborg Øst
Base Documents:	Directive 2006/42/EC (Machinery Directive) - EN 16005

We declare in sole responsibility, that the above mentioned product, which is referred by this declaration, is in conformity with the above listed directives.

Aalborg, 11 May 2018

Mr. Bjørn Hansen	Mr. David Lampe
CEO	CTO

Figure B.1. Conformity assessment needed to obtain CE-marking

TECHNICAL DESCRIPTION

This technical description includes drawings and bill of materials.

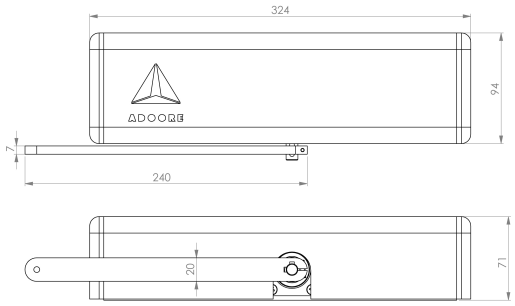

Figure B.2. Cover dimensions.

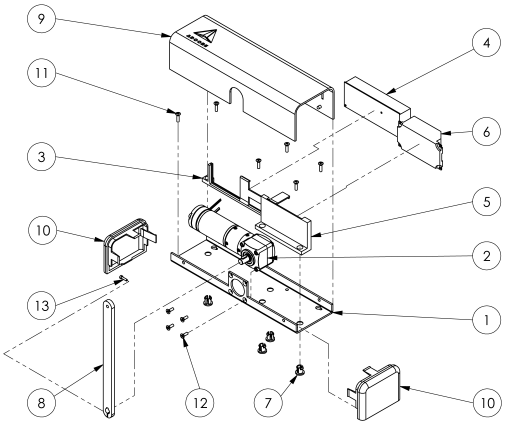

Figure B.3. Exploded view of ADO, including part numbers.

Table B.1. Bill of material, showing item number.

Item No.	Description	Item No.	Description
1	Baseplate	8	Arm Connector
2	DC Motor incl. Gearing	9	Cover
3	PCB Module	10	End cap
4	PCB Controller	11	M4 x 16mm Bolt
5	Power Supply Module	12	M4 x 12mm Bolt
6	Power Supply	13	M3 x 12mm Bolt
7	Snap Fit Component	-	-

RATING PLATE

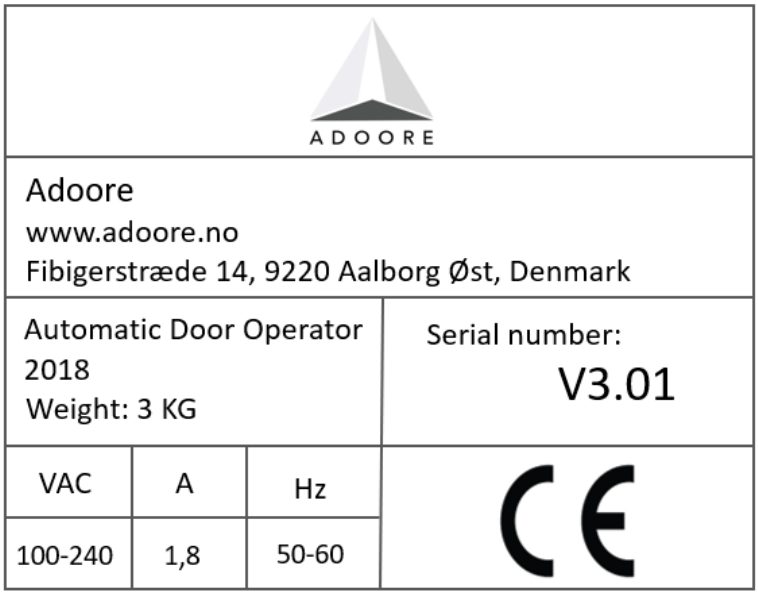

Figure B.4. Rating plate of Adoore.

