



Piloting a New Service in a Healthcare Living Lab Environment - Case: Medified

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**Piloting a New Service in a Healthcare Living Lab Environment -
Case: Medified**

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Social and health services are facing new challenges as digitalization is changing ways of working and job descriptions, bringing up needs for updating the healthcare professionals' skills and know-how. Third parties, such as startups, are developing new digital services and solutions that are introduced to healthcare organizations. The purpose of this thesis is to improve the customer experience and the late-stage prototype of a new service in a public healthcare context. The development process aims to co-create incremental value for the service. It also aims to assess the service to support decision-making for the service's implementation after the process. The thesis was commissioned by Medified Solutions Oy, a startup enterprise that has developed the new service. The service was piloted in a public healthcare organization's Living Lab environment, which constituted the context for the thesis.

The theoretical framework of the thesis is comprised of the co-creation of value according to the service- and customer-dominant logics, the concept of customer experience and its relation to value and how to evaluate it. The framework also examines Living Labs as environments for innovation processes, and lean startup and service design as complementary development approaches. The theories supported the thesis by providing essential guidelines for the development process on the roles of the customer and the service provider. In addition, the principles of a Living Lab to achieve the goals of the pilot from different stakeholder's perspectives and the characteristics of a holistic customer experience supported the thesis and the development of metrics for the service's assessment. Finally, the complementary possibilities of two distinct development approaches provided perspectives on applying the development methodology.

The development was done by applying a customer-centric service design approach, which followed the principles of the Double diamond model and utilized and adapted service design methods: healthcare professionals' in-depth interviews were conducted, analyzed, and reported to the client. Different co-creation and facilitation methods were used during the feedback sessions. Central problems and challenges were defined and re-framed and solutions were ideated. New feature and concept prototypes were developed, tested, and iterated in collaboration with the healthcare professionals. Continuous feedback was collected and analyzed, user stories were created, qualitative and quantitative evaluation metrics were developed, and the service concept was assessed.

The developed customer experience emphasized the healthcare professionals' needs and challenges and supported their activities by embedding the service to their context. Several service's features, touchpoints, and channels were developed during the pilot. Visual communication materials, technical improvements, a deployment concept, and use scenarios were developed to improve the treatment process and the customer experience of the service. The applied development approach improved the service's customer experience and the late-stage prototype. It benefited the client in supporting the service concept's future pilots and implementations, improved the client's design thinking model, and provided practical tools and methods to implement it. The thesis provides practical value to startups and similar actors developing and experimenting new services, the healthcare industry, and conducting pilots in Living Lab environments.

Keywords: service design, customer experience, living lab, digitalization, pilot

Jaakko Hannula

Uuden palvelun pilotointi terveydenhoidon Living Lab - ympäristössä - Case: Medified

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102

Sosiaali- ja terveyspalvelut ovat uusien haasteiden edessä, kun digitaalisuus muuttaa työtapoja ja työnkuvia sekä nostaa esiin sosiaali- ja terveysalan ammattilaisten taitojen ja osaamisen päivittämisen tarpeita. Kolmannet osapuolet, kuten startupit, kehittävät uusia digitaalisia palveluita ja ratkaisuja ja tuovat niitä sosiaali- ja terveysalan organisaatioiden käyttöön. Tämän opinnäytetyön tarkoituksena on parantaa uuden palvelun asiakaskokemusta julkisessa terveydenhuoltoalan organisaatiossa ja parantaa palvelun myöhäisen vaiheen prototyyppiä. Opinnäytetyön tavoitteena on yhteiskehittää palvelun tuottamaa inkrementaalista arvoa kehitysprosessin aikana ja arvioida palvelua. Palvelun arviointi tukee päätöksentekoa palvelun käyttöönoton suhteen. Opinnäytetyö tehtiin toimeksiantona Medified Solutions Oy -startupille, joka on kehittänyt palvelun. Palvelua pilotoitiin julkisen terveydenhuoltoalan organisaation Living Lab -ympäristössä, mikä muodosti opinnäytetyön kontekstin.

