Acronyms

Contents

Chapter 1

Introduction

1.1 Scope

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1.2 Problem Definition

Games are becoming more and more important in the health sector. One specific genre of games is exercise games (exergames). In this assignment we will focus on the business opportunities and economics of games in the health sector, with special focus on exergames for rehabilitation and elderly. The work has been done in collaboration with Cyberlab, a company focusing on serious games for education and training. The work will provide input to an EU funded project focusing on elderly afraid of falling.

In particular, the following studies will be done:

- A background study of exergames in general and exergames for rehabilitation and elderly in particular.
- A description of specific business cases.
- Analyzing the business potential of this type of games in the health sector using Osterwalder business model.
- Miscellaneous aspects to consider about this type of game

1.3 About the Project

This project assignment is based on an EU-funded project called "GameUp". The purpose of "GameUp" is to use technologies that are proved to improve motivation to encourage elderly to be more physically active. The goal is to sustain and enhance mobility in older persons so that they can live longer at home which will result in a better quality of life. To achieve this they want to increase physical activity capabilities in order to increase motivation and self-efficacy towards mobility. For making it convenient and easy to use, they will develop a platform for social and exercise games using low cost motion sensors and commercial modules and products [1].

This project is a European cooperation with different partners involved. On of these partners is Cyberlab, a small company located in Trondheim. They are working with developing simulators and simulation-based games primarily for technical education and training, but also for promotion and exemplification of technical products and services (nesten avskrift fra deres hjemmeside, [2]. Their work in the "GameUp" project is to develop a exercise game using Microsoft Kinect as a platform. (Tor-Ivar).

1.4 Limitation of Scope

hvordan går det

1.5 Related Work

her er det masse

1.6 Outline

Chapter 2

A Background Study

2.1 Fall Prevention and Rehabilitation Today

2.2 Exercise Games

Digital games where exercise and game play are brought together are called exergames. Technology for tracking body movement, like motion sensors and remote controls, require the players to move which stimulates exercise. The combination of movement, fun and social interaction provides exergaming great potential for new business opportunities for the entertainment, recreation and healthcare sectors [3].

Today there exist numerous types of games and technologies, where Nintendo Wii, Dance Dance Revolution, Playstation Eye Toy and Xbox Kinect are some of the more familiar technologies. This genres of games has become very popular, and due to the growing interests one has seen it as relevant to study the use in regard of health and education. The technology these games provide can in an interesting way help provide health-related information to specified target groups [3]. In the past years exergames research has increased dramatically, and indications show that it will continue to do so [4]. Some research done on exergaming shows tremendous promise in academic, social and physical progress of youth using exergames. The health sector is now more focused on prevention of illness in stead of treatment, where this type of research can contribute to use of exergames in health care [3]. Games like Wii Sports and Dance Dance Revolution were designed to encourage physical activity, but many currently available exergames were not designed for this purpose. The popularity of exergames and the increasing customer appeal will improve design principles and physical requirements [4].

2.2.1 Dance Dance Revolution

Dance, Dance Revolution (DDR) is a series of video games created by Konami Corporation's Bemani music games division. DDR is a rhythmic dance simulation game and was first released as an arcade game in 1998. In few years it became very popular, and the game has had its appearance on several game console systems like Sony Playstation, Nintendo 64, Microsoft Xbox and Nintendo GameCube [5].

DDR uses a touch-sensitive dance pad with sensors to register movements, where one shall press the right sensors in proper time with electronic dance music. Arrows on-screen gives direction on how and when to move around. The DDR games have varying difficulty, requiring different levels of physical activity. GetUpMove.com is an information website about the use of PlayStation Dance Dance Revoluition as a weight loss tool. This site was launched in 2004, and one of the highlighted stories was about a young woman who lost about 95 pounds by using DDR as an exercise tool. This and similar stories got widespread exposure, and consumers started to buy DDR solely for the purpose of exercise [5]. By a research done in 2006 it was clear that most articles stated that playing exergames had a positive health effect. Even though DDR falls short in meeting all the requirements stated from the American College of Sports Medicine (ACSM), studies has shown that players can meet the ACSM's minimum requirement by playing DDR at the beginner level [4].

In 2003, 5 years after the first release, Konami announce that DDR has reached a total sale of 6,5 million units worldwide [6]. This number does not include Arcade units. 8 years later, in 2011, the number of sold units had reached over 13 million, which is about 1 million units sold every year sinced the first release in 1998 [7].

2.2.2 PlayStation EyeToy

In the early 2000s the PlayStation 2 EyeToy was released by Sony Inc. It was the first in this category of games to introduce a device that could translate human motions into a controller input and allow players to physically interact with virtual objects using their own body and without being connected to wires. [8]. Human body movements are translated real-time into the controller input by a USB camera and can also map the player's face onto in-game characters. Eye Toy is easy to set up and its applications offer a lot of different environment and can be played by one or more players [9].

