



DEPARTMENT OF APPLIED
INFORMATION TECHNOLOGY

CONSIDERATIONS THAT NEEDS TO BE ADDRESSED WHEN IMPLEMENTING CO- PRODUCTION

An investigation of enabling dimensions on real
world cases within healthcare

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Essay/Thesis:	30 hec
Program and/or course:	TIA019
Level:	Second Cycle
Semester/year:	VT2018
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Report no:	2018:071

Abstract

This study investigates what considerations that need to be addressed when implementing co-production. Because of a growing demand for care, the healthcare sector was applied within this study, to investigate if co-production could become a complement to the traditional healthcare alternative. In order to gain more knowledge of what needs to be considered, four enabling dimensions was identified from previous literature which were: technology, activities, responsibility and knowledge. These dimensions were assembled into a research model, aimed as a guiding tool when collecting the empirical data. This study was carried out through a case study design and examined three cases within healthcare, where co-production had been implemented. Ten semi-structured interviews were performed, with respondents that had different roles within the examined cases.

Based on the empirical findings, four considerations for each enabling dimension was discovered, in total 16 considerations taken from real world cases. When examining technology, it was discovered that it is important to consider designing the technology and complexity level after target group, a low complexity in general will increase the value, but also that organizations needs to access the data. On the other hand, when it comes to activities, it is important to consider transferring valuable activities, which should be designed activities target group, and that data allow preventive actions and restructuring organizational resources. Further, regarding responsibility it needs to be considered that consumers are responsible even though it may not be expressed, it requires the right tools, and organizations need to start letting go of some responsibilities and to shape responsibilities in different ways. Lastly, it needs to be considered that knowledge enables participation, that different roles require different knowledge, to encourage existing knowledge and produce and spread knowledge. This study argues that the four enabling dimensions are largely influenced and dependent on each other and can be compared with a cogwheel, where all dimensions need to exist in balance. Hence, this study argues that these discovered considerations will assist in future implementations in organizations, especially within healthcare.

Keywords: *co-production, healthcare, chronic diseases, eHealth, enabling dimensions*

Acknowledgements

This master thesis demonstrates the findings of the research “Considerations that needs to be addressed when implementing co-production- an investigation of enabling dimensions on real world cases within healthcare”, which was conducted during Spring 2018 at University of Gothenburg- Applied IT.

Special thanks to our supervisor Kalevi Pessi, whom not only inspired us to write about this subject but further provided great encouragement throughout the research process.

Our gratitude is further directed towards all the respondents within the examined cases, who contributed with their time and knowledge towards the study. Lastly, thanks to family and friends for the support and engagement throughout the research writing.

Gothenburg 2018

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Table of content

Introduction.....	1
Related research.....	3
Theoretical background.....	6
Co-production.....	6
Technology.....	6
Activities.....	7
Responsibility.....	7
Knowledge.....	8
Research model.....	9
Research methods.....	10
Empirical data collection.....	10
Sampling of cases.....	11
Case 1.....	12
Case 2.....	12
Case 3.....	12
Sampling of respondents.....	12
Data analyze method.....	14
Quality assurance.....	15
Ethical considerations.....	15
Results.....	16
Case 1.....	16
Technology.....	16
Activities.....	17
Responsibility.....	18
Knowledge.....	18
Case 2.....	19
Technology.....	19
Activities.....	20
Responsibility.....	21
Knowledge.....	21
Case 3.....	22
Technology.....	22
Activities.....	23
Responsibility.....	23
Knowledge.....	24

Analyze & discussion	25
Technology	25
Activities	26
Responsibility	28
Knowledge	29
Considerations regarding enabling dimensions	30
Conclusion	32
References	33

Table of figures

Figure 1: Research model of enabling dimensions	9
Figure 2: Enabling dimensions' influence on each other	31

Table of figures

Table 1: Description of respondents for case 1	13
Table 2: Description of respondents for case 2	14
Table 3: Description of respondents for case 3	14
Table 4: Discovered considerations regarding the enabling dimensions	30

Introduction

Digitalization and the use of Information Technology (IT) has during the last decades become a growing trend and a key instrument for evolving organizations (Kilpeläinen & Tyrväinen 2004). New opportunities have this way arisen regarding how organizations can manage their processes, which in return could enhance their offerings towards the consumers (Walker et. al. 2002). Hence, the traditional production processes have started to change, with the use of IT (Newman 2017). Consumers, which traditionally have had limited participation within the production process have this way involved into more active agent (Troye & Supphellen 2012). This way, it makes it possible for consumers to participate in various stages of the production process, until the final production. Through allowing consumers to become more involved and active, will in return generate additional value for both consumers and organizations (Troye & Supphellen 2012).

Allowing consumers to become more active within the production process is nothing new to society, since it has existed for many years (Chen et. al. 2011). Organizations such as IKEA have allowed their consumers to participate since they first started, by offering their products in packages, with the pieces, tools and instructions they need for mounting the product together (Staines et. al. 2011). In line with allowing consumers to actively be involved, is the concept co-production. Co-production is defined allowing consumers to become more involved in various stages of the production process, until the final product is delivered (Ewert & Evers 2014). In this sense, consumers become more actively involved, which allow the underused resources of consumers to become valuable, in ways that previously have not been possible (Essén et. al. 2016).

Transforming consumers into participants with the idea of co-production, can further be applied on services as well (Batalden et. al. 2015). This through adjusting the service and to allow the consumers to become co-producers (Winston 2016). IT has in the same way, allowed organizations such as within the banking industry, to offer their services by allowing their consumers to participate through their online banks (Mädche 2015). Hence, many everyday tasks can be performed in new ways, with the assistance from new techniques (SKL 2016).

Healthcare is one sector that offers services and has started to implement the concept of co-production (Batalden et. al 2015). Within healthcare, the interest in digitalization and improving the care process is constantly growing (Regeringskansliet 2016). In this sector, IT has previously been viewed as only a supportive function and not as a strong strategic resource (e-halsa 2017). Founded in the growing interest in digitalization within healthcare, is the concept of eHealth, which is defined as applying information and communication technologies into healthcare processes (Regeringskansliet 2016). New services have now started to flourish and become introduced, such as 1177 in Sweden, a web page that gathers information and different services in healthcare (1177 Vårdguiden 2017). One of the reasons for this growing interest in eHealth is the rising demand for care, which is the result of a growing population (SKL 2016). This new demand opens the question of how care could be offered in other ways in the future, to be able to offer care to the whole society (Socialdepartementet 2016; SKL 2016).

Another much discussed topic within healthcare is patient-centered care, which is described as placing each patient in focus and providing care depending on their specific needs (Socialstyrelsen 2016). In line with this, the patient law in Sweden states that patients should have integrity, the ability to make their own choice and to have a participating role in the whole care process (Patientlagen 2014). Since healthcare needs to be offered in new ways in the future, patient-centered care and the patient law needs to be considered alongside strategic IT ideas, to meet the future demand (Socialdepartementet 2016). Through offering care in new ways and allow patients to perform activities by their own could make the care process more effective (Socialdepartementet 2016). Becoming more involved is even something that has been acknowledged by patients, since it would allow them to have better control, be more

independent and have the opportunity to influence within decision making, regarding their own health (Regeringskansliet 2016).

IT is according to Socialdepartementet (2016) described as a key enabler for addressing the upcoming challenges in healthcare, since it allows patients to become more involved and monitor their diseases from home. However, there is still much work left to do regarding addressing co-production into healthcare and what needs to be considered when implementing co-production. This is based on the need for constant improvement on how this type of technique could support healthcare to become more effective and generate an increased value (Socialdepartementet 2016). One way for addressing these growing needs and making the patients more involved, is through applying co-production, since it could improve the quality of the whole care process (Vennik et. al. 2016). Transferring parts of the care process towards the patients, would generate more value for the patients, but also allow healthcare professionals to focus on patients that are in most critical need of assistance (Sommarlund et. al. 2016). By addressing digitalization, allow patients to participate through different technology would generate more knowledge, patients could become more independent and distribution of responsibilities (Sommarlund et. al. 2016).

This study will therefore focus on co-production within healthcare, since it is one sector that stands in front of large challenges in the future and where co-production could become a complement to the traditional healthcare. However, allowing co-production to become an alternative solution, it is important to understand what needs to be considered when implementing this idea and what enabling dimensions that exists and empowers co-production. Therefore, the purpose of this study is to increase the knowledge about enabling dimensions and what needs to be considered when implementing co-production. This in order to get a better understanding, based on already implemented cases of co-production of what needs to be addressed. Further, to get an overall understanding about the considerations, it is also of importance to gain a better understanding of how enabling dimensions' influence each other. The research question posed in this study is:

What considerations need to be addressed regarding enabling dimensions when implementing co-production?

This study is an explorative study where real world cases will be investigated that has implemented co-production and come a long way with these kinds of solutions. This is to collect a better understanding and knowledge about what needs to be considered in the future implementations, based on what these cases have acknowledged. As assistance, a research model is developed, based on collected literature of enabling dimensions and used during the empirical data collection as a guiding tool. Within healthcare, this study will focus on cases within chronic diseases. This since it is a field where research has been done regarding the disease, treatment and where different technical solutions where patients have become more active and where they are required to participate, have started to rise in Sweden.

Related research

This chapter will present previous research within the field of co-production and healthcare, with focus on chronic diseases. During the presentation, dimensions that enables co-production will be identified.

During the last decades, co-production has become a frequently used buzzword where research has flourished (Alford 2014). Since Ellinor Ostrom presented the basics behind co-production for more than three decades ago, the field has constantly evolved as cited in Alford (2014). One field within co-production that has gained much attention is public services. Boyle and Harris (2009) present in their study that co-production could make public services more effective and efficient, since it is a shift in how they are provided. Loeffler and Bovaird (2016) argue that management and decision makers have for a long time underestimated the potential impact co-production could have on public services.

Healthcare is described as a key domain in public services (Meijer 2016). Vennik et. al. (2016) suggest that implementing co-production in healthcare, could bring forward quality improvements in the care process. To achieve co-production, Cramm and Nieboer (2016) have discovered that it is essential to enable the right capabilities for patients and healthcare professionals. Further, Palumbo (2016) argues that there is a lack of organizational capabilities that support patient empowerment. This is needed for allowing co-production, since it exists a cultural gap and information asymmetry. The lack of capabilities could therefore cause resistance to participate in co-production. On the other hand, Palumbo (2016) argues that it is natural to co-produce in healthcare, since it concerns the patient's own health.

Previous studies have focused on creating models that makes patients more active in healthcare. Wagner et. al. (2005) made their study by developing a model for chronic care and compared this against the idea of patient-centeredness. The model focused on how active and informed patients, who interacts with a proactive and prepared healthcare, could lead to an improved outcome. This model investigated factors such as organizational support, community, self-management, decision support, delivery system design, and information and communications technology. In their study, they found that through optimizing the outcomes for patients involved, demand competent and engaged patients that are provided with effective care. This since patients with this disease contributes with additional demands than other patients (Wagner et. al. 2005).

Despite focusing on healthcare, the research field of co-production for chronic diseases has gained a large focus. Batalden et. al. (2015) present a model for healthcare service co-production. They base their study on the model presented by Wagner et. al. (2005) and another one called House of Cards, which focuses on collaboration for management within chronic diseases (Batalden et. al. 2015). Their model investigated following factors: personalized care planning, element to maintain it by governance and policies, organizational process, workflows, capacity and behavior of patients and professionals. Since they conducted their study as a design principle in several service delivery innovation projects within healthcare, they also suggest the need for further research in this field. These suggestions focus on the education and knowledge is needed for all involved roles, how system and different technology needs to be redesigned, the need to investigate the edges outside and the power balance among establishing new mindset of not professionals know it all, to allow co-production to become effective and useful in healthcare (Batalden et. al. 2015).