DESIGN CALCULATIONS

Minimum opening time and speed:

$$t = \frac{D\sqrt{m}}{2.26} \tag{B.1}$$

Where:

t	Time [s]
D	Width of door [m]
m	Mass of door [kg]
2.26	Conversion factor $\left[\sqrt{\text{J}}\right]$

$$t = \frac{0.825[m]\sqrt{45[kg]}}{2.26} = 2.44[s] \tag{B.2}$$

Following equation B.2, the minimum allowable door closing time is approximately $2.5s$. Next following calculation ensures the door operator does not generated too high kinetic energy, see equation B.3

$$E_c = 1/2mv^2 = 1.69[\text{J}] \tag{B.3}$$

Where:

E_c	Kinetic energy [J]
m	Mass of door [kg]
t	Time for opening and closing [s]
D	90 % of the travelling distance of the door [m]
v	Speed of door [m/s]

$$v = \sqrt{\frac{2E_c}{m}}[\text{m/s}] \tag{B.4}$$

$$v = \sqrt{\frac{2 \cdot 1.69[J]}{45[kg]}} = 0.27[m/s] \tag{B.5}$$

Following equation B.5, the maximum allowable speed of the door operator, cannot exceed $0.27[m/s]$. As of such, the door operator cannot generate kinetic energy above the allowable $1.69[J]$.

COMPLIANCE WITH EN 16005

Two tests on the final product has been conducted, to insure its functionality and safety. The first test investigates the force required to open the door manually. Where the second test regards the force required to stop the door during a collision. Following EN 16005, the force used for opening the door manually cannot exceed $90N$ and during collision, the door can not apply a force higher than $67N$ onto the colliding object.

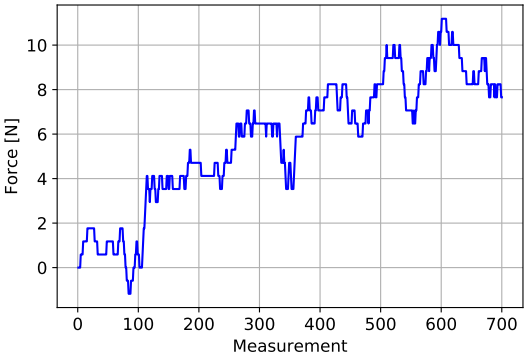

Figure B.5. Graph illustrating the required forces to open the door manually, maximum force recorded is $11.183N$.

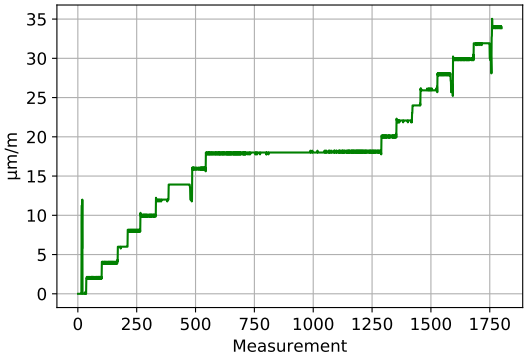

Figure B.6. Graph of the forces applied to an object during collision, maximum force recorded is $31.784N$.

As the figures illustrate, a maximum force of $11.18N$ is recorded when manually opening the door. Likewise, is the highest force recorded during collision $31.78N$. Thereby, the door operator complies with EN 16005 and is therefore safe to use.

MOUNTING MANUAL

We have created a picture showing how to mount it, but the guided text that comes with it is under construction. See Figure B.7.

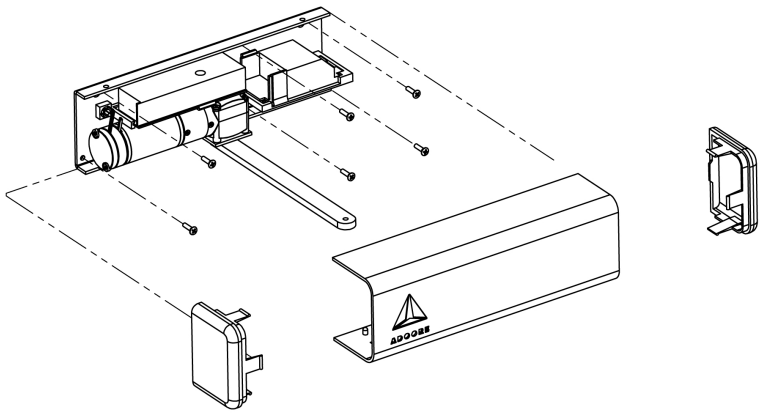

Figure B.7. Picture of mounting manual.