2.2.3 PlayStation Move

PlayStation 3 Move was released in September 2010. The PlayStation Move's interface consists of the Move Eye, a RGB camera with directive microphones, and the Motion Controller, a wand with an illuminating sphere attached to it. The camera can detect the sphere and determine where the wand is, which allows the players to interact with the PlayStation 3 through motion and position. The sphere attached to the wand helps the camera to determine the distance from the wand to the camera and to track the controllers position in three dimensions. The wand is equipped with a three-axis accelerometer and a three-axis gyro sensor which are used to track rotation in overall motion and can also be used to detect if the wand is out of range (i.e. hidden behind the player back). It also consists of a geomagnetic sensor used to calibrate the wand's orientation against the Earth's magnetic field, which makes it possible to recognize the wand's position accurately. (hmmm... hvordan kan denne setningen skrives på en annen måte?) [10]. Up to four wands are supported at one time, which makes it possible for four players to play together. The color of the sphere can be changed to any color and is usually used to show what player is active and to give visual feedback [11]. The SDK is not made public, so its difficult for a third-party to make original applications [10].

2.2.4 Nintendo Wii

Nintendo Wii was released in 2006 as the first motion sensor game. Only one year and 20 million units sold later, it became the market leader of that times generation of consoles. It consists of a Wii remote, which is the primary controller and a secondary controller called Nunchuk. The Nunchuk is connected at the bottom of the Wii remote control [12]. The Wii remote contains 12 buttons, a 3-axis accelerometer, a high-resolution highspeed IR camera, a speaker, a vibration motor, and wireless Bluetooth connectivity. Each Wii remote has a IR camera sensor on its tip. The camera ship can track up to four simultaneous IR light with high resolution and high speed. The accelerometer within the remote control provides the Wi remote's motion-sensing capability.The Wii remote has a total of 12 buttons and the buttons are arranged symmetric so that both hands can be utilized. A vibrator motor, LED lights and a small speaker are used for different kinds of user feedback, like varying light strength and sound-effects. The four LED lights are also used to indicate the different players ID. Communication is sent over the wireless Bluetooth connections, which enables up to four controllers to be connected at the same time. The users of Nintendo Wii can make their own personal profile, called Mii, where the data of the player will be directly

connected up on the remote used. To operate, the remote needs two AA batteries [12] [13]. By December 2010 over 75 million Wii consoles were sold. To complete the original system with improved accuracy and response time, Nintendo made an enhanced version, Wii Motion Plus, which was released in November 2009 [14].There are several SDKs for Nintendo Wii open, which makes it possible for a third party to develop applications which utilize the controller [10].

2.2.5 Wii Balance Board

The Wii Balance board is an add-on accessory for the Wii Fit, which is a video game created by Nintendo to work with the Wii platform. Just like the Wii Remote controller, the balance board can read your body movements and give them back on the screen as you are playing [15]. The balance board contains multiple pressure sensors which track body movements. The board has a area of 551 mm * 316 mm. A third party can also build applications for the balance board using the SDK WiimoteLib [10]. It has been shown that game-based balance programs like Wii Balance Board compared to traditional training is easier, more motivating and more enjoyable [16].

2.2.6 Xbox 360 Kinect

Microsoft Kinect was released in 2010 and became quickly extremely popular. Only 25 days after its release it had sold 2.5 million units and by January 2012 Xbox 360 had sold over 66 million consoles and more than 18 million Kinect motion sensors [14], [17]. Microsoft Kinect is a flexible low-cost motion sensor device for the Xbox 360 game console and for Windows PCs that can track human motion. It is a webcam-based add-on peripheral for the console, which enables the user to play and interact with the game without physically holding a sensor device. Instead the player can interact with the game console through a natural user interface using gestures and voice commands ([18], siste setning kanskje litt avskrift.. se på senere). The device gives full-body 3D motion capture capabilities and gesture recognition by help of a RGB camera and a depth sensor [18]. One advantage with Kinect is that it has an interface that senses players various motions and it also senses other objects in the field, which makes a natural environment where the players can interact with virtual objects in the real world. [10]. Another advantage is that its possible for a third party to write application for Kinect. Kinect for Windows SDK was released in June 2011 and enables developers to build Kinect applications with C++, C# or Visual Basic using Microsoft Visual Studio 2010 [19].

2.3 Using Exergames for Fall Prevention and Rehabilitation: A background Study

Games are becoming popular as a tool for exercise and rehabilitation. There has been a lot of different studies done on how some of the previous described types of exergames can be used for this. Most of the studies have been done on adolescents, but there also exists some research done directly on elderly. In this section we will review some of the interesting findings we did.