Essén et. al. (2016) on the other hand performed their study within co-production in chronic diseases, with a focus on empowerment implication. This study was conducted by exploring the use and development within quality registers that the healthcare managers used. They found that patients with a chronic disease could feel empowered and that they want to participate. Further, these patients will gain more knowledge about their own health and a further understanding of how healthcare professionals evaluate their health (Essén et. al. 2016). They explain that it is therefore important to have a clear purpose for co-producing between the involved parties. They argue that when patients are provided with more information, they will gain larger trust against the used technology as well. Despite this, there is a

lack of specialized knowledge, which can make patients hesitate to participate. Additionally, Essén et. al. (2016) describe that patients may want to take more responsibility over their health through participating in co-production.

Related to this, Meijer (2016) explains in his study that existing roles, responsibilities and distribution of power will change when addressing co-production. Therefore, the power balance needs to change, since it will be a shift between patients and healthcare professionals (Cramm & Nieboer 2016). Beside this, Loeffler and Bovaird (2016) argue that it does not exist a stereotype for which kind of people that should be involved in co-production, since it is individually motivated. Despite this, Bradley (2015) explains in her study that the people involved in co-production need to recognize and develop their capabilities. It is therefore important to have a mutual exchange and intensive between the ones involved so expectations and responsibilities are decided (Bradley 2015). Further, according to Harrison and Waite (2015), internet and interactive websites enable co-production since it becomes much easier for consumers to participate. Despite this, they determine that studies regarding if digital technology provide more power towards the consumers is missing or in its infancy. On the other hand, many researchers argue that technology is an enabling factor for co-production (Meijer 2016; Romanelli 2017; Legner et. al. 2017; Pestoff 2014). Alford (2014) explains that technology enables new ways of doing activities and changes the way we usually see consumer.

To summarize related research, there exist various dimensions to consider when co-producing. This study has therefore chosen to focus on four of the dimensions that are highlighted and dominates in the collected literature. Within this study, enabling dimensions will be defined as dimensions that enable co-production. Aligned with the purpose of this study and the research question, this indicates a need for collecting further information about these four enabling dimensions and what consideration that needs to be addressed alongside how they influence each other when implementing co-production. Many researchers argue that new technology is one of these enabling dimensions (Meijer 2016; Romanelli 2017; Legner et. al. 2017; Pestoff 2014). Other argues that it enables a new form of co-production, both when it comes to data collection and treatment (Meijer 2016). Based on this, it is of interest to examine *technology* as the first enabling dimension. This dimension will in this study be used as a collective name for all type of technology. Alongside this, many researches have focused on the process and activities itself, since it has been determined that adopting co-production, the activities are transferred towards patients to be performed outside the hospitals (Alford 2014). This will lead to the second enabling dimension chosen for this study, which is *activities*, since literature suggest that the activities will be transferred and it is important to understand in what way and if new types emerge. The choice of the name of this dimension is to gain a deeper knowledge of the activities itself and not the whole process in general.

As a result of transferring activities towards patients, the responsibility will change (Meijer 2016) alongside the power balance between the patients and healthcare professionals (Cramm & Nieboer 2016). Based on this is the third enabling dimension *responsibility*. When the activities and responsibilities are changing, it is important to understand which information and education different roles need for empower co-production (Boyle & Harris 2009). This is further in line with the recommendation that are explained above about what Batalden et. al. (2015) presented about the need for understanding what is required from the different sides. Lastly, the fourth enabling dimension is *knowledge*, since participating in co-production could need other types of knowledge than before and it is important to understand what needs to be addressed. Other dimensions could be important to examine, but this study will consider these four discussed dimensions due to its identified large influence in co-production.

Even though it exists studies about these enabling dimensions, previous research has focused on them separately. It is therefore important to gain better knowledge of what needs to be considered when co-production is implemented regarding these together from real world cases. Further on, it is still of interest to examine these enabling dimensions together to understand and if they influence each other. Based on

this, the cases will be investigated within chronic diseases, since they have come a long way. Further, they have experience from more than idea and planning phase, where considerations could be collected.

Theoretical background

This chapter will present relevant background for the study and first describe the concept of co-production. Thereafter the four enabling dimensions: technology, activities, responsibility and knowledge will be presented. This theoretical background will be used to create and support the research model.

Co-production

Co-production is a concept that emerged in the 1960s, when the manufacturing industries changed and became more service focused (Turakhia & Combs 2017). This meant that consumers and organizations began producing value together (Turakhia & Combs 2017). The concept is an outcome of technological, economical, institutional or political impacts (Pestoff 2006). Etgar (2008) defines the term co-production as a process, where the consumers participate in either one or several phases of the production. This way, co-production can be described as the new social economy, since it changes the old business models that only were focusing on production and consumption (Boyle & Harris 2009). Co-production is further explained as a reciprocal and equal relationship between actors that use a service (Daneshvar et. al. 2018). This way, co-production creates a network to manage and sustain relationships, which allow constant informal interactions (Boyle & Harris 2009). The relationship will in return be an important tool to create value (Chen, et. al. 2011). Despite this, the line between who is a consumer and who is a producer becomes blurrier since who the active participant in processes will differ between organizations (Boyle & Harris 2009).

Through adopting co-production, involving consumers can be accomplished in ways that previously not has been possible (Essén et. al. 2016). Despite this, the collaboration between the consumers and organizations encompasses in many different formats (Etgar 2008). When implementing co-production, different motives and contexts will appear (Pestoff et. al. 2013). Hence, regardless of the purpose for co-producing, consumers will perceive a greater value from participating (Essén et. al. 2016). This way, consumers that are involved in co-production, will potentially develop more effective and positive evaluations (Essén et. al. 2016). Hence, this could in return increase the consumer's loyalty towards the organization (Essén et. al. 2016) and enhance both economical and relational values (Flores & Vasquez-Parraga 2015).

Further, it has been argued that participating in co-production comes with several benefits, such as the ability to make choices and a better understanding of the service, which will result in less waiting time and greater customization (Auh et. al. 2007). In order to accomplish this, both parties are required to feel a need and be willing to commit (Loeffler & Bovaird 2016). This will make the contribution become both effective and efficient (Loeffler & Bovaird 2016). Consumers need to have the ability to participate, which can result in either a sense of control or the ability to influence the offering (Essén et. al. 2016). Compared to before, other skills will be required to facilitate that both parties can develop and use different participation methods (Pestoff et. al. 2013). The concept of co-production is enabled by different dimensions, the four discovered enabling dimensions will be described below.

Technology

In co-production, technology is by many researchers described as a key enabler for allowing consumers to participate (Meijer 2016; Romanelli 2017; Legner et. al. 2017; Pestoff 2014). Technology has over the years, developed and become more available and user friendly (Legner et. al. 2017), which allows consumers to participate in new ways (Linders 2012). With technology, it has become easier to reach and share information with different tools such as check-ups, questions, availability, options and messages (Schadler & McCarthy 2012). Additionally, technology has created new opportunities for consumers to get more influence (Schadler & McCarthy 2012; Amichai-Hamburger et. al. 2008;

Harrison & Waite 2015; Legner et. al. 2017). The developments of technology are described as a critical component in organizations to reach business success (Meuter et. al. 2000).

Further, technology and online platforms allow activities to be transferred outside the organization towards the consumers (Pestoff 2006), which allows a greater interaction with consumers (Florens & Vasquez-Parraga 2015). Therefore, technology has become a driving force when it comes to embracing collaboration between both parties (Romanelli 2017). This requires an optimization of the digital channels that allows these interactions (Legner et. al. 2017). The technical linkage between producer and consumer in co-production is important since its results can either be substitutes or independent of each other (Pestoff 2006). This can thereby be an important mean to increase both quantity and quality of services (Pestoff 2006). Technology tends to develop a new way of enhancing transparency, sustain openness and accountability. This because technology allows consumers to become engaged and inspired to participate actively (Romanelli 2017). Technology has had a large impact on how new forms of value can be possible through co-production (Delmond et. al. 2017).

Activities

In co-production, an essential part is the activities and its focus on involving consumers. Organizations that offer services, a common approach in co-production is to outsource a proportion of the activities towards the consumers (Boselli et. al. 2008). A co-production process can be described as an activity network chain that consists of different operational activities, performed sequentially (Etgar 2008). All the activities are linked to the next one in the production process (Etgar 2008). The activities can be developed in various ways and with different people depending on the purpose (Etgar 2008). Additionally, Etgar (2008) argues that through involving consumers to participate in either one or several activities, it will increase the value. This could be described as transforming inputs into outcome by using labor, capital knowledge and facilities (Boselli et. al. 2008).

Since co-production allows consumers to become co-producers, activities are adjusted in order for them to participate (de Andrade 2016). There is not a specific formula on how to co-produce, as every organization have different purposes (de Andrade 2016). Further, new technology creates new needs regarding the design of activities (Zott & Amit 2017). This since the old way of performing activities does not create enough value any longer for both parties (Zott & Amit 2017). Because of this, relationships and collaborations between the parties are fundamentally changing due to how activities are performed (Meijer 2016). From an organizational viewpoint, the barriers towards the consumers become lower since they can be more involved (de Andrade 2016). This means that through transforming activities towards consumers, they become a co-producer instead of only a consumer (de Andrade 2016). Co-production provides flexibility for the consumers, since they can have more influence in which activities they want to participate in (Auh et. al. 2007). The offerings can this way become more customized, depending on the purpose of co-producing (Auh et. al. 2007). This way, the consumers will transform into a more active participant with more influence of their life (Bovaird & Loeffler 2012). Hence, organizations can trust that consumers take the right decisions (Bovaird & Loeffler 2012).

Responsibility

When it comes to co-production, and transferring activities outside organizations, one enabling dimension is responsibility. This since co-production allows consumers and organizations to work together and deliver services (Boyle & Harris 2009). Caused by this change, new notions of how consumers could act are required in co-production (Pestoff et. al. 2013). Hence, consumers are becoming more active agents, rather than passive recipient that are trusted to take their own decision (Boyle & Harris 2009; Meijer 2012). Through allowing consumers to participate with their time, expertise and efforts they can accomplish outcomes, manage risks, gain more control and share the responsibility (Linders 2012). Therefore, when consumers become more involved, the power will also be transferred

more towards them (Meijer 2016). Despite this, responsibility and shifted resources are outcomes of involving the consumers in co-production (Boyle & Harris 2009).

In order to have responsibility in co-production, it is essential that the consumers have been assigned with that right to participate (Pestoff 2014). An important aspect for encouraging consumers to become co-producers is through allowing them to have the ability to influence (Pestoff 2014). Further, it could be difficult to distribute power to those that are not used to it (Linders 2012). This because consumers become a more active part, having power will come with larger responsibility (Linders 2012). Hence, to get consumers engaged and taking on responsibility, they need to feel that they have the ability to do so (Fuller et. al. 2009). Offering consumers to take on responsibility brings a need for providing them with for example additional access, education, and information (Harrison & Waite 2015). This further indicates that consumers are resources themselves, and not only a recipient (Boyle & Harris 2009).

With co-production and a greater responsibility, it provides consumers with the ability to choose more actively (Auh et. al. 2007). This way, consumers become the ones responsible for certain assignments and activities (Rantala & Karjaluo 2016). Additionally, technology has changed the traditional social patterns, which has resulted in a shift when it comes to the power balance (Menvielle et. al. 2017). This transfers responsibility from organizations toward consumers (Menvielle et. al. 2017). On the other hand, technology does not eliminate the organization's responsibility since they still have some central responsibility for the production process (Rantala & Karjaluo 2016).