USER MANUAL

1. Turn the product *ON*.
2. Download the Adoore *Application* on an Android device.
3. Follow the instructions in the application, for pairing the Android device with the door operator.
4. After successfully pairing of devices, the application can now be used for controlling the door operator.
5. Clicking the *Open* button inside the application, will start an opening/closing sequence.
6. Through the *Option* tab, adjust the settings to your personal preferences.
7. The device is now configured and ready for use.

BETA TESTS C

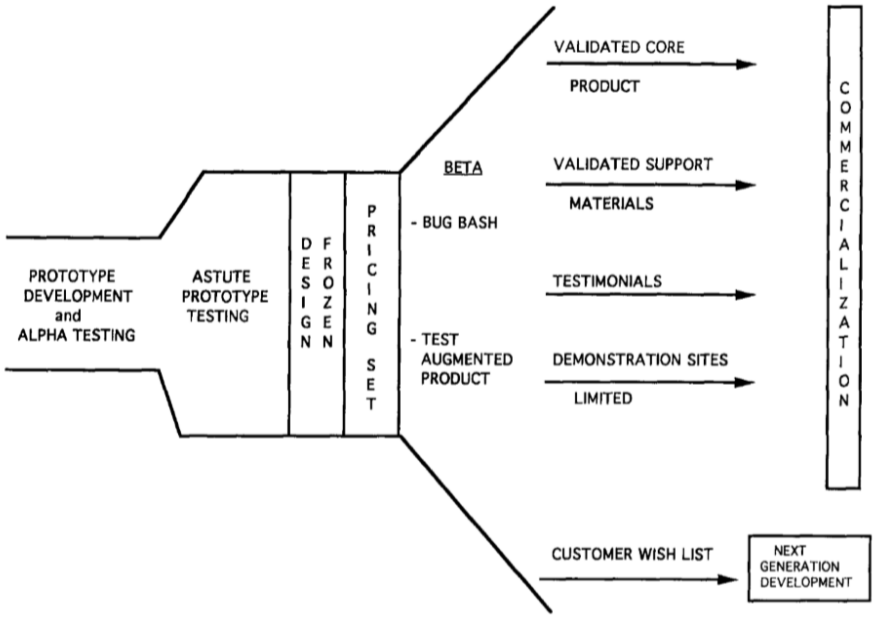

Figure C.1. Product development process at Network Software [Dolan and Matthews, 1993]

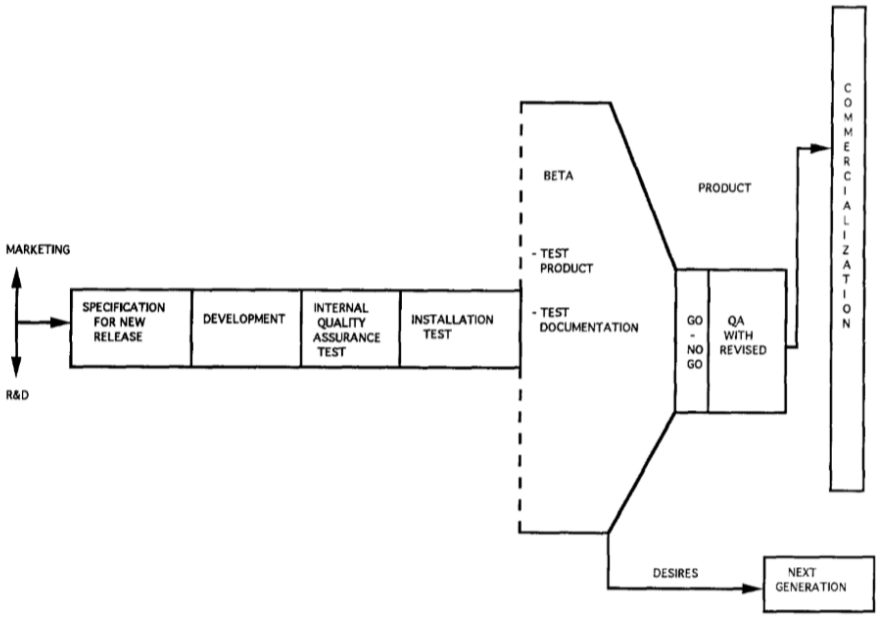

Figure C.2. Product development process at Toolkit [Dolan and Matthews, 1993]