Opinnäytetyön teoreettinen viitekehys muodostuu arvon yhteiskehittämisestä, kuten se on kuvattu palvelu- ja asiakaskeskeisissä logiikoissa asiakaskokemuksen käsitteestä ja sen suhteesta arvoon ja kuinka arvoa tulisi arvioida. Lisäksi viitekehys koostuu Living Labista innovaatioprosessien ympäristöinä sekä lean startup- ja palvelumuotoiluteorioista toisiaan täydentävinä kehittämistapoina. Teoriat tukivat opinnäytetyötä ohjaten kehitysprosessia asiakkaan ja palveluntarjoajan roolien suhteen sekä pilotin eri sidosryhmien tavoitteiden saavuttamisessa Living Labin periaatteiden mukaan. Teoriat rakensivat perustaa kokonaisvaltaisen asiakaskokemuksen piirteiden ymmärtämiseksi, mikä tuki palvelun arviointimittareiden kehitystä ja kahden kehittämistavan soveltamiseksi käytännössä.

Kehitysprosessi toteutettiin soveltamalla asiakaskeskeistä palvelumuotoilun lähestymistapaa, joka noudatteli tuplatimanttimallin periaatteita ja käytti soveltaen palvelumuotoilun metodeja: terveysalan ammattilaisia haastateltiin, haastattelut analysoitiin ja raportoitiin toimeksiantajalle. Erilaisia yhteiskehittämisen ja fasilitoinnin menetelmiä käytettiin palautesessioiden aikana, keskeiset ongelmatkohdat ja haasteet määriteltiin ja uudelleenmuotoiltiin. Ratkaisuehdotuksia ideoitiin ja uusia ominaisuuksia ja konsepteja prototypoitiin, testattiin ja iteroitiin yhteistyössä terveysalan ammattilaisten kanssa. Jatkuva palautetta kerättiin ja analysoitiin, käyttäjätarinoita luotiin, kvalitatiivisia ja kvantitatiivisia mittareita kehitettiin ja palvelukonseptia arvioitiin.

Kehitetty asiakaskokemus painotti terveysalan ammattilaisten tarpeita ja haasteita ja tuki heidän aktiviteettejaan upottaen palvelun heidän kontekstiinsa. Useita palvelun ominaisuuksia, palvelutuokioita ja kanavia kehitettiin pilotin aikana. Visuaalisia viestintämateriaaleja, teknisiä parannuksia, käyttöönottokonsepti ja käyttökäytäntö kehitettiin hoitoprosessin ja asiakaskokemuksen parantamiseksi. Käytetty kehittäminen lähestymistapa paransi palvelun asiakaskokemusta ja myöhäisen vaiheen prototyyppiä. Lähestymistapa oli toimeksiantajalle hyödyksi tukien palvelukonseptin tulevia pilotteja ja käyttöönottoja sekä paransi toimeksiantajan muotoiluajattelun mallia ja antoi käytännön työkaluja sen toteuttamiseen. Opinnäytetyö antaa käytännön arvoa startupille ja vastaaville toimijoille, jotka kehittävät ja kokeilevat uusia palveluita, terveydenhuoltoalalle, ja pilottien toteuttamiselle Living Lab -ympäristöissä.