Knowledge

In co-production, knowledge is described as an important aspect when it comes to participation (Cooke et. al. 2017). In the same way, knowledge can also be produced through participating in co-production (Cooke et. al. 2017). This way of sharing knowledge would lead to a higher quality on the products or services (Vennik et. al. 2016). It is the knowledge that defines an authentic and meaningful collaboration in co-production (Cooke et. al. 2017). This means that both parties need to be co-producers and not only to transfer the knowledge towards the consumers (Pestoff et. al. 2013). Therefore, it becomes essential for the organizations to provide an environment that allows the consumers to advance and apply their own knowledge (Essén et. al. 2016). By sharing knowledge, consumers will in return become more knowledgeable, which will create a higher value (Essén et. al. 2016).

Within co-production there is a significant importance to integrate and engage multiple perspectives, to shape the right processes for knowledge (Rycroft-Malone et. al. 2016). Knowledge within co-production is related to how information systems are designed to make it easy for the consumers and organizations (Romanelli 2017). It is important that involved consumers understand the purpose and how to participate (Auh et. al. 2007). When both parties gain more knowledge, it will result in a better contribution of the delivered services and see improvements (Auh et. al. 2007). Consumers that have more knowledge and expertise will be more equipped to perform valuable outcomes (Auh et. al. 2007). Consumers with less knowledge will probably experience larger risks when taking a decision and can therefore hesitate to participate since the outcome could be suboptimal (Auh et. al. 2007).

Consumers could contribute with different knowledge compared to the organization (Loeffler & Bovaird 2016). When addressing co-production, skills may need to be optimized for example training, development and performance management (Pestoff et. al. 2013). This also regards the organizational professionals that need to be educated to become more flexible in their work (Boyle & Harris 2009). An important aspect when adopting co-production is to make sure and ask the participants of their skills and what they need to learn (Boyle & Harris 2009). To create a higher degree of motivation among the participants, these trainings should consist of three factors: allow various services to communicate with the consumer, explain exactly how the consumer should perform the tasks and why they are performing the tasks (Damali et. al. 2016). Additionally, knowledge can in co-production be viewed as a strategic resource (Romanelli 2017).

Research model

This chapter will present the assembled research model, which are based on the collected literature about the enabling dimensions. This model will be used as a guiding tool during the empirical data.

Based on the purpose of this study, to gain more knowledge about what needs to be considered regarding the enabling dimensions when implementing co-production, a research model has been developed. This study defines enabling dimensions as dimensions that enable co-production. The research model is assembled from literature, presented in previous chapter (Theoretical background) and combines the enabling dimensions: technology, activities, responsibility and knowledge. The research model will be used as a guiding tool for the collection of the empirical data to gain a better overview of what needs to be considered when it comes to these dimensions. Below, the research model are illustrated in *figure 1*.

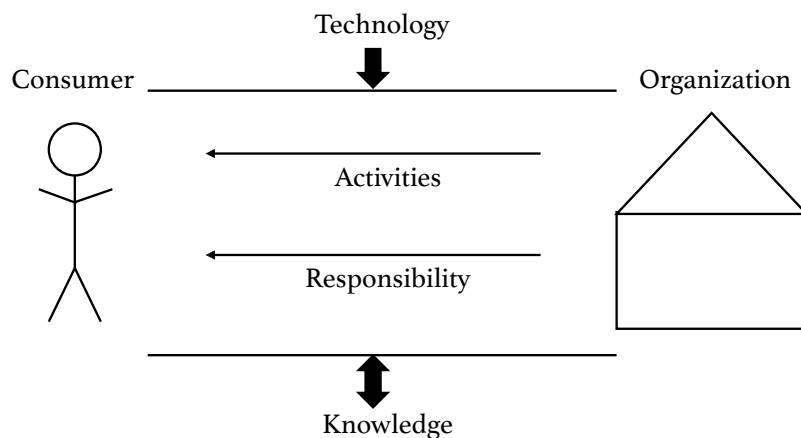


Figure 1: Research model of enabling dimensions

Since this research model refers to co-production, which focus on the relationship and collaboration between consumers and organizations, these two roles are illustrated on each side in the research model. Even through the context of this study are healthcare, patients can be viewed as consumers of healthcare services. In the past, patients have been more passive and not able to reach the same of information as today, which are a result of the expansion of internet and the growth of eHealth (Hardey 2001). Patients can this way become more involved in issues regarding prevention, environmental causes and lifestyle issues, which can affect the outcome of their health. This in return creates a shift in roles, turning patients into consumers within healthcare (Calabretta 2002). Therefore, during the analyze and discussion chapter patients will primary be described as consumers, to clarify similarities toward other industries.

The first enabling dimension *technology*, is illustrated with an arrow that is targeting into co-production. This is because literature describes technology as a key enabler for achieving co-production (Meijer 2016; Romanelli 2017; Legner et. al. 2017; Pestoff 2014). The second enabling dimension *activities*, which is illustrated with an arrow from the organization towards the consumers. This is because the literature argues that through performing co-producing, the activities are transferred towards consumers (Boselli et. al. 2008), in different forms depending on the aim (de Andrade 2016). The third enabling dimension *responsibility*, is illustrated as an arrow in the same way as the activities, which are transferred from the organization towards the consumer. This is because the literature argues that when activities are transferred and consumers starts to participate, the responsibilities and the power balance will move more towards the consumers (Boyle & Harris 2009). Lastly, the fourth dimension *knowledge* is illustrated with an arrow targeting both in and out from co-production. This is because literature suggests that new knowledge may be needed and that new knowledge could be developed (Cooke et. al. 2017).

Research methods

During this chapter, methods and perspectives applied within this study will be presented. This chapter further includes the research approach, empirical data collection, sampling of cases and respondents, cases and the analyze method. This chapter will end with an explanation of the qualitative assurance and the ethical considerations.

The purpose of this study was to increase the knowledge about enabling dimensions and what considerations that needs to be addressed regarding the enabling dimensions when implementing co-production. This required the use of social science, since it was valuable to investigate the human element and obtain accurate results (Usunier & Lee 2013). Hence, this study was carried out through a hermeneutic perspective, which allowed us to interpret text. Further, this perspective allowed us to gain a valid and mutual understanding of the collected texts (Kvale & Brickmann 2009). This perspective was addressed in this study because it made it possible to collect multiple perspectives of people's thoughts. In order to answer the research question, a deductive approach was considered since this study intended to collect more information within this field (Patel & Davidsson 2014).

This study was further conducted with a qualitative approach, because it allowed the study to focus on words and texts, rather than quantitative data (Bryman & Bell 2015). Hence, this was important in this study and is aligned with the choice of the hermeneutic perspective, which allowed us to interpret these texts and generated a greater flexibility during the whole study. Adopting the qualitative approach was primary important in order to answer the research question: *What considerations need to be addressed regarding enabling dimensions when implementing co-production?* since the intention was to collect the respondents point of view. Prior to the research question, this was important, since otherwise the results not provide the same depth regarding the considerations for the enabling dimensions, which would have been possible with a quantitative approach.

Additionally, since the purpose of this study was to collect in-depth data, from multiple perspectives, a case study design was applied (Kumar 2014). By applying case study design, allowed this study to explore selected cases where co-production already had been implemented and that had come a long way. Based on the decision to gain multiple perspectives, this study included three cases to gain a deeper understanding about the enabling dimensions from different solutions. This further allowed the opportunity to examine if considerations regarding the dimensions had been similar or not between the cases.

In order to find the enabling dimensions and developing the research model, which was used as a guide for the empirical data collection, it was essential to collect literature. The collection of the literature was based on several keywords, firstly: co-production, digitalization and enabling dimensions. After this, the context of healthcare and alternatives for enabling dimensions was chosen and additional keywords was investigated: healthcare, chronic diseases, technology, activities, responsibility, and knowledge. The search tools were primary from databases and resulted in discovered articles and journals, found at ub.gu.se and Google Scholar.

Empirical data collection

The empirical data was collected through semi-structured interviews, which further is a common method to apply based on the precious adopting of hermeneutic perspective, qualitative approach and case study design (Bryman & Bell 2015). Based on the purpose to collect deep information in relation to the research question, in a flexible way. Before conducting the interviews, an interview guide was developed, which was based on a list of general questions that followed the order of the answers (Bryman & Bell 2015). The interview guide was based on five primary questions, one general question regarding the project and then the four enabling dimensions, described in the theoretical background with support from the research model.

The interviews were constructed as a discussion with all the respondents, which allowed a lot of leeway when it came to how they responded (Bryman & Bell 2015). This way, the questions did not follow a specific order, since it depended on how the respondents answered. Further, through conducting this type of interview, it allowed the ability to ask follow-up questions depending on the respondents answer, which made it possible to add additional interesting considerations. By performing the interviews this way, the collected empirical data was based on the respondents own thoughts and feelings of the subjects that allowed us to collect data that would not been possible in the same way with for example a questionnaire.

The interviews were performed during both physical meeting and by telephone and were divided equally between the respondents, with 5 each. This decision was taken in order to meet as many respondents as possible, but still be available for those that did not have time to meet face-to-face. Hence, this created a good combination of interviews, and where not meeting all the respondents was not seen as a challenge, since this way they could still explain their thoughts and their reactions and emotions could become interpreted. Before each interview started, the question was asked if it was allowed to record the interview, which all of them agreed upon. This further allowed us to focus on listening and interpreting their answers, since it later on this way would become transcribed.

Additionally, Guest, Bunce and Johnson (2006) explain that to meet saturation and have a good number of interviews are between six and twelve interviews, which this study has considered during the sampling of respondents. This study resulted in ten performed interviews and where the time duration for these interviews was approximately between 25-75 minutes. The time duration was influenced on how large discussion the interview resulted in. All the interviews were performed in Swedish, since it was the respondent's native language and we wanted them to be as comfortable as possible.

Sampling of cases

In order to investigate multiple cases of where co-production had been implemented within chronic diseases to get as deep understanding as possible, sampling of cases was important. Therefore, many potential cases were explored and where the search started looking through different co-production solutions that had been implemented. It was then discovered that healthcare was an area where much research already had been made and where patients acts as consumers, which was founded to be interesting. Despite this, this study found that healthcare has a rising demand for new solutions, where co-production could become one alternative. Since the area for chronic diseases within healthcare have gained large focus both inside and outside the research of co-production, this study decided to address chronic disease projects. This was because it is a target group that requires much resources and required to participate in their care (Socialdepartementet 2014; Socialstyrelsen 2014). Since there exist studies within co-production and chronic diseases, this study decided to focus on when co-production already has been implemented in real world cases and base the considerations from them. The authors of this study then discovered four enabling dimensions, which made our focus more specific.

The investigation continued throughout a more specific search, for projects within chronic diseases that had implemented a solution where the patients had become participants. Potential projects were discovered, both from Sweden and abroad, which further was examined. Hence, the investigation for the projects was through academic papers, healthcare websites and newspapers, where five of the discovered projects were contacted. The selection of cases was based on requirements, to guarantee that the research question could be answered. The requirements were: the projects should have been introduced and tested in cases with patients, a solution where the patients become co-producers, a solution for chronic disease, patients within different ages and resources available for interviewing. Two of the contacted project was eliminated because they were in too early stages of the project or because they had not implemented it on patients. On the other hand, three selected cases fulfilled the requirements and were based in different regions in Sweden. Additional, the selected cases had different

solutions, offerings, type of chronic diseases and focused on different ages to get as deep and broad data collection as possible. In this study, these three projects will be described as Case 1, Case 2 and Case 3 and are further described below.