Taylor et al. [16] did a study where they searched through already done studies to draw a picture on how games can be used for exercise and rehabilitation. They reviewed some of the interesting findings they did here. Unfortunately, exergaming is mostly targeted towards children than adults. From the studies they reviewed they found a trend; the Energy Expenditure (EE) while playing Wii was greater than when doing sedentary activities, but not greater than brisk walking. This suggests that playing Wii sports could not replace real sports activities. Playing DDR on the other hand, maximum heart rate and oxygen consumption were greater compared with Wii Tennis, suggesting that DDR can substitute physical activity. In their research they also found a study on how what attitudes people have against DDR to encourage exercise. 40 postmenstrual women, aged 45-75 years old were asked. The overall attitude were positive; The game was fun and it gave a potential to improve coordination. They also expressed a concern about a long learning process. It is also found that playing against a human gave greater arousal ratings and physiological responses to gaming than when playing against a computer, which benefit the enjoyment, suggesting that this can be beneficial for the older people. From their study they can conclude that computer-based rehabilitation is not a new phenomenon and that one of the main reasons for this is that games have the ability to increase motivation and produce distraction from daily, boring and painful treatments.Wii is seen as an attractive game for rehabilitation, both at home or in institutions. Wii is actually already in use within the National Health Service in UK and is commonly used for the elderly and patients with pathologies. [16]

Another study they found was that non-disabled elderly (70 +/- 5,7 years) was positive to the EyeToy; they enjoyed it and found it easy to use. For patients with stroke it appeared to be less suitable, which could be even worse if they had to hold on to a controller. This suggests that EyeToy is more suitable for patients with stroke than for example Wii. (litt usikker om vi bør ta dette fra den orginal kilden eller ikke) Even though these these type

of games are initially meant as entertainment systems, there are a number of studies that have used the hardware and developed software to turn for example the Wii into a useful rehabilitation tool. The importance of these games are entertainment that motivates for actual sports. This is very important in for example rehabilitation. [16]

Staiano and Calvert write about how exergames are more and more used in the health sector. Gaming consoles are already integrated into equipments at gyms and health clubs. An example is Concept 2's rowing machine. Here the people exercising are motivated through competition and through virtual trainers who monitor their progress and encouraging them to proceed to the next level. Also some schools are starting to integrate these games into their curriculum. In all of West Virginia's 765 public schools they have integrated DDR in their physical education. This has proven to be very effective and popular and some students lost 5-10 pounds after playing DDR daily. [20].

Williams et al. did a study to see if exergames, more specifically Nintendo WiiFit, was an applicable type of exercise to reduce the falling statistics of community-dwelling people over 70 years. A group who attended WiiFit exercise sessions was compared with a group who went to a local falls group. 77 percent of the participants meant that if the exercise programme was more available people like themself would use it. 92 percent of the participants expressed that they wanted to exercise with the WiiFit in the future, while 61percent would choose to exercise with the WiiFit rather than attend a falls group. An improvement in Berg Balance Scale (BBS)[1] at 4 weeks was seen in the group that played WiiFit, meaning that there is a potential to improve balance in this population. Despite this, there was no change in The Falls Efficacy Scale - International (FES-I)[2] at 4 weeks. The qualitative data for the group that played WiiFit showed improved confidence for the participants. The conclusion of the study is that WiiFit is acceptable in older people with a history of falls and that it has the potential to improve balance and confidence. Further work has to be done to find and develop an acceptable exercise programme with the potential to improve balance in older individuals. [21]

Chang et al. did a study where they prototyped a Kinect game that was designed to help motivate people with motor disabilities to do their exercise

[1]Berg Balance Scale (BBS), a performance based measure using 14 activities of daily living (range 0-56) [21]

[2]The Falls Efficacy Scale - International (FES-I) (http://ageing.oxfordjournals.org/content/34/6/614.short)

more frequently and to improve the motor proficiency and quality of life. Because of the inconvenience of having to wear sensors in some of the other relevant technologies, Chang et al. chose to use Kinect. They developed a game, called "Kinerehab", that was meant to assist therapists in rehabilitating students in public school settings. To detect the students' movements Kinerehab uses image processing technology of Kinect. To engage and motivate the student for physical rehabilitation, the system is made with an interactive interface that has both audio and video feedback. For making it easy for therapists to review the progress of each students quickly, the system also includes details of students rehabilitation conditions which is automatically recorded in the system. Two students, a 16 year old girl diagnosed with having acquired muscle atrophy and insufficient muscle endurance, and a 17 year old boy diagnosed with cerebral palsy, were chosen to participate in the study. The girl used a wheelchair and could only stand up with assistance. The study included two phases: a baseline phase where no assistive technology was applied, and the intervention phase where the Kinerehab was used. Both phases were done twice, beginning with the baseline phase, continuing with the intervention phase and so on. In both phases the same exercises were done. The result showed that both participants increased the number of correct movements significantly in the intervention phase. On average the the correct movements was 49 in the first baseline phase (5 sessions), while 170 in the first intervention phase (11 sessions). Both students indicated that the game motivated them to do the exercises and that they wanted to continue using it. The therapists said it would increase their workload a lot. This suggests that Kinect can be a viable rehabilitation tool, but further work, where more people with disabilities participate, should be done. [18]