Asiasanat: palvelumuotoilu, asiakaskokemus, living lab, digitalisaatio, pilotti

Contents

1	Introduction	6
1.1	Digitalization, healthcare, and startups	6
1.2	Overview of the case company and development challenge.....	8
1.3	Purpose and aim of the thesis.....	10
1.4	Key concepts.....	12
1.5	Structure of the thesis	15
2	Theoretical framework	15
2.1	Co-creation of value	15
2.2	Customer experience and value.....	18
2.3	Living Labs	21
2.4	Lean startup and service design	24
2.5	Theoretical framework and the development process.....	31
3	Service design as a development approach.....	33
3.1	First diamond: discover and define.....	37
3.2	Second diamond: develop and deliver	40
4	The development process: Improving the customer experience - Case Medified	43
4.1	First diamond: understand, identify, and define	45
4.1.1	Design Sprint	46
4.1.2	Contacting the client and agreeing on the thesis project	52
4.1.3	Preparatory research and observation.....	52
4.1.4	Interviews.....	53
4.1.5	Feedback sessions	56
4.1.6	Identifying the gaps and defining the problems.....	59
4.2	Second diamond: develop, test, and evaluate	61
4.2.1	Ideation and concept development	62
4.2.2	Mid-evaluation	66
4.2.3	Embedding the service.....	67
4.2.4	Final evaluation.....	68
4.2.5	Concluding the development process and implementation of the results..	70
5	Conclusions and discussions.....	71
5.1	Research questions, answers, and final results.....	71
5.2	Evaluation of the research and lessons learned	77
5.3	Final discussion, next steps, and transferability of the results.....	79
	References.....	82
	Figures	90
	Appendices	91

1 Introduction

This introduction chapter establishes the context for this thesis' topic - piloting a new digital service in a public healthcare organization. Next, the case company and development challenge are introduced, the purpose of the thesis and the key concepts are discussed, and the structure of the thesis is introduced.

1.1 Digitalization, healthcare, and startups

Digitalization is a megatrend that has been changing the world at an increasing pace since the introduction of home computers in the 1980s, shaping services, industries, and societies. Digital technologies are used to develop new business models, generating new ways create value and produce revenue, and evolve a transition to a digital business. (Gartner.) Digitalization is affecting all the sectors: private, public, and the third sector, creating new ways for them to interact, collaborate, and co-create new services that are more adaptable to different needs and contexts.

A third wave of adopting new information and technology systems digitizing complete enterprises, their channels, products, and processes is flowing over the healthcare industry. According to a survey by McKinsey & Company (2014), more than 70% of people from all age groups are willing to use the new digital services, but they must be developed to match the to meet their needs, which many of the digital services don't. Digitalization does not mean making the current ways of working irrelevant, as digital services and solutions should be embedded into existing concepts completing each other. The new services and solutions don't have to be highly innovative to be successful, and the healthcare organizations don't have to have a comprehensive digitalized system fully operational. They can start small but act fast. (McKinsey 2014.) Despite the willingness to use digital services, digitalization has not been fully embraced by the healthcare industry. According to a study (PricewaterhouseCoopers 2020), healthcare industries are still catching up to other fields in digitalization, and despite large investments in digital solutions, applications, and collecting data, they are not getting the return to the investments they have been looking for. According to a global survey conducted by the Economist Intelligence Unit, the COVID19-pandemic has accelerated the pace of digitalization, with more than 80 % of hospital CEOs stating that investment in digital systems and tools has increased significantly during the pandemic. Based on the analysis, it is not clear what digitalization in healthcare should strive to accomplish. Four key components are suggested: managing the data collected as a strategic asset, harnessing digitalization to enable data-driven decision-making throughout the patient's treatment process, connecting the patients and the professionals quicker, safer, and stronger by digital tools and

technologies, and aim to build a learning health system to improve the utilization of data collection continuously and to generate better insights. To achieve the goals of digitalization, the most prominent obstacles must be cleared: lack of investment, shortage of skills, and bureaucracy. (Siemens Healthineers 2020.)

Finland's social and healthcare services have been facing a critical period of transformation as the operating environment is changing, the population is aging and centralizing at an accelerating pace, staff shortages are more common, and the public sector deficit is growing. All these factors have contributed to an increasing interest in digitalizing the services. (Hyppönen, Iivari & Ahopelto 2011.) Artificial intelligence and robotization are progressing, creating new digital services as possible solutions to the challenges that require productive, cost-efficient, and effective working methods. Digitalization and the development of healthcare technology are changing how doctors treat their patients and how citizens can monitor their health and be more active actors in the health care system. (Ministry of Social Affairs and Health 2016.) Finland is one of the world's top countries when it comes to digital skills and public services, creating a firm ground for implementing and adopting new digital services, which are one solution to the structural challenges that Finland is facing. Customer-centricity has been identified as one of the critical factors to achieve successful digitalization. The public services and administration must be developed from the customer's perspective to match the changing needs of the citizens and increase Finland's competitiveness as a country. (The Ministry of Finance.)