Case 1

The project for Case 1 was developed for patients with a chronic lung disease. This project ended in June 2017 and is now under evaluation. The solution is based on a tablet application, which patients are provided with and external technique that are connected. The patients could with this solution take their tests from home. Despite the tests, this solution included questionnaires, virtual rounds and activity recommendations. The purpose of this solution was to minimize hospitalizations and allowing patients to become more active alongside collect more data. This was a project where different hospitals in Sweden participated and where they could be an active part themselves, or outsources it to an external care service. The project was on-going for 22 months and involved 80 patients. For this chronic disease, the patents are older and often over 75 years old (1177 Vårdguiden 2017). Only in Sweden, there is around 400 000 – 700 000 patients have this chronic disease and it is nothing they could be cured from (1177 Vårdguiden 2017).

Case 2

The project for Case 2 was developed for patients with a chronic heart disease. This projected was conducted with different actors, and some of the hospitals that were a part of the project have now continued with the solution in their daily work. The solution is based on a tablet application, which the patients were provided with that was connected to external technique. The patients could then have the tablet and home and conduct the test. Despite the test, the solution included some recommendations and tips alongside a questionnaire. The purpose of this solution was to minimize hospitalizations and allowing patients to become more active alongside collect more data. The patients that have this chronic disease are usually over 65 years old. The project was conducted in two different phases between 2014 and 2016 and involved 55 patients. Around 2-3 % of the population in Sweden has this chronic disease, which is around 250 000 patients (Hjärt- och lungfonden 2018) that cannot be cured from this chronic disease.

Case 3

The project for Case 3 was developed for patients with a chronic stomach disease. Different actors participated in this project and contributed with different functions. The solution is based on a mobile application and external techniques that connects to a system. The patients could this way perform the tests at home, instead of at the hospital. The purpose of this project was to minimize hospitalization, allow patients to become more active and collect more data. Patients that have this chronic disease get it when they are around 15-40 years old. The project is still active and proceeds between 2017 and 2019. Today, around 80 patients participate in this project. In Sweden, around 60 000 patients have this chronic disease that they cannot be cured from (SVT 2015).

Sampling of respondents

When the three cases had been chosen, a snowball sampling method was applied and one person was contacted at each case (Bryman & Bell 2015). The person that was contacted in each case were the contact person on the website of the project. The contact person either agreed on a meeting or helped with other contacts that were more suitable. This way, the study was provided with more contact and people within different roles in the projects, which then was contacted. This allowed interviewing people within different position of the projects, both people that worked with the idea and practically. One

respondent per case had worked with the technical solution and main idea, one that had worked strategically within the project, a nurse that worked practically and one that used the solution.

This study was able to get in contact with patients that had used this solution during the project, which was an important perspective to include. Because of laws, hospitals are not allowed to give out any personal information about the patients. Therefore, this study's authors asked the respondents in these cases if they could ask patients that had been included in the projects if they wanted to participate. This way, it was the patient's decision to participate and had the ability to say no. Before giving their consent, they were informed about the purpose and telephone number to those patients that had accepted to participate was provided, which were prepared for our call. Despite the benefit of including patients, the fact that they could have been biased against the project since they had participated and agreed on talking to us, needed to be considered. This study claims that it still provided another valuable perspective in this study. The respondents in this study represent different levels, the technical, strategic, daily work and those that used the solution in the project. The initial idea was to have four interviews per project: founder, strategist, nurse and patient. This generated the possibility to gain deep knowledge and a broad picture of the dimensions.

The initial idea was to have 12 interview, four per case, but two was removed by purpose or by external circumstances. Within Case 3, the interviewed nurse also worked with this project on a strategic level both with the hospital and external. This made the decision of including the nurse the role as strategist as well, since it provided the information needed. Further, since patients are patients, this came with a challenge in Case 3. A patient that had accepted to participate became sicker and was therefore not possible to participate as planned. After this, it became difficult to find another patient, since the original one was the one that usually participate in these kinds of interviews. Thereby, the decision was taken to illustrate Patient 3 from secondary data, found in a report made within the project, about the patient's own opinions. Below, the respondents will be described in *table 1, 2 and 3*, and given a name used in this study. The given names may not be their exact job description, but our interpretation of their part of the project.

Case 1	
Description	Title within this study
Has worked with the idea of the technical solution and its functions	Founder 1
Work strategically with the healthcare activities for the solution	Strategist 1
Works with the solution in daily work as a nurse	Nurse 1
A patient that participated in the project and used the solution	Patient 1

Table 1: Description of respondents for case 1

Case 2	
Description	Title within this study
Works at the company that has developed the idea and solution	Founder 2
Worked strategically with implementing the solution into a hospital	Strategist 2
Works with the solution in daily work as a nurse	Nurse 2
A patient that participated in the project and used the solution	Patient 2

Table 2: Description of respondents for case 2

Case 3	
Description	Title within this study
Has worked with the idea of the technical solution and its functions	Founder 3
Worked strategically with implementing the solution and work as a nurse with this solution daily. Despite working strategically, the respondent will in this study has the primary role as the Nurse because that was the primary role.	Nurse 3
Secondary data from a report made within the project about patient's opinions.	Patient 3

Table 3: Description of respondents for case 3

Data analyze method

This study has addressed a thematic analyze method, which allows the results to be structured after the enabling dimensions themes (Bryman & Bell 2015). Once all the interviewed had been performed, all the recordings were transcribed. The transcriptions were then translated to English, since the interviews was performed in Swedish, which was done with the intention to similar descriptions. The transcribed interviews were then placed into documents of their own. Through having each transcription in a separate document, provided a good overview of the results. The authors of this study then started to go through all the material, this by color coding the sentences related to each dimension, each keyword had its own color. The material was read through several times to secure it was aligned with what had been mentioned during the interviews. The result will be described after each case, to get the overall picture of the case. Then, post-it's was then used for writing down the most important result and then tried to find a connection to the considerations that needs to be addressed regarding the enabling dimensions in each case and together. This to answer the research question posed in this study. Sentences were then taken out from the different documents and placed them together in one document and thereafter wrote the result. Following, we started to connect out result to the research model to find similarities or deviations.

The analyze was divided after the enabling dimensions to clarify the discovered findings. From this, it was possible to discover what considerations that needs to be addressed when using co-production, which further was both discussed and explained. The research model provided with both information and a structure for how these considerations should be explained. In the end of the discussion, the consideration that needs to be addressed for each enabling dimension is clarified through a *table 4*. The chapter ends with explaining how these enabling dimensions, based on the empirical findings influence each other, this is because it provided a better overview of what needs to be considered in future implementations.

Quality assurance

To answer the research question of this study, transparency and authenticity has been important to consider. During the whole study, these two concepts were considered both when it came to collecting literature and the empirical data. The authors of this study considered to be as transparent as possible, since much literature was read, which was needed for supporting both the reader and our research model. This was also important during the interviews, since the authors of this study did not want to become influenced by the respondent's thoughts or feelings, in the same way as they could have been influenced by us. Further, it was especially important to consider transparency when writing the result and not put any valuation in the findings and present what had been found. The same when it came to trying to be transparent when analyzing the empirical collected.

When it came to the authenticity, this was considered in the same way, during both the collection of literature and empirical data. It was important to always consider the purpose of this study alongside answering the research question and not focus too much on other findings. Throughout the collection, the meaning of sentences was interpreted several times before writing them into the study, to have a clear perspective of the meanings. During the interviews, the authors of this study tried to put ourselves in their situation, to make them comfortable and get as honest answers as possible, but still needed to consider these aspects afterwards. It could therefore be claimed that the results explained both the answers the respondents gave and the impressions those answers gave. The authors have tried to express the result in the same way as the respondents. Hence, the authors can guarantee that they have tried to be as trustworthy, transparent and authentic as possible during the whole study.

Ethical considerations

During this study, ethic has been considered both when it comes to the purpose and the respondents. When it comes to the sector within this study has been performed within, healthcare, there is different factors that needs to be considered. These dimensions were primarily related to the strict laws about giving out certain information about patients participating in the project and what the healthcare professionals could say. As in all research, there is a risk that the respondents are biased towards what they talk about. This was something important to consider, since all the respondents had been a part of the projects with different roles and could therefore have their strong beliefs regarding the solutions, both good and bad. Since most of the respondents were open about both what has succeeding and the obstacles, this was not a challenge during this study, but still needed to be considered. Hence, to be able to understand and gather knowledge regarding consequences of certain implementations or actions it was needed to be these respondents.

Every respondent was asked and could take their own decision to participate on their free will (Payne & Payne 2004). Before taking their decisions, they were provided with an explanation of the purpose of this study. To protect the involved respondent's integrity and confidentiality, much of this information has been anonymized. This related to the project name, chronic disease, respondents name, real positions, solution name and all the involved parties. We have decided to not include the chronic disease name, but what type of organ it concern since we decided that it would provide more value to this study, since it is hard to understand what is needed from the enabling dimensions otherwise. This regarding for example, what technology that is used, which activities that performs, what knowledge that are needed and how the responsibility is viewed based on this. Based on this decision, the project is not securely anonymized, which we and the including respondents is aware of. Not any respondents wanted to be anonymized but we chose this because it would not create value in this study, rather more confusion. The choice to record the interviews was likewise a decision the respondents had to take, which was no problems. Despite this, the only ones that know what the name of the respondents and the projects are the ones involved within this study.

Results

This chapter will be present each case separately including the four enabling dimensions and describe considerations made by respondents regarding the enabling dimensions. The research model has been used as a guiding tool for collecting the empirical data.

Case 1

The project for Case 1 was developed for patients with a chronic lung disease. The solution was based on a tablet application, which the patients are provided with and external technique that are connected that helps patients do their test at home. The project ended in June 2017 and is now under evaluation.

Technology

During the interviews, it was highlighted that technology had been an important part for conducting this project. Founder 1 explained that the technology was based on an application, with external technology for supporting measurements of weight, blood pressure, pulse, activity and oxygen consumption. The technical solution was established by collecting and sharing the results of the measurements the patients aimed to performed, through a system, which was connected to a database. Strategist 1 explained that the results of the measurements are automatically transferred into the system, with the help of external technology and everyone involved could access the data. Founder 1 further explained that since many roles was involved, such as technical operator, healthcare operator and patient, they all had access to the system. The patients were offered the solution on a tablet, which they were provided with. Additionally, Strategist 1 explained that the solution consisted of different questionnaires that contained questions regarding different symptoms, which made it easier to follow the evolvement of the disease. Despite this, the solution consisted of a video call function, which was used as a substitute for physical meetings between the different roles.

Founder 1 further explained that the interface was developed with the mindset of being of low complexity. This since patients with this disease normally are older and very sick, which have been the focus to assist. The interface was based on five functions such as for example assistant, measurement and contact. The initial thought was that this would become easy, but Founder 1 described that since they allowed another part to develop the software, it somehow became more complex than expected. Despite this, Founder 1 and Strategist 1 continued with that it still was a helpful tool, even if the interface may not have resulted in their initial thought. Nurse 1 explained that it was still manageable for the patients, which Patient 1 agreed on. Patient 1 continued with that the technical solution was not too difficult to control and are good for patients in same situation, that are old and sick.