Chapter 3

Case 1: Prevention for Elderly Afraid of Falling

78 year old Olga lives in her own apartment in central Trondheim. Everything she might need is situated in the area, but lately she has started to feel unsteady and has trouble keeping her balance, making sure she does not go out more than necessary. Trondheim is also very icy most of the winter, which increases Olga's fear for falling. Basically, Olga is a very social person, but there has been little contact with friends and acquaintances lately because of the fear of going out. Olga has no close family nearby. Beside the unsteadiness, Olga is very ambulatory without any physical pain, and thus has no need for physiotherapists. Olga has a great desire to be more steady on her feet so that she can gain an increased social contact, and particularly increase her confidence.

Many elderly today are afraid of falling, which indicates that Olga is not alone with this problem. Fall is actually considered as a public health problem [22]. It is estimated that around 30 percent of people over 65 years old and almost 50 percent of people over 80 years old fall at least once a year. 1/10 of these falls results in fracture and one-fifth needs medical treatment. The worse outcome of a fall is death. 25 percent of elderly getting hip fracture after a fall, dies within a year [23] [24].It is shown that after a fall one-third will be afraid of falling again. Being afraid of falling make them insecure which can result in a even bigger risk of falling. For many elderly, the fair of falling can result in them being less active and a loss of confidence in carrying out everyday activities. This can result in fair of leaving their house, which can lead to total inactivity. The latter is a serious problem because a long time of inactivity will result in disabilities and increased risk of falling. Therefore it is important to find ways to activate the elderly and to

offer a service that can prevent the elderly from developing disabilities [23]. Another issue is that missing the ability to carry out everyday activity can result in loneliness and even depression (site dette?).

To prevent developing disabilities elderly should regularly perform a training program that strengthen their muscles, improve balance and coordination, endurance and mobility [23]. These kind of training programs are offered in Trondheim. There has been established various fitness groups; do you want to get back in shape and become physically stronger? do you feel unsteady and see the need for better balance? Do you manage less now than you did a year ago? Do you find it difficult to go outside? These fitness groups find place at various locations around Trondheim and are offered 1-2 hours one day a week. In addition there exists senior dance, walking groups and water gymnastics [25]. These activities are good initiatives, but when the main problem for Olga is that she's afraid to go outside, how will she manage to engage in these fitness groups? It is also shown that 2 hours a week with physical activity is not nearly enough to increase Olga's physical strength [23]. Regular physical activity is the key to become physically stronger and obtain better balance.

Trondheim municipality did a study where they provided a once a week group training program for elderly. Their study showed that training once a week did not improve physical function for the participants, but the participants expressed that they were less afraid of falling after starting with the group training. The study suggests that this kind of program should be combined with home training programs or other extra physical training offerings [23].

We found that there are already some offered training programs for elderly that can be implemented in their home:

The *"Otago"-program* is a program developed as a home training program for elderly to prevent falls. It consists of exercises that take about 30 minutes to complete which should be performed three times a week in addition to a walk twice a week. Each customer receives a booklet with instructions for the individual exercises prescribed in addition to ankle cuff weights. The participants needs to record the days they complete the program for follow-up purposes. For follow-up an instructor should do home visits every six months and telephone them every month. The instructor can then increase the difficulty in the prescribed exercises for each individual. The program has been tested and evaluated for 1016 home living people aged 65 to 97. The

program was shown to reduce falls and falls related injuries with 35 percent, with the highest effect on those over 80 years old and those that have had a previous fall. The participants experienced improved strength and balance, as well as they maintained their confidence so it was easier for them to do everyday activities without being afraid of falling. [22] [23]

Falls Management Exercise (FaME) is an exercise program consisting of tailored group and home-based exercises and builds on the core exercises from the "Otago"-program. There are a total of three group training sessions per week, in addition to two home-training sessions per week. The exercise intervention is designed to improve participants dynamic balance and core and leg strength. In the United Kingdom a study was done where they examined the effectiveness of this program for home-living women aged 65 or older who had already fallen 3 or more times within the previous year. After using FaME for 36 weeks the fall rate was reduced by one-third. The conclusion of the study was that the exercise program should last for at least 36 weeks including at least 2 hours of training per week. For progression it is important that the intensity, resistance, and weight are continually increased, as well as the balance gets challange. [26]

Øvelsesbanken is a Scandinavian project providing a user profile with different training programs. The different exercises are developed from the two previous described concepts and other relevant studies on balance and exercising for elderly. The program gives an idea on how you can put together an exercise program customized for each individual. It is primarily made as a tool for physiotherapists for putting together training programs for their patients to do at home. As we see it, it can also be used as a tool for each individual to put together their own program, because you can also log in as a private user and make your own program. The program offers the user a choice of different exercises that you can add to your exercise program. When all exercises are chosen you can print out pdf-files with pictures and descriptions or you can read from the computer screen. It is an easy, self-explanatory and straightforward program to use. Øvelsesbanken is in use in Scandinavia and the summer of 2012 it had reached 4300 users. [27]

The new generation of video games that combine game play and physical activity is called exergames, and it has shown promise in effecting users health in a positive direction [28]. Exergames has proved to be motivating because of its easy understanding, accessibility and fun. This type of games are suitable for people in various age groups because most of the games does not require any prior knowledge of either computers or video games [29].