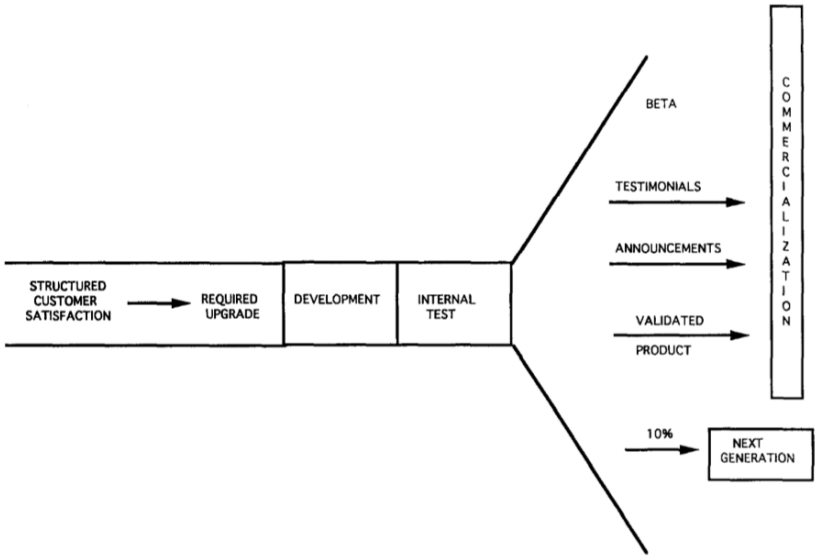

Figure C.3. Product development process at Mini Hardware [Dolan and Matthews, 1993]

VALUE DRIVERS: SEARCH D

Underneath are all the BMCo we acknowledged to have a potential to fit into our BM during the searching process.

Configurations linked to Value Proporsition:

VP3: Cool brands (Linder and Cantrell, 2000): use a high-end brand marketing for products or services either singly or with expert partners (NIKE).

VP6: Fast follower (Authors' interpretation): under-price competitors and leverage marketing to persuade customers that your offering is equivalent (MCI WorldCom)

VP7: Full service provider (Weill and Vitale, 2001): provide a total and complete coverage of services in one particular area (e.g. financial, health) (Alberta Health Services, Geek Squad)

VP8: exploit proprietary technology to offer unique products/services that command high margins.

VP10: Mass-customized commodity (Linder and Cantrell, 2000): customized model options along with competitive prices and fast delivery (Dell)

VP11: No frills (Gassmann et al., 2014): offer low price, low service/ product and standardized version of a traditionally high-end offering (Ryanair)

VP13: Price-reduction bundling (Authors' interpretation): packaging related product together. The price of the package deal is lower than the sum of the prices of the single products or services (Fast food value meals) Today you don't find the prices of most door operators, and especially not everything combined (installation, door lock, door operator, electrical stuff).

VP15: Selling product performance (Authors' interpretation): rather than sell product ownership, sell the performance that the product fulfills (e.g. time unit, distance unit) (Rolls Royce engines, Zipcar)

VP19: Trusted product/service leadership (Linder and Cantrell, 2000): ensure long-lasting customer relationships through a platform with a continuous upgrade path (Teradyne)

Configurations linked to Value Segment:

VS2: Customer focused (Authors' interpretation): focus on the customer needs and decentralize the infrastructure management and the product innovation activities (Zara)

VS5: Robin Hood (Gassmann et al., 2014): the same product or service is provided to

high-income customers at a much higher price than to the low-income customers. Serving the low-income segment is not profitable per se, but creates economies of scale, which other providers cannot achieve (TOM'S Shoes, Warby Parker)

VS8: Ultimate luxury (Gassmann et al., 2014): target high-income customers with high quality, high status, luxury products (Lamborghini, Jumeirah Group)

Configurations linked to Value Configuration

VCo4: Disintermediation (Johnson, 2010): deliver a product or a service directly to the customer rather than through intermediary channels (Dell)

VCo6: E-procurement/procurement (Timmers, 1998): tendering and procurement of goods and services by leveraging suppliers against each other in order to reduce the cost of procurement (Public invitation to tender)

VCo9: Integrator (Gassmann et al., 2014): be in command of the bulk of the steps in a given value chain by controlling all resources and capabilities needed to create value (Zara, Ford)

VCo10: Reverse innovation (Gassmann et al., 2014): cheap products created within and for emerging markets are also repackaged and resold in developed nations (Nokia, Renault)