From an organizational point of view, Nurse 1 explained that the system itself was very easy to use, since all the data were directly transferred towards them and accessible through the system. The system showed the results based on each patient. These results were then colored after a traffic light system, where red was bad and green good results. For each patient, these colors can be adjusted after their independent needs, for their situation and if needed they can call the patients though video call. This way Nurse 1 explained that they easier could access data that previously was not possible and collected in one place, which makes their work much easier. Regarding the video calls, there was some connection problems in the beginning, which was fixed since it is important with this disease to have a clear picture of the patients and that the quality of the video is good. Nurse 1 further explained that there existed a technical support number, if there were any problems with the solution. Additionally, Patient 1 explained that their existed a fear of doing something wrong, which disappeared more over time. Without the solution, Patient 1 explained a lack of control over the measurements.

Despite the benefits of this technical solution, Founder 1, Strategist 1 and Nurse 1 explained that one obstacle was the medical records, where all the other medical results are collected, was not possible to

integrate with. Even if they had this system, which made it possible to view the results, they saw it as a challenge since the data was in different places. They continued with describing that this needs to be possible in the future, since healthcare in a long-term perspective not can implement one new system for every function. Another challenge mentioned, was the compensation models, which made it hard to integrate this kind of solution in healthcare. In the same way as the medical records, the Founder 1 and Strategist 1 expressed their hope that the compensation models in a soon future will change, to encourage more projects like this.

Activities

Founder 1 explained that this solution has targeted patients that have been into the hospital because of an impairment of disease status. Patients that are discharged from the hospital were offered the solution, which made it possible to monitor from home. With the solution, the patients were intended to take daily measurements alongside filling in a questionnaire. The transferred activities that the patients should perform, with this solution, were taking their blood pressure, weight and oxygen consumption. These activities made it easier for the patients to have control of their symptoms. Within the solution, patients could find videos that explained activities for exercising, specified for this disease. Further, every week there was virtual rounds, where the nurse and doctor called the patients through a video call and talked about the disease and how the patient currently was feeling. The hospitals that implemented this solution, had the alternative to be the healthcare operators themselves, and be the ones monitoring the patients' measurements. Otherwise that role could be outsourced to a third-part healthcare provider.

Founder 1 described that when they developed the solution they worked with several actors, one of them were healthcare professionals. This was important to be able to include the patient and care perspective from the start, to understand what is possible to transfer towards patients with that specific disease and abilities. This regarding both what was possible to perform and could be transferred from healthcare into patients' daily life. Strategist 1 argued that this was a way for patients to keep track of their own symptoms. Additionally, it also provided healthcare with more collected measurements and information about the patient's disease. Strategist 1 continued with that this way of working, developed a feeling for security and safeness among the patients, but also an overview for which problems that occurred among patients. The daily measurements provided data and graphs that could be analyzed. Previously, when the healthcare professionals only took measurements occasionally, the results were either good or bad, but did not say anything about the period between the meetings. These additional measurements made it possible to develop a better understanding about the disease in general and how it usually progress. It could also help in reducing and preventing hospitalization among the patients. From a healthcare professional side, it offered other ways to be available and meeting the patients.

Founder 1 explained that the solution was intended to free more resources within healthcare, since it developed another type of process as a complement to the normal one. Nurse 1 argued that this kind of solutions, is the way of working in the future, especially for those that experience difficulties getting to hospitals. This way of working is explained by Nurse 1 as not resource demanding from the healthcare side, since it does not take much time compared to the physical meetings and they can give more assistance to those that really needs it. Further, Strategist 1 explained that the automatically color coding of the measurements intend to give healthcare professionals an interpretation of how the patients are feeling so they can put in preventing actions. This is also confirmed by Nurse 1, who further explained that it provided a good overview of the progress over the patients' disease. Nurse 1 highlighted that patients with this disease often has to leave hospitals too early. This makes them fragile and often even sicker, which made it necessary to go to the hospital again. By transferring some activities and being able to monitor their measurements, healthcare can keep track of the patients after they leave the hospitals, which make both the patients and the healthcare professionals feel more safe and secure. This is something that Patient 1 agreed on, and added that the solution provided greater control over the symptoms, which is important for people in that age. Because of this, it was easier to control the day-to-day symptoms and verify if the measurements are bad or just an evil thought. This way, Patient 1

explained that because of the solution, the visitations at hospitals are only necessary when it is an emergency.

Responsibility

During the interviews, it was expressed that the responsibility changed when implementing this solution. Both Founder 1 and Strategist 1 explained that one of the aims of implementing this solution was to make the patients more responsible, through offer self-care. They continued with describing the difficulties with transferring the responsibility, because of the laws. Founder 1 described that for other solutions for chronic diseases, has already been implemented, where the patient has the greatest responsibility, but within this project it has been more resistance. This despite patients being responsible for adjusting the medicine by themselves in this other mentioned disease, which can be life threatening if doing it wrong. They therefore asked themselves the question of why it was okay in those diseases to transfer the responsibility, but much harder in their project. They expressed that the responsibility, despite this, has started to transfer towards the patients, since they are more involved and are responsible for performing different activities. Nurse 1 explained that the responsibility has with this solution made it into a shared responsibility, instead of only at one side.

Strategist 1 continued with describing that responsibility can be transferred more towards the patients, if they express that they can, want and have the energy for participating. Despite this, Nurse 1 explained that it is important for healthcare to offer the support needed for the patients. Strategist 1 explained that both the patient and healthcare can access the data. Even though patients perform and it was their data, they have not expressed any concern of sharing it, since it makes them feel more secure and that it will generate a better outcome. Nurse 1 explained that with this solution patient could be a greater part of their own disease, which makes them more aware and control of their own disease and their measurements. Hence, patients become more curious about their measurements and the solution can help control the disease on a daily basis, which develops a better understanding of how they feel and increases the quality of life. Further, Strategist 1 explained that it is not the patient's responsibility to hold the care process together, but that they should be the ones in focus.

Strategist 1 explained that some healthcare part is responsible for follow-up the patients, which could be either an external part or the hospital themselves. Further, Nurse 1 argued that the biggest responsibility still was on healthcare professionals. They still needed the data for medical input, since they have other responsibilities than just to perform activities. They need to ensure that patients get the best care, but to do that, they need data. This was further in line with what was mentioned by Patient 1, which meant that it not was a shift in the big picture, but a greater participation and awareness about the disease and care process. This was primary since the patients know and can control when they do not feel well and can handle it when they are still home, with the help of healthcare professionals.

Knowledge

Founder 1 explained that a large part of the education and information provided regarding the solution was educated in the patients' home. This since they did not want it to be confusing for the patients and as far as it was possible, guarantee that patients had all the necessary knowledge before the technical operator left their homes. The education included information about the technology itself, but also how to perform all the activities. Further, Strategist 1 explained that they learned the patients more about their diseases, the purpose of the measurements and performing the activities. It was important to be able to understand how to participate and do the activities since it otherwise not could use the solution. The solution offered in itself education regarding exercises and information about the diseases symptom.

Founder 1 and Nurse 1 both argued on that the technology need to be changed in the future to become easier for the patients to maneuver and a not have such a difficult interface to understand and hard to learn. Nurse 1 continued with that it is necessary that this kind of solutions must be simple, easy to

handle and safe for the patient. But also, that it would be easy to contact both the healthcare operator and technical operator, if questions occurred as for example the technical equipment do not work. Nurse 1 expressed that both healthcare professionals and patients did not have this kind of knowledge before implementing the solution, and acknowledged that it was hard in the beginning but that they had learned over time. Further, Patient 1 described that it was complicated at first, even when using the solution, it did not need so much new knowledge about either the solution or technology. Patient 1 continued with that it was a lot to get familiar with and learn during the way. The knowledge already existed was not used in the same way as after implementing the solution. The solution made it easier when having the knowledge to better control the disease and to use your knowledge in the correct way.

Case 2

The project for Case 2 was developed for patients with a chronic heart disease. The solution was based on a tablet application, which the patients was provided with and external technique that was connected. This projected was conducted with different actors and where some of the hospitals that was a part of the project has now continued with the solution in their daily work.

Technology

It was highlighted during the interviews that technology had been an important part for conducting this project. Founder 1 explained that the technology was based on an application, with connected external technology for supporting measurement of the weight, with a scale. The technical solution was based on a system with belonging database, which collected the results and algorithms to calculate the accurate medicine after the test result. Nurse 1 explained that the algorithm could be adjusted after a patients' specific needs. Strategist 2 explained that unfortunately, patients collected all the data and was the only ones that could have access. Therefore, healthcare had no direct connection to this solution. Even if the healthcare could not see the data, Nurse 1 explained that patients usually brought their tablets to the meetings, there is a wish for having access to it as well. When a patient measures their weight, it was transferred automatically into the system. The patients were offered access to this system through a tablet, which they were provided with. Additionally, the solution consisted of a questionnaire that was based on the symptoms and how the patient was feeling. Despite this, Nurse 2 explained that the solution consisted of many tips and tricks on how to live with this chronic disease, which healthcare also provides them with during the meetings.

Founder 1 explained that their mindset in the beginning was to develop the technical solution as low complex as possible. This was because most of the patients with this chronic disease are old and they wanted the solution to be for everyone, and developed after the target group. Founder 1 continued with that they have based their solution on clinical studies and are CE-marked. Based on this, and by talking to both patients and healthcare professionals, the solution resulted in low complexity, since it was needed for this target group. Nurse 2 explained that the patients did not need to do much or spend much time with this solution, besides standing on the scale and answer the questions and the solution will do the rest. Strategist 2 explained that their oldest patient using this solution was 95 years old and found no difficulties using the solution. It was therefore important to offer this solution to everyone and not only the younger people. Patient 2 explained that the technology worked and was not to complex, which made it easy to use every day. Founder 2 continued with that many people today expresses that when the ones that are young today, becomes old these problems will not exist. But, they will since older people always will have a harder time to learn new and new technology always will come.

To make it available for everyone, Founder 2 explained that they designed the interface of the technical solution as a binder, with tabs. This was because of the patients that never had used technology, would associate it with a paper or a folder. Strategist 2, further described that the interface was designed similar to the Swedish magazine Allers, which this target group are familiar with. This was by Patient 2

mentioned as well, which expressed that there were not any specific challenges with the technology and that it was designed in easy way to understand.

Despite the benefits of this technical solution, Founder 2, Strategist 2 and Nurse 2 all explained the challenge of not being able to connect it to the medical record, where all other medical results are collected. This was expressed as necessary in the future, in order for healthcare to have more use of the technical solution, since had no access to any data. In order to get a long term perspective of this way of working in healthcare, Strategist 2 explained that changes must happen, in order to allowing adjustments after the specific needs. Additionally, Founder 2 explained that the laws and the compensation models was the largest obstacles for them. Strategist 2 and Nurse 2 both explained that they had suggested more functionalities to be included, but Founder 2 explained that in that way will become to complexed and would interrupt the user experience.

Activities

Founder 2 described that at ordinary patient meetings were alternative patients identified and asked if they wanted to use this solution. Then, the hospital ordered the solution from the developing organization, which provided the patient with a tablet, scale and information. Every morning, the tablet lighted up and greeted the patients' good morning, and then the patient stood on the scale, which automatically transferred the measurements into the solution. Then, the solution provided the patient with some suggestions on how to live better with their disease. Alongside this, recommendations for adjusting the medicine was made depending on the weight, since that is the first indicator on an impairment of the disease. Despite this, patients got to answer a questionnaire on how they were feeling every fifth day. The solution therefore clarified the next step for the patients and minimizes the confusion on how their disease is progressing. This way, hospitalizations have become minimized and have until now been reduced with 25%.