Nowadays, startups are a significant part of the global economy and play a big role in the digitalization of public services. Rock Health, a fund and incubator supporting the growth of startups has reported that startup-based digital health services have grown to a mainstream market. Investment funding has been breaking new records at an increasing pace, with close to 14 billion dollars invested in digital health solutions in the US only in the first half of 2021. (Rock Health). Various platforms have been created, and projects have been undertaken to bridge the gaps between different stakeholders and foster collaboration between startups, researchers, business partners, and public sector actors. For example, Terkko Health Hub, a Finnish startup community with a focus on health and life science entrepreneurship founded in 2017, has grown to the most prominent health hub in the Nordics with 45 startups offering new services and innovations to the health sectors aiming to bridge academia and entrepreneurship and bring different actors together (Terkko Health Hub). Kalasatama Co-designing Wellbeing project brought together startups, the City of Helsinki's Social Services and Health Care Division and partners from the private sector to co-creatively develop and test digital services in collaboration with the citizens of Helsinki (Forum Virium). Co-Created Health and Wellbeing project brought together 150 companies, 830 social and healthcare service professionals, and 1490 customers to co-create and develop services in 35 pilots in six

cities in Finland. The project aimed to foster the collaboration between companies and cities to enable the development and implementation of new customer-centric services. (6Aika.)

A service design approach can significantly benefit developing customer-centric digital services and bring the different actors together to collaborate. The approach offers a human-centric mindset, processes, structures, and methods to co-create. Yet, startups present a relatively novel field for service design, and possibilities of creating substantial value can be seen (Grimes 2019).

1.2 Overview of the case company and development challenge

Medified Solutions Oy, referred to as Medified from here on, is a startup established in 2019 operating in mental healthcare to answer the growing challenge of mental health disorders, especially depression and its detection, diagnosis, and treatment. Medified has developed a service including a digital solution, MEDIFIED, for the dynamic monitoring for mental health treatment. The service has won several prizes in 2020, such as the HumAInity Open Innovation Challenge, the business idea competition organized by Pirkanmaan Yrittäjät, and the Urban Innovation and Entrepreneurship Competition. In 2021 Medified has been selected to the Nordic Health Virtual Market Entry and the Kiuas Accelerator programs. (Medified.)

The service Medified has developed aims to create value for both the mental healthcare patient and the professional. The patient can use the service by a mobile application (figure 1) where they can answer questionnaires and provide data on their wellbeing in various forms. Healthcare professionals can view the patients' data from their desktop application (figure 1) and monitor their wellbeing. The data collected to the application is then used in the patient's treatment process.



Figure 1: Healthcare professionals' desktop application and healthcare patients' mobile application (Medified)

The value propositions of the service are:

- Create a digital connection between healthcare professionals and mental health patients
- Patients can capture and communicate daily mood and wellbeing in an easy and motivating way
- Patients can monitor and self-assess their daily mood factors and symptoms, and take self-reflective tests, and receive individual feedback that supports recovery
- The cloud-based software presents a data-driven approach for healthcare professionals to monitor patients in real-time, fostering the shared understanding and helping to provide more personalized and efficient care
- Professionals are provided valuable insights from the patient's treatment process that can be utilized in treatment decisions
- Tool to increase productivity and impact of the treatment (Medified.)

The service was first trialed in the City of Tampere's and City of Oulu's healthcare services as a part of the Co-Created Health and Wellbeing project (6Aika). To develop the service further, Medified agreed in the spring of 2020 on a new pilot in a public healthcare Living Lab environment. This agreed pilot forms the development context for the thesis. The pilot started in September 2020 and was initially planned to end in December 2020, but due to prolonged bureaucratic steps and mandatory information security assessment by the healthcare organization, the pilot period was extended to continue until May 2021.