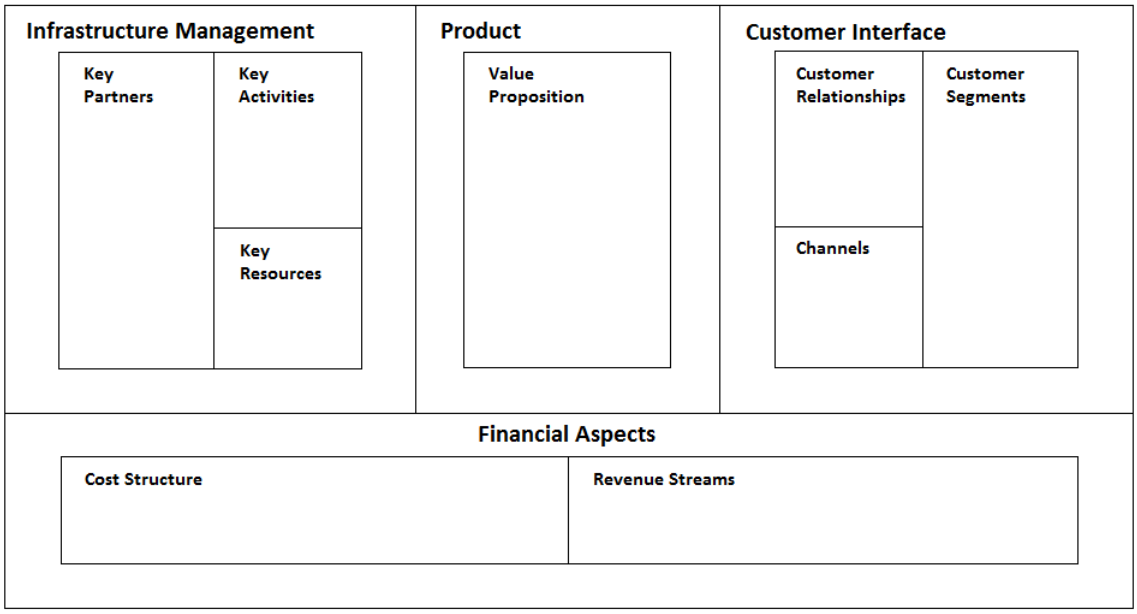
Use of exergames is also an important factor to the social aspect, because of the possibility of playing with others, something that will be entertaining for elderly who are often alone and experience loneliness as a part of the everyday life [30]. It has also been shown that this type of exercise improves moods [20]. The feeling of accomplishment users get from reaching goals, completing exercises and being in physical activity increases the users mood. This combined with the social interaction you get from playing provides a desire to play again [30] [20]. Exergames has shown promise in rehabilitation of balance after stroke and damage to the spine. The use of exergame also has an appropriate use in exercise and rehabilitation, because the fun and challenges you get through the game could take the focus away from boredom and any physical pain [30] [31]. Today there exist numerous games of this type, but very few commercial games are suitable for the focused, controlled exercise required for therapy [31]. The existing games are unfortunately too complicated, too rapidly and too difficult to handle for the elderly, and they have too complex and cumbersome consoles [30].

Chapter 4

Osterwalder's Business Model Ontology

We have decided to use Osterwalder's Business Model Ontology for the analysis of the case. Osterwalder defines a business model like this "A business model describes the rationale of how an organization creates, delivers, and capture values" [32]. Osterwalder came up with a way to describe business models through nine building blocks. Going through these building blocks allows us to describe and think through the business model of any enterprise by covering four main areas of a business: Product, Customer Interface, Infrastructure Management and Financial Aspects. The nine different building blocks are: Customer Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships and Cost Structure.The nine business model elements are the core of the model, see Figure 4.1. In this chapter we will go through every of the nine building blocks in more detail. [32]

Figure 4.1: The Business Model Canvas [modified from [32]]



4.1 Product

Product is what the company offers to its customer and how it differentiates itself from its competitors. This area covers the building block Value Proposition [33].