Founder 2 described that an important aspect in the initial phase of the project was to visit nursing homes, talk to patient associations and healthcare to develop valuable activities in the right way. Strategists 2 explained that before they implemented the solution, the care process in general worked well, but that they needed to reduce number of hospitalizations. Through transferring some activities towards the patients, the healthcare professionals would be able to spend more time on those that really need it. Further, Strategist 2 explained that the data was presented in a graph, which made it easier to understand how patients weight changed over time. Based on the patient history, the algorithms could be adjusted after the patient's need. The main purpose was never to minimize the meetings at the hospital, but rather more to prevent hospitalizations. The solution was giving the patients advice on when to take an extra pill and then together with nurses discuss the results from it. By providing the patient with tools, and the ability to perform the activity at home, they could earlier identify their symptoms of getting worse.

Nurse 2 further explained that as patient's diseases gradually gets worse, it would in return make them in more need of help from healthcare professionals. During the meetings with the nurse, patients often gets to do other tests such as breathlessness, tiredness and apathy, but as the weight often is the first sign of a worse degree of sickness it has been prioritized in the solution. Founder 2 argued that even if patients could take their weight without the solution, patient did not. With the solution, patients performed the test in a more structured way then before. Through allowing patients to monitor themselves, they got more control and could prevent getting worse in their diseases. The meetings with the nurses reduced for many patients, but they still needed to come for yearly checkups. Through allowing patients to answer questions within the solutions, it became easier for both them and the healthcare professionals to understand the progress of the disease during a longer period. Nurse 2 argued that it was important to keep the activities simple. This since it possibly could become too difficult and reduce the value, which could cause that patients think it becomes too complex. The need for it to be easy was something that Patient 2 mentioned as well. Additionally, Patient 2 explained that the activities was simple and provided much value, which can be done at home instead of requiring a meeting at the hospital.

Responsibility

During the interviews, it was determined that the responsibility had shifted, through implementing this solution. Founder 2 explained that a risk analyze was done in the initial stages of the project, to determine the different responsibilities each role had. The responsibility was essential within this project, since they wanted to minimize the hospitalization and make the patients more involved. Founder 2 continued with describing that the idea of this solution was to make patients more engaged through allowing them to own the data. As they were the ones that only could view their collected data, they were the ones clearly responsible for the data. Despite this, Strategist 2 explained that they still needed to offer them assistance for accomplish having a higher degree of responsibility. Further, Founder 2 continued with that through allowing patients to perform tasks automatically make them more responsible. The European guidance for this disease, recommends that patients should take their weight every day and was therefore something that healthcare encourage their patients. Hence, it was especially important to give patients the opportunity to follow these recommendations, through feeling more responsible.

Founder 2 further explained that the patients must be a part of the healthcare chain, especially since people today are becoming sick, old and new ways need to be addressed. Strategist 2 highlighted that through transferring the responsibility towards the patients, enabled them to take better care of their health, which in return created a greater value. Patients therefore needed to be responsible for the treatment at home, since no one else could. In return, patients felt safer and in control, but could always get assistance when needed. Further, Strategist 2 and Nurse 2 both explained that the responsibility has started to move away from healthcare, but that has not been that much acknowledged from the patients.

Nurse 2 explained that with an increased responsibility for the activities, patients felt better through using this solution and could discover changes in their sickness in new ways. By monitoring their symptoms, would in return made patients feel more secure in their homes. Despite this, patients became more engaged and curious about what they could do to manage their disease, which made them learn more over time and feel more responsibility towards themselves. Patient 2 explained that this solution had helped with providing greater control over the disease and that it became manageable to take the weight every day. Strategist 2 further explained that healthcare traditionally takes on too much responsibility automatically. The patient becomes a rather small part of the healthcare chain when they visit the hospitals, but for the patient, their disease is a large part of their lives. Therefore, patients should have greater responsibility of their own care. In return, involving patients have resulted in better treatment plans.

Knowledge

Founder 2 described that in the initial phases of the project, much focus was on how patients should be educated and how to guarantee they understood the disease, so the symptoms can be discovered. Educating patients was an important way of ensuring that the right knowledge was established. Founder 2 visited the patients home where they both informed and installed the solution to ensure the right education among patients. This was both regarding the technology and how they could find and perform the test. Education was important, since without the right information, and allowed the knowledge how to use it, this solution and idea would be useless. Furthermore, Strategist 2 explained that providing additional information about the technology, symptoms and how to control them, was performed either in groups or individually at the hospital. Nurse 2 argued that they provided patients with all the necessary information, such as why it was important to take the weight every day, which after a while made patients feel more secure. To accomplish this, Nurse 2 explained that to manage the solution required very basic knowledge. Further, with this solution the patients both got increased knowledge about the technology and their own disease from daily recommendations and tips in the tablet, which made them more interested about the disease.

Further, Founder 2 explained that the 85 year old that never has used a mobile phone was in the mindset from start of what knowledge that should be required. Hence, this was the target group that this solution

needed to fit and therefore be designed as easy as possible. Founder 2 continued with that it was important to use the patients, since they are an unused resource in the healthcare chain. But to become a part, they needed to be provided with the right tools and information to be able to participate. Hence, Strategist 2 argued that this solution should be available for everyone in all ages and that even a 95 year old woman could learn how to treat her disease from home. Founder 2 argued that elderly people would always be in need of more support and education when learning new things. Despite this, some patients with this disease are too sick or tired to learn new things. Patients therefore need to feel motivated to participate in order to be offered the solution.

Strategist 2 explained that both patients and healthcare professionals found it difficult to maneuver the technology. When it came to the healthcare professionals, they got education about the solution to assist the patients with the necessary information. Additionally, Patient 2 explained that the solution was easy to use, since enough knowledge and information had been provided. This way, this new knowledge caused large changes in the patient's life.

Case 3

The project for Case 3 was developed for patients with a chronic stomach disease. The solution was based on a mobile application and external techniques that connects to an application and systems. The patients could this way perform the tests at home, instead of at the hospital.

Technology

During the interviews, it was highlighted that the technology had been an essential part for conducting this project. Founder 3 explained that the technology was based on an application, with connected external technology for supporting home-based test for calprotectin. The technical solution and external technology were developed by different actors that has worked together to form this project. The solution consisted of two mobile applications, where one was for performing the test and the other for the connection. The calprotectin test then needed to be placed on a card, which then are inserted into the system through the mobile camera. This way, the physical test with no technology, would get assistance by other technology to access data. When inserted into the system, the application transferred it to a quality register, specific for this chronic disease where all the results were directly transferred to. They used the quality register before as well, but manually. Within the quality register, the results of the tests were showed and are color coded after the traffic light system, where red is bad and green is well. Nurse 3 described that healthcare professionals this way easier could control the results of the tests. This technical solution required that the patients have their own smartphone for usage. Additionally, the mobile application consisted of a questionnaire about how the patient are feeling, which before was done on paper.

Both Founder 3 and Nurse 3 expressed that there had not been too much focus on making the solution as easy as possible, since the target group was younger, which generally uses this type of technology every day. What was argued to be trickier was performing the test. The interface of the mobile applications, was like many other and consisted of questions, the test and messages on when to perform the test. Patient 3 confirmed that the functionality works good and that it was easy to download and install the mobile applications. Despite this, Patient 3 explained that there were initial problems with the calibration of the camera, which made it a bit complexed. When it came to the interface for healthcare it was more complexed and Nurse 3 explained that it was very hard in the beginning. Nurse 3 explained that this was mainly because the interface, was a template from another industry, which made it hard to understand on what each data meant. This improved during the project and then became less complexed. Founder 3 and Nurse 3 explained that it has been possible to provide feedback, both from patients and healthcare professionals, which have made improvements that was not expected before.

Nurse 3 explained that the solution is not limited to only this disease, but could also be connected to other diseases. They could this way collect much valuable data, which could be used for preventive actions of the diseases alongside better and faster treatment plans. Working this way, with the technology, has improved much. Despite this, no communication was possible in the solution, described Nurse 3 and they needed to use external tools. Even if Founder 3 explained that they have had pressure from patients, clinics and politicians for this to work, challenges exist. Further, one concern was that it is not possible to connect the solution to the medical records, which not made it possible to have all the data in one place. This will need to be accomplished, but the strict laws first need to change. Even if Nurse 3 explained that the solution they had, still works, they both claimed that this is needed in the future.

Activities

Founder 3 explained that the first activity for healthcare professionals was to register the patient in the quality register and for the solution. After registration, patients received a welcoming email, which described the basics of how the patient could download and get started with the applications. After downloading the mobile applications, the patient was asked to choose a pharmacy for picking up the tests, and when the tests had arrived, patients would get a text message that it is ready for pick up. Then, the patient would have all the pieces for performing the test by themselves, at home. They could then perform the test, hold the mobile camera over the test and then get the measurements into the application. Patients answered a questionnaire, which was transferred automatically into the quality register. These are the same questions that everyone with this disease would answer, even if they do not have this solution. But without the solution, it would be answered on paper and transferred manually by healthcare professionals to the quality register. The measurements of the tests would then be transferred into the quality register and converted into graphs and lists and become available for healthcare professionals.

Founder 3 explained that from start, they had worked with different healthcare organizations to get the right expertise. This is regarding both the need of the activities and how patients should perform them. Further, Founder 3 continued with that the main purpose of this solution was to digitalize the already existing workflow. Despite this, Nurse 3 highlighted that by transferring activities towards patients, hospitals became less burdened with their resources and laboratory. This since the patients performed activities by themselves at home and got the results within two hours. Compared to, when they previously needed to take a feces sample in a small tube and bring to the hospital, where it took a week to get a result from laboratory. This resulted in that many people did not perform the test and became sicker. Instead of coming to the hospital each 8th week, depending on the degree of sickness, people could this way manage this from home.

Through doing these tests and answer the questionnaire, healthcare professionals could view and discuss the results with the patient and suggest a treatment plan. This is something that Nurse 3 explained was a great help, especially since the graphs provided a good overview of the situation, it went fast and actions could be taken before it was too late. This way, patients could call and explain that they were not feeling good, take a test at home, then Nurse 3 would have the results and could suggest preventive actions. Despite these benefits, Nurse 3 explained that this solution would probably not fit all, since not everyone want to participate in this kind of solutions. If patients could threat themselves more at home, it would give them more free time to help the patients that really are in need. This would in return minimize the costs and time for patients and healthcare. Patient 3 expressed that doing the tests was very easy and that it saved much time. Furthermore, Patient 3 explained that it felt more secure to have more control over when the disease was getting worse, since the result was very fast.

Responsibility

During the interviews, it was discovered that the responsibility had changed through implementing this solution. Founder 3 explained that this solution fits those patients that were committed, driven and had the interest for a freer lifestyle. Hence, this would make the patients more responsible of their own

health. Even though the responsibility was moving more towards the patient, it would lead to more options and a higher degree of freedom. Nurse 3 explained that this solution created a higher degree of participation for the patients, which was explained here as the most important factor for better treatments and a growing interest for their disease. Nurse 3 explained that the purpose of this solution was to make the patients more responsible over their own health. Because of this intention, the patients own all the data, but they had the choice to share it with the healthcare professionals through the solution. Further, Nurse 3 experienced that patients felt more responsibility for their disease, especially since they understand both it and their body better.

The intention of the solution was not to abandon the patients, but rather more make them independent. This since Nurse 3 meets many patients that have no understanding of their disease, and of why they are taking medicine, which was one of the argument for why they needed to make the patients more responsible and informed. Further, Nurse 3 clarified that they want the patient to be more involved and responsible, especially since it is possible. Despite this, Nurse 3 continued with that other healthcare organizations have expressed their concern of letting go of the responsibility. Additionally, trusting the technology was one of the reasons alongside giving up their work tasks. Patient 3 expressed that through using this solution and getting more responsibility over activities such as taking the task, increased the self-awareness. Despite this, it was acknowledged that the responsibility will be transferred more towards the patient in the future. This is because patients easier could treat their disease by themselves with medicine and minimize the meeting at the hospitals.