From the service provider's perspective, the pilot's goals were to gain practical experience of the use of the MEDIFIED solution in a clinical healthcare environment and develop the service, the technical aspects of the solution, and the new treatment process offered by the service. For the public healthcare organization, the pilot's goal was to examine the suitability of the new service to their context. The overall goal for both the startup providing the service and the organization using it was to develop the service so that it could be implemented in the healthcare organization after the pilot process. To support this overall goal, the development of the customer experience was a central task. In addition, evaluation metrics of the customer experience were developed to provide sufficient information to support the decision-making for the implementation.

The pilot process can be seen to have begun when the service provider initially contacted the healthcare organizations' Living Lab coordinator in January 2020. Medified introduced the service to the organization's administration in March, held a demonstration event to the healthcare professionals in April, and negotiated on the pilot project during May and June 2020. The author joined the pilot process in September 2020, a few weeks before the start of the pilot, when the structure of the process and participants of the pilot had already been

agreed upon. Hence, the service design approach and the development process were adapted to the previously agreed structure. The public healthcare Living Lab provided a framework to which the thesis' development process was adapted. The service created by Medified was piloted by six to eight healthcare professionals, who voluntarily participated in the pilot process and co-creation structure of bi-weekly feedback sessions for the duration of the pilot.

The design team was comprised of the author as the service designer, a partner of Medified as a representative of the client, and the Living Lab coordinator of the public healthcare organization. The author's role was to plan and execute the service design process and adapt it to the previously agreed piloting process structure, to plan and facilitate the bi-weekly feedback sessions, analyze the collected data, and collaborate with the rest of the design team to further develop the customer experience and guide the pilot process towards its goals.

1.3 Purpose and aim of the thesis

The purpose of the thesis is to improve the customer experience of a new service in a public healthcare context. The service has been created by a third-party private startup enterprise Medified, an external actor in relation to the public healthcare organization. The service is piloted in a Living Lab environment provided by the healthcare organization. The aim is to apply a service design (SD) approach to the pilot process to co-creatively improve the customer experience and develop an improved late-stage prototype of the service.

The following research questions have guided the development process:

1. How to apply a process based on service design and lean startup principles in a Living Lab environment in a public healthcare organization?
2. How can the customer experience of the new service be improved to create incremental value during a pilot process?
3. What are the public healthcare professionals' value expectations of the new service, and how can the service be improved during the pilot to meet the value expectations?
4. How can the metrics for the evaluation of the value of the customer experience be developed during the pilot, and how can the customer experience be evaluated?

To accomplish the purpose and to achieve the aims of the thesis, a SD approach is applied to the service pilot process in the public healthcare Living Lab environment. The approach is applied by adapting a SD process and implementing SD principles and methods to understand the healthcare professionals' work context, needs, and value expectations, co-create solutions for the identified gaps in the service, and rapidly prototype and test the solutions. The healthcare organization forms the Living Lab environment for the pilot to which the SD approach was applied to. The SD approach is mainly based on the principles and methods of

service design, and it is executed by adapting a customer-centric Double Diamond service design process to the Living Lab structure that forms the pilot process. However, as the piloted service has been created by a startup and the piloting process focuses on improving the late-stage prototype of the service based on their way of working, the principles of the lean startup theory affect the applied approach as well. The service design and lean startup approaches can be seen to complement each other, as will be further discussed in subchapter 2.4. The SD approach is implemented by adapting the SD process to a previously agreed Living Lab structure. The implementation of the SD approach is further affected by the characteristics of the pilot process, which will be further examined in subchapter 3.2.

The development focuses on the healthcare professionals' customer experience, who are the internal customers of the service and the participants of the pilot process. The healthcare patients are the external customers of the service, but due to ethical policy standards, there was no direct access to them except for one feedback questionnaire at the end of the pilot. However, it should be noted that there is a link between the experience of an internal and external customer (Grace & Iacono 2015). This is a crucial factor in this development project as the service is mainly deployed to the patients through the healthcare professionals, and the service is used collaboratively by the professionals and patients together.