VCo11: Self-service (Gassmann et al., 2014): customers perform some tasks of the value creation process in exchange for a lower price. Tasks usually add low value for the customers, but generate high costs for the company (Ikea, McDonald's)

VCo12: Trade show (Authors' interpretation): leave marketing or other value chain functions (payment, logistics, ordering) to a 3rd party with a well-known brand name (Alibaba, Exhibition fair)

VCo13: Trash to cash! (Gassmann et al., 2014): for the sake of sustainability, used products or materials are reused in another value chain or recycled and sold as new products (H and M)

VCo14: White label (Gassmann et al., 2014): a product created by one company is packaged and sold by multiple marketers under varying brand names so that different customer segments can be served (Foxconn)

Configurations linked to Value Network

VN5: Crowd funding (Gassmann et al., 2014): get the financing of an idea (project, product, start up) from the general public. Investors support the underlying idea by providing zero-interest financial resources. Then, they receive special benefits if the critical mass is achieved and the idea is realized (Pebble Technology)

VN8: Inside-out (Osterwalder and Pigneur, 2010): sell or license own developed R and D, i.e., intellectual properties or technologies which are not used or underused inside the company (GlaxoSmithKline)

VN10: Outside-in (Osterwalder and Pigneur, 2010): gather value (e.g. information) from external sources, such as innovation partners and research communities (Procter

and Gamble)

Configurations linked to Value Capture

VCa1: Bait and hook (Osterwalder and Pigneur, 2010): offer customers an inexpensive or free initial product and then have pay more for additional related products (Gillette, HP inkjet)

VCa4: E-auction/auction (Timmers, 1998): web-based or traditional auction with traditional bidding mechanisms (eBay)

VCa6: Freemium (Osterwalder and Pigneur, 2010): customers get basic offerings for free and then pay additional offerings if they desire. The large customer base is subsidized by a small and higher paying one (Skype)

VCa8: Instant gratification (Linder and Cantrell, 2000): make money on high-priced instalment credit by providing a split payment option to customers who can't afford the whole payment immediately (Capital One)

VCa9: Leasing (Johnson, 2010): make products affordable by renting rather than outright selling them (Xerox) (don't think this one is possible. The installation costs to much)

VCa10: Pay-as-you-go (Johnson, 2010): charge the customer for metered services based on actual usage (PG and E)

VCa11: Pay what you want (Gassmann et al., 2014): customers set the price for a given product or service so that companies can attract a wide customer base. It is crucial that the customers understand the real value of the product or service to be priced (NoiseTrade, Humble Bundle)

VCa12: Reverse auction (Johnson, 2010): set a ceiling price for a product and have potential customers bid the price down (Elance.com)

VCa13: Reverse bait and hook (Johnson, 2010): offer a low-margin product at low or no cost to encourage sales of the initial highermargin product (Amazon Kindle)

VCa14: Subscription club (Johnson, 2010): charge the customer a subscription fee (e.g. fixed, daily monthly, or annual) to gain access to a product or service (Costco, Netflix)

VCa16: Upfront payment (Authors' interpretation): have the customer pay up front and generate high profits by maintaining low inventory (Amazon.com)

SECONDARY VALUE E

Table E.1 shows how the primary value drivers work on a secundary level.

	Value Proposition	Value Segment	Value Configuration	Value Network	Value Capture
VP 6		X	X		
VP 19		X	X		
VS 2			X	X	
VCo 4	X				
VN 10			X		
VCa 9	X	X			