Knowledge

Founder 3 described that they have provided both healthcare professionals and patients with education, information material and instruction videos to make sure that the patients have the right knowledge. If the patients had general experience and knowledge of using smartphones, this solution was not hard to understand. To guarantee that users do not have any unanswered issues, they established a support division that was available for answering all questions regarding the test and technology. This was something that Nurse 3 expressed had been of great value, because it was hard in the beginning to understand the technology. Furthermore, it was explained that they have developed manuals and instruction videos, to make it as easy as possible for the patients to learn. During the way, Founder 3 explained that they had included the most common questions and improved both the solution and education after the feedback. Based on this, it was argued that the majority of both healthcare professionals and patients had succeeded very well and that the knowledge they have been provided with was enough to be able to use the solution.

In the same way, Nurse 3 explained that since many of the patients that have this disease often are rather young, there should not be any difficulties for them to handle a new mobile application. Additionally, even patients that were born in the 1940s, are now familiar with new technologies are therefore often adaptable to use this solution. Despite this, the solution required more knowledge than some patients felt they could manage and therefore did not want to use this type of solution. But generally, Nurse 3 explained that not much knowledge regarding the technology was needed to complete a test.

Nurse 3 expressed that by allowing patients to perform the tests at home and viewing their result, led to them gaining more information and knowledge about how their disease progresses. Despite this, when the patients gain more knowledge they will be more aware and observant when something is wrong. From their perspective, it was essential that patients get this solution as soon as they become diagnosed and offered the choice to participate. This since they will learn and collect more information about the disease from start. Further, Nurse 3 explained that based on experience, this kind of solution is something the patients expects when they arrive the first time at the emergency room. Patient 3 explained that it was provided enough knowledge in order to handle the solution and perform the activities.

Analyze & discussion

This chapter will analyze the theoretical background combined with the empirical findings, as this study investigates enabling dimensions of co-production in implemented cases. Further on will this chapter also examine considerations addressed and if the enabling dimensions influence each other.

Technology

Based on the empirical findings, it was discovered that technology has been an important and critical component within all three cases. The technology was described as essential to allow a new form of collaboration, which in return improves the relationship between the organization and consumers (Meuter et. al. 2000). Further, the technology allowed information to be both shared and researched among the different roles, in ways that previously have not been possible (Schadler & McCarthy 2012). Based on this, it could be argued that technology have been a key enabler for co-production, which further is aligned with the literature (Meijer 2016; Romanelli 2017; Legner et. al. 2017; Pestoff 2014).

Through comparing the technical solutions, it could be determined that they were developed differently, even if they all had the purpose of allowing consumers to be more involved. The large difference was mainly caused by who the solution was for and what those consumers' needs. The target group was essential to consider during the development of the technology, since they all needed different functions. The solutions were based on both tablets and mobile phones, depending of what they considered the target group to be most comfortable with. Within all cases, these were factors that was investigated before even start developing the solution and have resulted in different outcomes. The interfaces were developed differently to match both the purpose and target group, to make it as easy as possible for the consumers. In one of the cases, they even developed the interface to be as similarities to a magazine as possible, since they expected their target group to be more reviving to this kind of look. It could therefore be determined that considering the target group is essential, both when it comes to the technology itself and the interface.

The target group is important to consider when it comes to the complexity of the technical solution as well. This to allow greater interactions with the consumers, which is recommended in the literature (Florens & Vasquez-Parraga 2015). Based on the empirical findings, it was discovered that the age of the target group has been important to consider when deciding the complexity level. In one of the cases, where the target group was younger, they expected their consumers to be comfortable with more complexity. This resulted in changes to make the solution less complex and improved quality of the service (Pestoff 2006). In comparison to another case, where they had tried to develop the technology as easy as possible, but it still became too complex. Even though they considered the complexity in different ways, it depends a lot of the included functionalities within the solution. The case that became too complex consisted of many functionalities such as video and exercising recommendations, which the other two did not included. The other two solutions consisted of only one function, or tests, which the consumer was expected to perform, while the other one required more. Therefore, it could be argued to consider the complexity when it comes to the technical solution after target group, when implementing this idea.

Despite the risk of developing a to complexed technical solution, this could have been influenced by the context, the chronic diseases. The chronic diseases all have different symptoms that needs to be monitored, which could either be one or more. This means that if one chronic disease has one strong symptom, for example increased weight, this is the one measurement that is important to monitor. On the other hand, for another disease it could be several things that needs to be monitored, which automatically makes it more complex. This is nothing that solely needs to be addressed within healthcare, but with different aims in other industries. Despite this, including for example videos and exercising recommendations could for all cases increase the outcome (Pestoff 2006), but will it provide the same value when consumers are too afraid of doing something wrong? Both yes and no. Either it

could motivate them to be accurate or it will minimize the use since the technical solution are too complex for them to manage. Especially with the considering that not one of them probably has used technology for this purpose before, which makes this even more complexed and new. In addition, this can be substantiated with the idea that the consumers explained that the technology was manageable, but other roles indicated that it had been more challenging. Is it therefore necessary to view all target groups as a 95 year old consumer that never used a computer when developing the solutions? Perhaps. This since the situation, which in the examined cases was their diseases, the technology needs to be as less complex as possible since it is hard to understand which level of complexity each consumer has and could therefore end up in minimized value instead of increased (Delmond et. al. 2017). Therefore, this study would argue that the complexity level needs to be considered as low as possible when it comes to the technology, to generate as much value as possible.

Despite influencing the consumers, technology has had large influence for the organizations as well, through participating in co-production. They will be provided with more data than before, shown in graphs and lists of the historical data that in two of the cases was color coded, which could help discovering better treatment plans (Daneshvar et. al. 2018). This further became a driving force for the collaborations since it developed value for both parts, which further are strengthened in the literature (Romanelli 2017). But to collect this value, organizations needs to have access to this data. In two of the cases, the organization had access to all the data directly, but in one they have no access at all. This could cause different results, since if they do not have access to the data, they cannot keep track of the values or discover when something is wrong, which then needs to be done through other communication technology. It is therefore important that the consumers know exactly what to do with the technology. Does it create as much value without the connection? Probably not. This is also related to what was mentioned in all cases, that they want to connect it to the medical records, but cannot because of strict laws. If this would be possible in the future, which it hopefully is, these solutions could be directly connected to these, instead of external system, which will result in all the data being in one place. It could therefore be argued that allowing the organizations to have access to the data needs to be considered, to collect as great value as possible, since it is possible in different ways.

Activities

Based on the empirical findings, it can be determined that activities have been transferred from organization towards the consumers. Since the activities have been transferred and now are performed by the consumers within all examined cases, it is argued in the same way as mentioned in the literature that a mindset of co-production has been implemented (de Andrade 2016). This has in return made the consumers, co-producers in different activities (Boyle & Harris 2009).

From the empirical findings, it could be determined that it do not exist any standard activities, this is because different types of activities have been transferred within the cases. At the same time, the activities have been transferred in different complexity and amount. This was further supported by de Andrade (2016), which explains that activities within co-production have no specific formula, because it depends on the purpose for co-producing. Within all the cases, investigation about what activities to transfer was made in the initial stages in the projects. This included everything from literature reviews, get information from professionals or even going to the nursing homes to gain their perspective. This study will claim that making a detailed research before implementing it was an essential part for it success, since it otherwise could have been a waste of time. By not talking to those that was going to use it, or those with the expertise competence, a clear picture could have not been possible to collect and it would have been a possibility that wrong, less valuable activities had been transferred. This to have a clear picture which activities that should and can be transferred before implementing are important to consider. Therefore, it could be argued that it is important to consider which activities that are most valuable to transfer.

When the right activities have been decided, it is important to have a clear picture of who should perform them. The target group is therefore important to consider, so they have the right abilities to perform them. Comparing the investigated cases, the age differed between the target group. The younger target group could in first thought be considered as having the motivation to perform many activities often, but that may not be the case in all target groups. It could also be that these consumers are those that want to perform as simple activities as possible, as rarely as possible. Compared to the older target group, it could differ in the same way. It is therefore important to consider that specific target group, aimed to perform certain activities and for its purpose. Hence, the activities needed to be designed to fit the participants, and the outcome can this way become customized due to what the participant want to achieve, as further explained in previous studies (Auh et. al. 2007). It could therefore be argued that it is important to consider the specific target group when designing the activities, the consumers aims to perform.

Through transferring the activities outside the organization, leads to the opportunity to use the underused resources of consumers, which previously has not been used (Essén et. al. 2016). By using consumers as a resource, leads to that activities could be made more often and when needed. Within the examined context of healthcare, it could create opportunities for monitoring patients' disease more frequently, without spending too much organizational resources and focus on the right patient when they need. Based on this, it will become easier both for consumers and organizations to take actions earlier, which within healthcare can prevent emergencies. This has led to a reduced number of hospitalizations, which was in line with many of the solutions purposes. The question may be asked if the minimized hospitalization only was because of perform activities? Perhaps not solely, but it has been a large impact. This may be same in other industries as well, but maybe not the same question of life and death. With more collected data, better plans can be developed through allowing the activities to be performed more often. When more activities are transferred, it could be argued that it will increase the value for all the participants and co-production in general. This is further supported by Etgar (2008) that arguments that through inviting the consumers into the whole process and perform activities would generate increased value. From the empirical findings, it was discovered that this in return creates a feeling safety among the consumers since they have greater control and now that preventive actions could be developed. This could in return, save a life, product or a service depending on the purpose for co-production. Therefore, it could be assumed that it is important to consider that the collected that could allow preventive actions, earlier than before through co-producing.

Implementing co-production and transferring activities will further affect both consumer and organization. Through addressing co-production, both parties will need to adjust their activities to be able to co-produce, but the outcome value will differ. One value that both parties gains through co-producing within health, is that the inhabitants can control their disease and become healthier. But in order to reach this goal, healthcare needs to put their resources on the right patients because of the demand for care in the future is rising (SKL 2016). The empirical findings further discovered that working this way, organizations can restructure their resources. This is because, allowing consumers to perform activities within the solution, they could get signals or be informed when actions need to be made. It could therefore be argued that allowing consumers to perform activities and only demand assistance when needed, will make the organizations more efficient and effective (Boyle and Harris 2009). Further, it could be claimed that this could lead to improvement of the whole production process of this service (Vennik et. al. 2016). Through addressing co-production, creates both opportunity and need for the organizations to restructure their resources. Therefore, it is important to considered that the organizational resources will be restructured in other ways, which could make them more efficient and effective.

Responsibility

Based on the empirical findings, it was discovered that the level of responsibility differed within the cases. When consumers become co-producers through performing activities and technology exists to assist, the responsibility will become affected (Meijer 2016). The consumers this way become active agents that take their own decision (Boyle & Harris 2009; Meijer 2014).

Through comparing the cases, it could be argued that they had similar mindsets, with different results. In some of the cases, it was mentioned that making the consumer more responsible was one of the main ideas of the whole project, since they saw what value it could create. Specific to this context, it meant that the patients needed to become a larger part of the care chain process, since people are getting older, sicker and more people needs care, which further has been highlighted in other investigations (SKL 2016). Through making the consumers more active and offer them to performed activities by themselves, will in return provide them with responsibility, even if it is for those specific tasks (Meijer 2016). In order to make the consumers feel responsible, it is important that they have the ability to participate, even though the empirical findings suggest that the consumers do not acknowledge that themselves (Rantala & Karjaluo 2016). This could be because the consumers are not used to having responsibilities (Linders 2012). Even through the power balance will shift (Boyle & Harris 2009), is it most important that they have an expressed responsibility or that they performed what's expected of them through an inner responsibility? As the other roles clarifies that working this way will make the patients more responsible, it could be argued that they in some extent are more responsible than before. Based on this, it could be argued that it is important to consider that patients are more responsible through participating in co-production (Pestoff 2006), even if they do not express it themselves.