The first research question gives valuable information on how the chosen development approach serves the context to which the development project was applied. First, the author examines theories concerning Living Labs, which form the environment and as implemented in the healthcare organization, defines the development process's structure in practice. Second, the lean startup paradigm and service design theory are reviewed through literature to provide the thesis a background on how these approaches can be applied to complement each other and support the purpose of the thesis. The empirical development project gives answers to the question through the implementation of the approaches and their principles to the Living Lab environment of the public healthcare organization.

The second research question sheds light on the value creation processes of the pilot to which the development project was applied. The primary purpose of the thesis is to improve the customer experience of the new service being piloted. Due to the nature of the pilot, it can be seen to create incremental value as the pilot forms a cyclical and iterative process during which different touchpoints, features, and channels of the service can be developed and tested both in parallel and separately. The concept of incremental value is a central feature in the lean startup paradigm, even though it has been criticized for it instead of allowing the development of novel theories and ideas, as will be further examined in subchapter 2.4. The question is answered by applying a development approach based on both the service design and lean startup approaches, with an emphasis on the first, and with the aim of improving the customer experience of the new service.

The third research question concerns the internal customers of the new service and their value expectations towards it, which form an integral part of their customer experience, as explained further in subchapter 2.2. Thus, they are an essential component concerning the purpose of the thesis. The question is researched mainly through interviews which provide the foundation for the qualitative data of the design research phase in the early stages of the development process. In addition, the expectations are further researched throughout the process during the feedback sessions between the design team and the internal customers of the service. The insights provided by the interviews guided the development process as the service was developed based on these early insights and iterated, when necessary, based on further research during the pilot.

The fourth research question gives information on the evaluation of the new service's customer experience, which is an integral part concerning both the purpose of the thesis and the pilot's goals, which are addressed in the previous subchapter. The question is answered by applying the service design approach to the development project, which focused on qualitative metrics and guided the development of the quantitative metrics that complemented the previous. The developed metrics provide information for the design team and the service provider on which areas the service development should be focused next and whether the actions taken so far were correct to support the improvement of the customer experience. The metrics are also essential in providing the public healthcare organization administration with sufficient information for the decision-making concerning the implementation of the service.

1.4 Key concepts

Value creation

Value creation is understood here in a sense as it is understood in service-dominant logic, which emphasizes the active role of the customer, the dialogue between the customer and the company, and the co-creation of value. Value emerges only as the service is used (value-in-use) and is defined as perceived by the customer based on their experience of the use of the service. The customer is seen as an active participant, a co-producer, in the value-creation process. In this interactive formation of value, consumers engage in the value creation process by using their resources or capabilities to achieve their own goals. (Nenonen & Storbacka 2018.)

According to service-dominant logic, the companies can only offer value propositions to the customers. As value is always co-created, the service providers have to collaborate with and learn from the customers to adapt the service to their needs. (Vargo & Lusch 2004.) As such the service-providers role is to create experience environments where co-creation with the customer can happen (Prahalad and Ramaswamy 2004) and co-creation of value is enacted

through platforms that enable engagement between stakeholders (Ramaswamy & Ozcan 2014) and facilitate processes supporting customers' value creation (Grönroos 2006).

In the current paradigm, co-creation is described, for example, as joint creation and evolution of value where stakeholders create value together with organizations (Ramaswamy & Ozcan 2014), co-creation itself acting as a function of interaction (Ojasalo & Ojasalo 2018b), emphasizing the customer having an active role in the value creation (Vargo & Lusch 2004). In the context of this thesis, value co-creation is seen as the central activity between the service provider and the customer during the development project.