4.1.1 Value Proposition

Osterwalder's definition is: "The Value Propositions Building Block describes the bundle of products and services that create value for a specific Customer Segment" [32]. This is what the organization actually offers to their customer or customer segments and are suppose to satisfy the customers needs. It might be different value propositions for the different customer segments. The values can be both quantitative and qualitative, meaning that the value can rely on for example price or on design. The value propositions have to be so good that the organization's defined customer segments turn to them over another company. It can be either something new, an improvement of already existing products or services, customized products and services or simply just helping a customer to get a certain job done. Something to also

consider is design and brand. These two aspects are more important in some type of products than other. It is also important to compare price levels with their competitors. A common way to satisfy the needs of the customer is to offer them the same value to a lower price. The firm can also keep-up with the market price, offer luxury goods to a higher price or simply offer a Value Proposition for free. For the latter, the model is based on an other source of income, for example advertising.

There are different ways of creating value for the Customer. By reducing the cost, this will for most customer be experienced as valuable. Also reducing the risk when buying something, by for example offering them one-year guarantee is very satisfactory for customers. Other ways of creating value are to make products and services available for customers that did not have access to them before and to make products and services easier and more convenient to use. [32]

4.2 Customer Interface

Customer Interface covers everything that have to to with customers: who they are, what kind of relationship the firm has with them and how the firm reach out to them. The three building block covered by this area are thus: Customer, Channel and Customer Relationships, described below. [33]

4.2.1 Customer Segments

Osterwalder's definition is: "The Customer Segments Building Block defines the different groups of people or organizations an enterprise aims to reach and serve" [32]. To make a good business, you have to understand who the business are meant to create value for, which is all about segmentation. It is important to carefully choose the most important customers and to focus on them and their needs. A business can have more than one customer segment, but they can not always serve all segments. Therefore a careful valuation has to be done to choose the organizations most important segment(s). [32] [33]

A firm can deliver a value Proposition to different types of Customer Segments. They can choose to not distinguish between customer segments and rather focus on the mass market, they can distinguish their customers into segments with slightly different needs or problems, or sharpen it even more by targeting a niche market with specialized customers. The firm can also serve unrelated Customer Segments or even independent Customer segments. [32]

4.2.2 Channels

Osterwalder's definition is: "The Channel Building Block describes how a company communicates with and reaches its Customer Segments to deliver a Value Proposition" [32]. This is about finding the best and most cost-efficient way of reaching the right customers, at the right place and right time [33]. We distinguish between five channel phases, shown in figure 4.2. A channel should be studied over all these phases. It is important for an organization to think about how the customers want to be reached in all of these phases and how the channels can be integrated with the customers routines. The way the organization communicates with the customers is an important role in the customer experience. The value proposition can be delivered either directly, through for example sales force, or indirectly through intermediaries. They can also be delivered through owned channels, partner channels or a mix of both, see figure 4.3 ... Her har jeg tatt bort det med links.. [33].

Figure 4.2: The 5 Channel Phases [modified from [32] [33]]

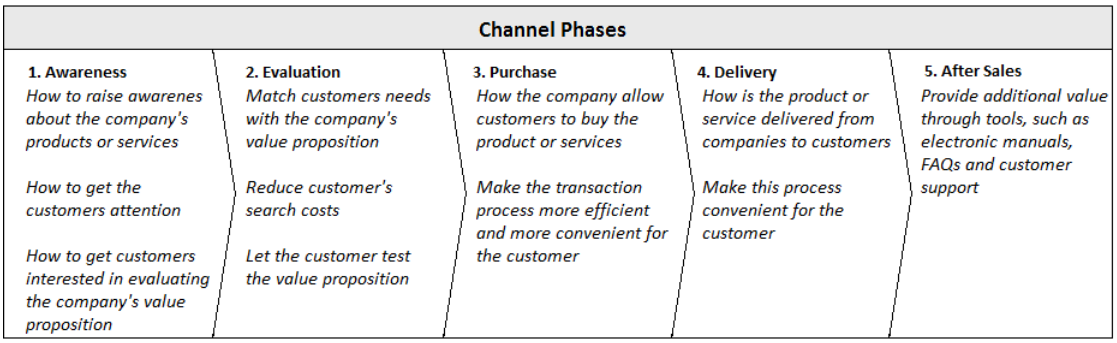
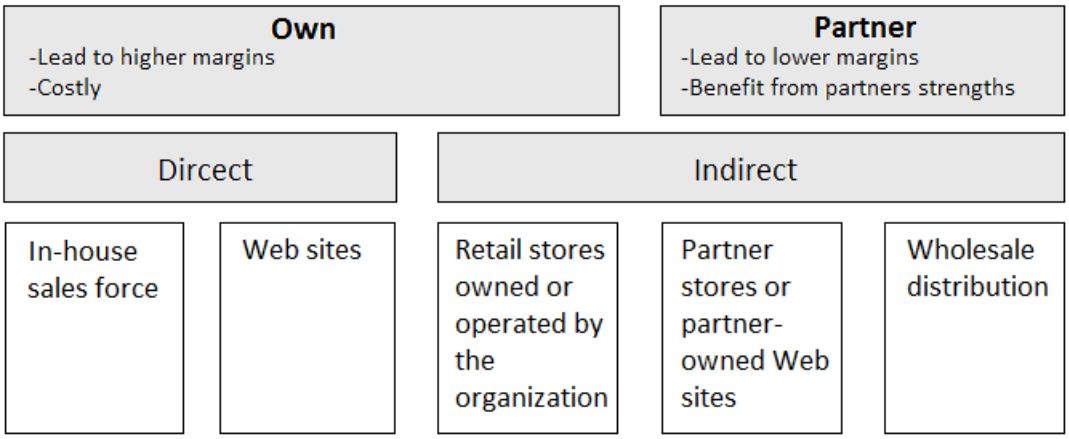