Table E.1. Secondary Value Drivers

BUDGET F

YEAR 1

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Sales													
Sales	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	186.00
Price	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	
Total Sales	70,000	77,000	84,000	91,000	98,000	105,000	112,000	119,000	126,000	133,000	140,000	147,000	1,302,000
Cost of Sales													
Purchases													
Motor	14,300	15,730	17,160	18,590	20,020	21,450	22,880	24,310	25,740	27,170	28,600	30,030	
Encoder	2,240	2,464	2,688	2,912	3,136	3,360	3,584	3,808	4,032	4,256	4,480	4,704	
PCB	2,230	2,453	2,676	2,899	3,122	3,345	3,568	3,791	4,014	4,237	4,460	4,683	
Power Cable	250	275	300	325	350	375	400	425	450	475	500	525	
Power Supply	650	715	780	845	910	975	1,040	1,105	1,170	1,235	1,300	1,365	
Activation buttons	100	110	120	130	140	150	160	170	180	190	200	210	
Rail & Arm	2,250	2,475	2,700	2,925	3,150	3,375	3,600	3,825	4,050	4,275	4,500	4,725	
3D printing material	650	715	780	845	910	975	1,040	1,105	1,170	1,235	1,300	1,365	
Baseplate	600	660	720	780	840	900	960	1,020	1,080	1,140	1,200	1,260	
Total Material	23,270	25,597	27,924	30,251	32,578	34,905	37,232	39,559	41,886	44,213	46,540	48,867	
Unexpected 10%	2327	2559.7	2792.4	3025.1	3257.8	3490.5	3723.2	3955.9	4188.6	4421.3	4654	4886.7	
Total Cost of Sales	25,597	28,157	30,716	33,276	35,836	38,396	40,955	43,515	46,075	48,634	51,194	53,754	476,104
Gross Profit before Labour	44,403	48,843	53,284	57,724	62,164	66,605	71,045	75,485	79,925	84,366	88,806	93,246	825,896
Labour Costs													
David	0	0	0	0	0	0	22,500	22,500	22,500	22,500	22,500	22,500	135,000
Jakob	0	0	0	0	0	0	22,500	22,500	22,500	22,500	22,500	22,500	135,000
Total Labour Cost	0	0	0	0	0	0	45,000	45,000	45,000	45,000	45,000	45,000	270,000
Gross Profit	44,403	48,843	53,284	57,724	62,164	66,605	26,045	30,485	34,925	39,366	43,806	48,246	555,896

Figure F.1. Sales Forecast Year 1 - Adoore 1/2

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
Gross Profit	**44,403**	**48,843**	**53,284**	**57,724**	**62,164**	**66,605**	**26,045**	**30,485**	**34,925**	**39,366**	**43,806**	**48,246**	555,896
Expenses													
Insurances		15,000											
Credit card charges	100	100	100	100	100	100	100	100	100	100	100	100	
Bank charges	750	100	100	100	100	100	100	100	100	100	100	100	
Consumer goods	200	200	200	200	200	200	200	200	200	200	200	200	
Accountant	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Office rent	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	
Car (55,000 yearly, estimate fron	50,000	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	
3D Printer	30,000												
Advertising/marketing (3% of rev	2,100	2,310	2,520	2,730	2,940	3,150	3,360	3,570	3,780	3,990	4,200	4,410	
Payment (dibs.dk)	299	299	299	299	299	299	299	299	299	299	299	299	
Legal & Prof. Fees (Freedom to operate)				60,000									
Total Expenses	91,649	30,709	15,919	76,129	16,339	16,549	16,759	16,969	17,179	17,389	17,599	17,809	350,998
Net Profit/Loss	(47,246)	18,134	37,365	(18,405)	45,825	50,056	9,286	13,516	17,746	21,977	26,207	30,437	**204,898**
Accumilated Net Profit/Loss	(47,246)	(29,112)	8,253	(10,152)	35,673	85,729	95,014	108,530	126,277	148,254	174,461	204,898	
Quarter Net Profit/Loss			8,253			77,476			40,548			78,621	