Despite not having an expressed responsibility, it could be argued that it has made them more involved. Before the solution was implemented, consumers were asked to perform similar activities at home, but for some reason did not do them. This was despite recommendations for example the European guidance, which said that this was required of them. With the solution, the consumers started to perform their activities, even more often. This since they easier could control and manage with the help of graphs, recommendations and additional questions, since it was based on their situation (Meijer 2016). Could it therefore be argued that it is easier to have responsibilities when having greater control and the right tools? Absolutely, which further was discovered throughout this study. But the tools may be need to be different and developed after that specific consumers need, otherwise the responsibility for performing will go away. Therefore, it could be argued that when responsibility is transferred towards the patients, activities will be performed more often through providing the right tools.

The shift of power balance and transferred responsibility have also influenced the organizations (Boyle & Harris 2009). They need to let go of some of the responsibility, which in one of the cases was expressed as a concern among other organization. This was due to the fear of letting go and as another case mentioned, organizations often take on too much responsibility. Even if the organization still needs to have the central responsibility (Rantala & Karjaluo 2016), the question is in what level. In line with this, it should be acknowledged that within this sector, the laws make it hard to let go of the whole responsibility, since it regards the care of patients. Even if the empirical findings discovered that the responsibility slowly has started to transfer towards the consumers, it is hard to let go fully. One case mentioned that they do not aim to abandon the patient, but instead make them independent. But to become more independent, it could be claimed that consumers needs to be offered more responsibilities so they can perform tasks and become a resource (Boyle & Harris 2009). Despite this, it could be argued that when implementing co-production, it needs to be considered that organizations needs to start let go of some of the responsibility in order for co-production to work.

Additionally, based on the empirical findings, these cases have transferred the responsibility in different levels, which could be argued to be caused by the technical solution. The technology has therefore developed a shift in the power balance between the involved parts (Menvielle et. al. 2017). The solutions

consist of various functions which they have transferred and allowed the patients to perform, but the organizations control and checks it in different ways (Auh et. al. 2007). Within two of the cases, the organizations have access to all the collected data, even if this needs to be accepted by the consumers in one case, while in one case they did not have that opportunity. Could it this way be argued that the solution where the patient is the only one having the data, have more responsibility? Nobody that could control that the tests are performed right or when one have been missed? Or is it the one that performs more activities? This study would therefore claim that it depends on the situation. There is no right or wrong way of having increased responsibility since it would be shaped in different ways. Therefore, it could be argued that when co-producing, the responsibility needs to be shaped in different ways, depending on the aim.

Knowledge

Based on the empirical findings, it could be determined that there was much focus on providing consumers the right education to allow their knowledge to be able to participate. How the education was provided, but also what it contained differed between the cases. Many skills need to be adjusted when addressing co-production (Pestoff et. al. 2013). Through providing the consumers with the right knowledge facilitated participating in co-production, which is aligned with Cooke et. al. (2017) and Essén et. al. (2016).

The knowledge does not only regard to how to participate, since the empirical findings discovered that the education both needs to address in the technology and the context, the disease. This are further in line with Essén et. al. (2016) explanation that organizations needs to provide the right environment to enable co-production, which the consumers was offered. From the empirical findings, it could be argued that when the target group were of older age, it was of great importance to educate in consumer's home, to make them comfortable. This was primary for the education about the technology itself and the activities they were expected to perform. One of the solutions that were oriented towards a younger group, the education was offered through video online while knowledge regarding technology was taken for granted. What knowledge that needs, are largely related to how the solutions was designed, with the aim to make it easy for the consumers and organizations (Romanelli 2017). This shows that it is important to consider that all consumers have the knowledge that enables participation in co-production, both regarding technology and the context, which is here chronic disease.

The empirical findings further discovered that educating the organizations are important to consider in the same way. This is because it is important to understand what knowledge that is required, to be able to generate as much value as possible (Boyle & Harris 2009). This is in line with Pestoff et. al (2013), who mention that when it comes to co-production, both parties need to be co-producers, which means that they both needs the knowledge and not just transfer the knowledge. When the different roles have been provided with the right knowledge, they can bring this knowledge into the activities. Based on the empirical findings, participants have much knowledge regarding themselves, close to expert knowledge, because they have had this condition for many years. Which Loeffler and Bovaird (2016) explain that consumers that have large amount of knowledge, which professionals do not. Participants with expert competence will probably want more control over the process (Auh et. al. 2007). Would the project have worked as good without providing all roles the necessary education? Probably not, because the additional knowledge that must be educated to be able ensure consumers could participate in co-production. The increase knowledge could in return lead to consumers that are more willing to contribute. This since within co-production it is important to integrating and engaging multiple perspectives, to shape the right processes for knowledge (Rycroft-Malone et. al. 2016). By providing knowledge could generate a greater value for participating, in the same way as the consumers have the best knowledge about themselves. This may be something specific to the context of this study, healthcare sector, since other may focus on for example telephone services where consumers may not have the expertise knowledge. Despite this, consumers today have access to more knowledge through the use of

internet, which makes it easier for them to discover more by themselves. Based on this, it needs to be considered that the involved roles will maybe require different knowledge, that enables them participating in co-production.

The education needed to be adjusted after the target group and their need and they took feedback and adjusted it to become easier to understand. When developing the technical solutions, it was adjusted after the target group and their depth of knowledge. Even if some of the consumers will have different knowledge compared to their target group, most of them had the same. Additionally, Auh et. al. (2007) argue that the expertise among the consumers is related to their understanding of the service, which was the same in these cases. Based on this, it could be argued that the knowledge of technology has shifted since the projects firstly become introduced, which made it more successful. It was mentioned from the empirical findings that the technology itself often are not the problem, but that older people have harder time learning new stuff. Therefore, it could be argued that providing all participants with education and all the information they need to participate is necessary to work. This regardless of their age and previous knowledge about technology, but acknowledge that learning new things demands more support and encouragement. Based on this, it is important to consider encouraging consumers using their existing knowledge so they could be more independent.

In the empirical findings, it was showed that by using the solutions it was first provided with knowledge how to participate, but while using them the solutions had informative function. At the same time the solutions collected and gathered information it also provided information and training to consumers that used them. The empirical findings also suggest that all collected information from consumers could produce a greater knowledge in the field, which in the future could help to act even more proactive. This is in line with Cooke et. al. (2017) who mentions that co-production can lead to producing knowledge. In addition to this, consumers that used the solutions got to use their knowledge that they already have, which is of great value to engage consumers to do active choices in their own lives. Consumers need to use their knowledge, because without it, who would? Many problems in this type of organizations today are based on the idea that participants have new knowledge, and someone tells them what they should do. In this way, they need to use their knowledge, combined with the one they have been offered to get value out of it. Based on this, it would be argued that it is important to consider that using solutions also produce and spread knowledge.

Considerations regarding enabling dimensions

When implementing co-production, this study has discovered that when it comes to the enabling dimensions, there are some consideration that needs to be addressed. The discovered considerations for each enabling dimension will be presented in the *figure 4* below:

<p>Technology</p> <ul style="list-style-type: none"> • Design technology after target group • Complexity level after target group • Low complexity increases the value • Organizations' needs to access data 	<p>Activities</p> <ul style="list-style-type: none"> • Transfer valuable activities • Design activities after target group • Data allow preventive actions • Restructures organizational resources
<p>Responsibility</p> <ul style="list-style-type: none"> • Consumers becomes responsible despite not expressed • Require the right tools • Organizations need to start letting go of some responsibilities • Shape responsibilities in different ways 	<p>Knowledge</p> <ul style="list-style-type: none"> • Knowledge enables participation • Different roles require various knowledge • Encourage existing knowledge • Produce and spread knowledge

Table 4: Discovered considerations regarding the enabling dimensions

Based on the empirical findings, this study found that these 16 considerations are important when implementing co-production. This through investigating and learn from real world cases that have implemented the idea of co-production. These considerations have showed to be important, both from the start and during the project. Through interviewing different roles within the cases, it was possible to discover the considerations expressed from different levels and gain an overall picture, which in return could improve future implementations.

Despite this, it could be argued that these enabling dimensions have large influence on each other, since they are in some way or another depending on one another. Technology could be viewed as a facilitator for co-production. This is because it also facilitates the other enabling dimensions, without it the activities could not as easy be transferred, hence, responsibility could not be loosened and knowledge as not collected or spread as easy. Further, for activities that are being transferred toward consumers, certain knowledge must be settled, supported by technology, which makes it possible for them to have responsibility. In the same way, knowledge about how to use the technology must be settled, but also about how participants should perform the activities and what responsibilities they as individuals have and do not have. Lastly, it is required that consumers need knowledge regarding technology, the activities and how they should be performed, which makes it possible for them to have responsibility. Alongside the considerations that needs to be addressed when implementing co-production, these enabling dimensions are largely dependent on each other. This is because, all four dimensions needs to work together, in order to allow co-production to work. Their influence of each other, will in this study be argued to be a cogwheel, where they all needs to work in balance to allow co-production to work. Below, the cogwheel for the enabling dimensions will be illustrated in *figure 2*.



Figure 2: Enabling dimensions' influence on each other

At last, it could be argued that co-production could become one alternative solution for addressing the upcoming challenges within healthcare. Further, allowing consumers to participate with co-production are in line with patient-centered care, which this way would become possible since the patients would become more involved and provided with care specified after their needs, with the assistance from IT. This would in return help healthcare to become more effective, since the resources could be restructured. But, when implementing co-production into healthcare, it will be essential to address the discovered considerations regarding the enabling dimensions, since this study claims that it can makes it easier to succeed and generate greater value. Additionally, this study would argue that further research should focus on other enabling dimensions to discovered even more considerations that needs to be addressed when implementing co-production. Further, it could be of interest to examining real world cases that has been implemented in the daily work and not as projects to collect even more knowledge.

Conclusion

This study investigated the research question: What considerations need to be addressed regarding enabling dimensions when implementing co-production?, in order to gather increased knowledge within this field. The contribution of this study is that it has examined real world cases and discovered considerations that needs to be addressed when implementing co-production. A research model was assembled based on previous literature, on the four enabling dimensions, which was used as a guiding tool for collecting the empirical data. Totally 16 considerations were discovered, with four for each enabling dimension.

When examining technology, it was discovered that it is important to consider designing the technology and complexity level after target group, a low complexity in general will increase the value, but also that organizations needs to access the data. On the other hand, when it comes to activities, it is important to consider transferring valuable activities, which should be designed activities target group, and that data allow preventive actions and restructuring organizational resources. Further, regarding responsibility it needs to be considered that consumers are responsible even though it may not be expressed, it requires the right tools, and organizations need to start letting go of some responsibilities and to shape responsibilities in different ways. Lastly, it needs to be considered that knowledge enables participation, that different roles require different knowledge, to encourage existing knowledge and produce and spread knowledge. Hence, this study argues that these discovered considerations will assist in future implementations in organizations, especially within healthcare. Therefore, this study argues that these considerations is important to address when implementing co-production. Further, the four enabling dimensions are largely influenced and dependent on each other and can be compared with a cogwheel, where all dimensions need to exist in balance. Based on this, co-production can be viewed as one solution for addressing the upcoming challenges in healthcare, through addressing these considerations.

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