Figure 4.3: Channel Types [modified from [32]]



4.2.3 Customer Relationships

Osterwalder's definition is: "The Customer Relationships Building Block describes the types of relationships a company establishes with specific Customer Segments" [32]. The customer relationship is very important for the customers overall experience. This can range from personal assistance, where a real customer representative communicates with the customer, to a more automated service, where typically the customer helps himself, to a more community based service that allows customer to exchange experiences with each other. For every type of Customer Segments defined, the organization has to keep in mind what kind of relationship the Customer wishes to have. At the same time, the organization has to keep in mind how this relationship is integrated with the rest of their business model and how costly they are. The Customer Relationship is based on customer equity. There are three different customer equity goals: customer acquisition, customer retention and boosting sales (upselling).

- *Acquisition:* A company needs customers to do business. The customer acquisition is a very expensive affair and must be carefully managed and evaluated because the relationship developed with its customers will strongly influence the two next equity goals [33].
- *Retention:* "The goal of customer retention is to leverage customer acquisition investments. "¡-skrive om.The customer acquisition is usually more expensive than customer retention. Because of this ways to

extend the duration of the relationships between the company and its (profitable) customer should be found. High switching costs is an element that can help retention. This means that the cost of ending the relationship and building a new one is so high that the customer does not want to switch [33].

- *Boosting sales (upselling):* This means adding on to your initial sale with additional products and services [33].

4.3 Infrastructure Management

Infrastructure management describes the companies capabilities and resources that are necessary to deliver the value proposition and maintain customer interface. This block also describes who provides and own the capabilities and resources, as well as who executes the activities and the relationship between them [33].

4.3.1 Key Resources

Osterwalder's definition is: "The Key Resources Building Block describes the most important assets required to make a business model work" [32]. This means all the resources you need to make all the 4 described building blocks work. The resources can be physical (e.g. buildings and machines), intellectual (e.g. brands, patents and copyrights), human (for example in an industry where knowledge is in particular important) and financial (e.g. cash). The company does not need to have all the resources within their organization, they (bedre ord for "de"?) can also be acquired from outside the company. A Resource can be linked to one or more Activities (described below).

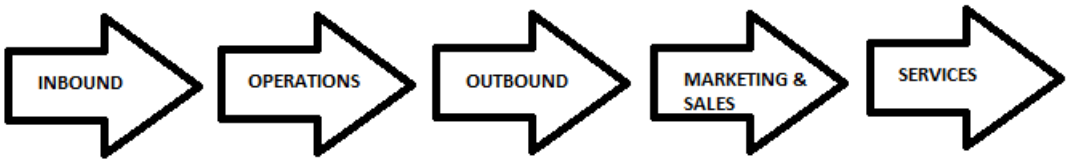
4.3.2 Key Activities

Osterwalder's definition is: "The Key Activities Building Block describes the most important things a company must do to make its business model work" [32]. This means all the actions that have to be done to make all the 4 first building blocks described work and to generate profit. The main purpose of a company is the creation of value that customers are willing to pay for. This value is the outcome of a configuration of inside and outside activities and processes. Depending on what kind of company it is the configurations can by categorized as a *Value Chain*, a *Value Shop* or a *Value Netork*. Osterwalder distinguish between primary and support activities.

Primary activities are involved in the creation of the value proposition and its marketing and delivery. Support activities are the underlying activities that have to be in-place for the primary activities to take place (e.g. firm infrastructure, technology. All the three different types of configurations have different primary activities, as described in figures 4.4, 4.5 and 4.6 [33]:

Value Chain:

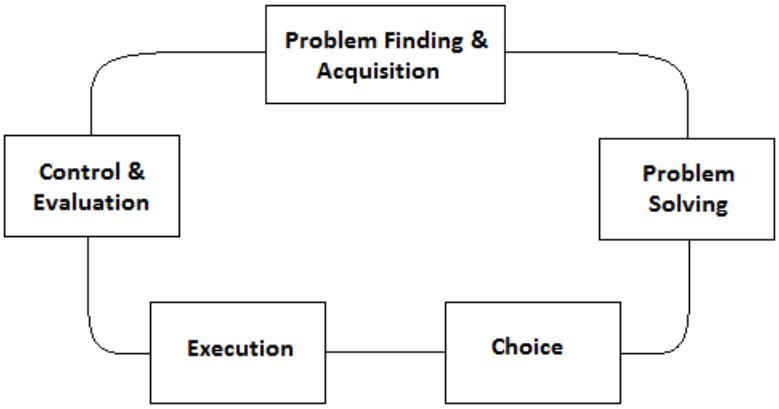
Figure 4.4: Value Chain (5 primary activities) [modified from [33]]