Figure F.2. Sales Forecast Year 1 - Adoore 2/2

YEAR 2

Sales	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total 12mths
Units sold Nursing homes	50.00	52.00	54.00	56.00	58.00	60.00	62.00	64.00	66.00	68.00	71.00	74.00	735.00
Price	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	
Total Sales	350,000	364,000	378,000	392,000	406,000	420,000	434,000	448,000	462,000	476,000	497,000	518,000	5,145,000
Cost of Sales													
Purchases													
Motor	71,500	74,360	77,220	80,080	82,940	85,800	88,660	91,520	94,380	97,240	101,530	105,820	
Encoder	11,200	11,648	12,096	12,544	12,992	13,440	13,888	14,336	14,784	15,232	15,904	16,576	
PCB	11,150	11,596	12,042	12,488	12,934	13,380	13,826	14,272	14,718	15,164	15,833	16,502	
Power Cable	1,250	1,300	1,350	1,400	1,450	1,500	1,550	1,600	1,650	1,700	1,775	1,850	
Power Supply	3,250	3,380	3,510	3,640	3,770	3,900	4,030	4,160	4,290	4,420	4,615	4,810	
Activation buttons	500	520	540	560	580	600	620	640	660	680	710	740	
Rail & Arm	11,250	11,700	12,150	12,600	13,050	13,500	13,950	14,400	14,850	15,300	15,975	16,650	
3D printing material	3,250	3,380	3,510	3,640	3,770	3,900	4,030	4,160	4,290	4,420	4,615	4,810	
Baseplate	3,000	3,120	3,240	3,360	3,480	3,600	3,720	3,840	3,960	4,080	4,260	4,440	
Total Material	116,350	121,004	125,658	130,312	134,966	139,620	144,274	148,928	153,582	158,236	165,217	172,198	
Unexpected 10%	11635	12100.4	12565.8	13031.2	13496.6	13962	14427.4	14892.8	15358.2	15823.6	16521.7	17219.8	
	127,985	133,104	138,224	143,343	148,463	153,582	158,701	163,821	168,940	174,060	181,739	189,418	1,881,380
Total Cost of Sales	127,985	133,104	138,224	143,343	148,463	153,582	158,701	163,821	168,940	174,060	181,739	189,418	
Gross Profit before Labour	222,015	230,896	239,776	248,657	257,537	266,418	275,299	284,179	293,060	301,940	315,261	328,582	3,263,621
	63.43%	63.43%	63.43%	63.43%	63.43%	63.43%	63.43%	63.43%	63.43%	63.43%	63.43%	63.43%	
Labour Costs													
Part-time sales employee	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	
Part-time sales employee	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	
Mads	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
Bjørn	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
David	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
Jakob	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	

Figure F.3. Sales Forecast Year 2 - Adoore 1/2

Total Labour Cost	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	1,728,000
Gross Profit	78,015	86,896	95,776	104,657	113,537	122,418	131,299	140,179	149,060	157,940	171,261	184,582	1,535,621
	22.29%	23.87%	25.34%	26.70%	27.96%	29.15%	30.25%	31.29%	32.26%	33.18%	34.46%	35.63%	
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Gross Profit	**78,015**	**86,896**	**95,776**	**104,657**	**113,537**	**122,418**	**131,299**	**140,179**	**149,060**	**157,940**	**171,261**	**184,582**	1,535,621
Expenses													
Salary program	330	330	330	330	330	330	330	330	330	330	330	330	
Insurances		15,000											
Credit card charges	100	100	100	100	100	100	100	100	100	100	100	100	
Bank charges	750	100	100	100	100	100	100	100	100	100	100	100	
Consumer goods	200	200	200	200	200	200	200	200	200	200	200	200	
Accountant	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Office rent	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	120,000
Car (55.000 yearly, estimate from	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	54,000
Insurances	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
3D Printer	60,000												60,000
Advertising/marketing (10% of rev	35,000	36,400	37,800	39,200	40,600	42,000	43,400	44,800	46,200	47,600	49,700	51,800	514,500
Payment (dibs.dk)	299	299	299	299	299	299	299	299	299	299	299	299	3,588
Legal & Prof. Fees (Freedom to operate)													0
Total Expenses	113,379	69,129	55,529	56,929	58,329	59,729	61,129	62,529	63,929	65,329	67,429	69,529	802,898
Net Profit/Loss	(35,364)	17,767	40,247	47,728	55,208	62,689	70,170	77,650	85,131	92,611	103,832	115,053	**732,723**
	-27.63%	13.35%	29.12%	33.30%	37.19%	40.82%	44.21%	47.40%	50.39%	53.21%	57.13%	60.74%	
Accumilated Net Profit/Loss	169,534	187,300	227,548	275,275	330,484	393,173	463,342	540,993	626,123	718,735	822,567	937,620	
Quarter Net Profit/Loss		22,650				165,625			232,951			311,497	