This is all about how a firm creates value from taking an input, transforming it to the final product (refined output), distribute the product to the customers and maintain the product. At each step there are added value (e.g. production and manufacturing)

Value Shop:

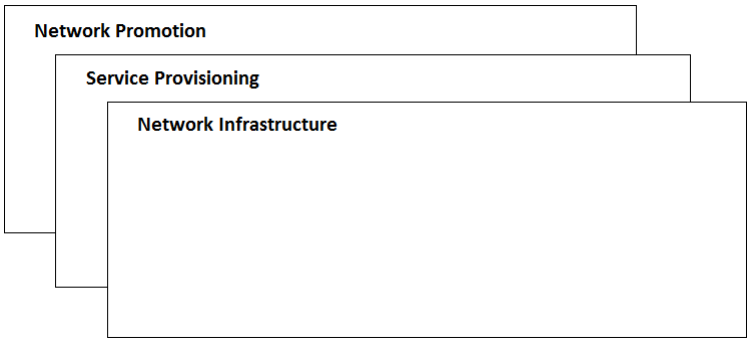
Figure 4.5: Value Shop (5 primary activities) [33]



This figure describes how a firm can create value for its customers by understanding their problem and finding a solution for it (e.g. consultancies and doctors).

Value Network: This is about network effects, which means that the more people a network has the more value it gets. (e.g. banks and telecom operators). It consists of getting potential customers to the network, establishing links between customers and billing for value received, and maintaining and running a physical and information infrastructure so it is ready to serve customers requests.

Figure 4.6: Value Network (3 primary activities) [33]



4.3.3 Key Partnerships

Osterwalder's definition is: "The Key Partnerships Building Block describes the network of suppliers and partners that make the business model work" [32]. Not always can a company do everything on their own. The motivation for creating partnerships can be divided in three:

1. *Optimizing their business model:* Sometimes it is not profitable for a company to own all resources and do everything in-house. Cooperating with other firms can reduce costs and optimize the allocation of resources and activities.
2. *Reduce risk:* In a very competitive market it can be safer to cooperate with the competitors in one area, even though they are competing in another.
3. *Acquire resources:* Usually it is not very profitable for a company to have all resources and to have the knowledge to do all the activities. Cooperating with other firms by buying/lending resources is often more profitable than having everything in-house. [32]

4.4 Financial Aspects

All of the other blocks already described influence this last block in the framework, thus this block is an outcome of the rest of the business model configuration. This area covers the Revenue Streams and Cost Structure elements [33]

4.4.1 Revenue Streams

Osterwalder's definition is: "The Revenue Streams Building Block represents the cash a company generates from each Customer Segment" [32]. This is where the company earns its money. It is important to keep in mind what the customers are willing to pay, as well as what they are currently paying. A firm can have one or more revenue streams where each revenue stream can have different pricing mechanisms, shown in table blabla. There are several ways of generating revenue streams, including asset sale (e.g. selling a car), usage fee (e.g. customer pays his telecom operator for the minutes he has spend on the phone), subscription fee (e.g. users of Spotify pay a monthly fee to access Spotify Premium), renting (e.g. renting a car for the weekend), licensing (e.g. companies have to pay a license fee to get access to a patented technology), brokerage fee (e.g. a seller earn a commision each time they sell something.. sjekk denne), and advertising (e.g. newspapers take a fee for companies who wants to promote a specific product or service in their newspaper).

The pricing mechanism chosen is very important and can make a huge difference on how much revenue that is generated. Osterwalder distinguish between two types of pricing mechanisms: fixed and dynamic pricing, where fixed pricing means that the prices are based on static variables, while dynamic means that prices changes with market conditions. [32] TABELL: PRICING MECHANISMS s 33 i boka

4.4.2 Cost Structure

Osterwalder's definition is: "The Cost Structure describes all costs incurred to operate a business model" [32]. The costs in the business model come from Key Resources, Key Activities and Key Partnerships. The book [32] defines two cost structures: cost-driven business model, which focus on minimizing costs, and value-driven business model, which are focussing on value creation by for example making personalized services. Despite of if the model is cost-driven or value-driven the costs can have different cost structures, shown in

figure 4.7 [32].

Figure 4.7: Different cost structures

Cost Structure	
Fixed costs	Costs stay the same regardless of the volume
Variable costs	Costs depends on volume
Economies of scale	Less cost as output increases
Economies of scope	Less cost due to a larger scope of operations

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