Figure F.4. Sales Forecast Year 2 - Adoore 2/2

YEAR 3

Sales	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total 12mths
Units sold Nursing homes	100.00	103.00	107.00	111.00	115.00	119.00	123.00	127.00	131.00	135.00	140.00	145.00	1,456.00
Price	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00
Total Sales	700,000	721,000	749,000	777,000	805,000	833,000	861,000	889,000	917,000	945,000	980,000	1,015,000	10,192,000
Cost of Sales													
Purchases													
Motor	143,000	147,290	153,010	158,730	164,450	170,170	175,890	181,610	187,330	193,050	200,200	207,350	
Encoder	22,400	23,072	23,968	24,864	25,760	26,656	27,552	28,448	29,344	30,240	31,360	32,480	
PCB	22,300	22,969	23,861	24,753	25,645	26,537	27,429	28,321	29,213	30,105	31,220	32,335	
Power Cable	2,500	2,575	2,675	2,775	2,875	2,975	3,075	3,175	3,275	3,375	3,500	3,625	
Power Supply	6,500	6,695	6,955	7,215	7,475	7,735	7,995	8,255	8,515	8,775	9,100	9,425	
Activation buttons	1,000	1,030	1,070	1,110	1,150	1,190	1,230	1,270	1,310	1,350	1,400	1,450	
Rail & Arm	22,500	23,175	24,075	24,975	25,875	26,775	27,675	28,575	29,475	30,375	31,500	32,625	
3D printing material	6,500	6,695	6,955	7,215	7,475	7,735	7,995	8,255	8,515	8,775	9,100	9,425	
Baseplate	6,000	6,180	6,420	6,660	6,900	7,140	7,380	7,620	7,860	8,100	8,400	8,700	
Total Material	232,700	239,681	248,989	258,297	267,605	276,913	286,221	295,529	304,837	314,145	325,780	337,415	
Unexpected 10%	23270	23968.1	24898.9	25829.7	26760.5	27691.3	28622.1	29552.9	30483.7	31414.5	32578	33741.5	
	255,970	263,649	273,888	284,127	294,366	304,604	314,843	325,082	335,321	345,560	358,358	371,157	3,726,923
Total Cost of Sales	255,970	263,649	273,888	284,127	294,366	304,604	314,843	325,082	335,321	345,560	358,358	371,157	
Gross Profit before Labour	444,030	457,351	475,112	492,873	510,635	528,396	546,157	563,918	581,679	599,441	621,642	643,844	6,465,077
Labour Costs													
Accountant	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
Sales employee	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
Sales employee	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
Mads	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
Bjørn	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
David	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
Jakob	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	

Figure F.5. Sales Forecast Year 3 - Adoore 1/2

Packaging guy	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	
Total Labour Cost	217,500	217,500	217,500	217,500	217,500	217,500	217,500	217,500	217,500	217,500	217,500	217,500	2,610,000
Gross Profit	226,530	239,851	257,612	275,373	293,135	310,896	328,657	346,418	364,179	381,941	404,142	426,344	3,855,077
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Gross Profit	**226,530**	**239,851**	**257,612**	**275,373**	**293,135**	**310,896**	**328,657**	**346,418**	**364,179**	**381,941**	**404,142**	**426,344**	3,855,077
Expenses													
Salary Program	330	330	330	330	330	330	330	330	330	330	330	330	
Insurances		15,000											
Credit card charges	100	100	100	100	100	100	100	100	100	100	100	100	
Bank charges	750	100	100	100	100	100	100	100	100	100	100	100	
Consumer goods	200	200	200	200	200	200	200	200	200	200	200	200	
Office rent	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	120,000
Car (54000 yearly, estimate from	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	54,000
Insurances	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
3D Printer	30,000												30,000
Advertising/marketing (10% of rev	70,000	72,100	74,900	77,700	80,500	83,300	86,100	88,900	91,700	94,500	98,000	101,500	1,019,200
Payment (dibs.dk)	299	299	299	299	299	299	299	299	299	299	299	299	3,588
Legal & Prof. Fees (Freedom to operate)													0
Total Expenses	117,179	103,299	91,099	93,899	96,699	99,499	102,299	105,099	107,899	110,699	114,199	117,699	1,259,568
Net Profit/Loss	109,351	136,552	166,513	181,474	196,436	211,397	226,358	241,319	256,280	271,242	289,943	308,645	**2,595,509**
Accumilated Net Profit/Loss	1,046,971	1,183,523	1,350,036	1,531,511	1,727,946	1,939,343	2,165,701	2,407,020	2,663,300	2,934,542	3,224,485	3,533,129	
Quarter Net Profit/Loss			412,416			589,307			723,957			869,829	

Figure F.6. Sales Forecast Year 3 - Adoore 2/2