Customer experience

Customer experience is a broad concept that encompasses many terms, research orientations, and concepts from business economics and marketing. In the contemporary literature, the different definitions of a customer experience contain several characteristics, such as the interactions between a customer, company or a brand (Gentile, Spiller & Noci 2007), mental images, and emotions that a customer forms about a company's activities (Löytänä & Kortesoja 2011), the temporal nature of customer experience as it is formed over time (Golding 2018; Saarijärvi & Puustinen 2020) and affected by the customer's earlier experiences of the company (Heinonen et al. 2010), and the multiple dimensions that have to be taken into account when examining customer experiences (Bolton 2016; Saarijärvi & Puustinen 2020). In the context of the thesis, the improvement of customer experience is considered as the primary purpose of the development project.

Living Labs

Living Labs are open-innovation ecosystems based on user-centricity and systematic user co-creation, integrating research and innovation processes in real-life contexts. They operate between different stakeholders, such as citizens, companies, regions, and research organizations for joint value co-creation, prototyping, or validation to scale up businesses and innovations. (ENoLL.) Five core principles have been proposed on which all LL operations should be based on: value, sustainability, influence, realism, and openness (Bergvall-Kåreborn, Ihlström Eriksson, Ståhlbröst & Svensson 2009; Ståhlbröst 2012), and the concept of a Living Lab has constantly been developed to encompass different features, and it has been defined as an environment, methodology and as a system.

Living Labs are used to foster and facilitate collaborative open innovation, study user innovation processes, and develop new solutions. They generate concrete, tangible innovations that are based on user involvement and multi-stakeholder participation, advancing at the same time understanding of open innovation processes and principles. (ENoLL; Schuurman & Tönurist 2017.) In this thesis, Living Lab formed the operational environment of development for the thesis.

Service design

Service design is an evolving approach that integrates multiple disciplines to a holistic field that aims to innovate and improve services to make them useful and desirable for clients and efficient and effective for organizations (Moritz 2005). Service design is based on the design thinking approach. It applies design tools and methods in practice to develop services to match people's needs to technologically feasible solutions and viable business strategies to create customer value and market opportunities (Liedtka 2015). Service design can be seen as a mindset, a shared framework of both thinking and doing, as a toolkit, and as a process (Stickdorn 2013; Tuulaniemi 2011). In the context of this thesis, service design formed the central theory of the applied development approach.

Pilot

A pilot is a small-scale project testing a service in a real-life context, and they are an integral part of a service design process when developing a late-stage prototype. Pilots are an important mechanism leading to the actual implementation of the service. Key implementation elements are that the product or service functions in a real-life context and that they are embedded into existing environments. Pilot projects engage real customers, users, and employees enabling the testing of the service concept and focusing on specific touchpoints exposing the new service to various challenges and learning by experimentation. (Penin 2018; Tuulaniemi 2011.) As such, pilots enable testing different features, touchpoints, and service channels at different times (Penin 2018). It is crucial that piloting provides measurable results so that the design team can conclude which parts of the service are working and which are not, and to recognize the bottlenecks in the production of the service and make necessary changes to training, tools, and the service environment (Tuulaniemi 2011). In this thesis, the service design development approach was applied to a pilot. As such, the characteristics and goals of the pilot defined how the approach was adapted and implemented.

1.5 Structure of the thesis

In this subchapter, the structure of the thesis is described. First, the theoretical framework and knowledge base are established in Chapter 2, which starts by describing the co-creation of value, customer experience, and value evaluation. Second, the environment of the thesis is characterized by discussing Living Lab theory. Third, the lean startup theory and its connection to service design are examined as they affect the implementation of the development approach for the thesis. In the synthesis, the theoretical framework is discussed from the perspective of the development project.

Chapter 3 starts with introducing service design as a development approach in general and its principles continuing with exploring the phases of a service design process based on the Double Diamond process model. The emphasis of the development and research process are on the first three phases of the model: discover, define, and develop, with the last phase, deliver, explained more in brief as it falls mostly outside of the scope of the thesis.

Chapter 4 describes the adaptation and implementation of the SD approach through the Double Diamond process model, explaining the methods used and the results of each phase of the process. Chapter 5 summarizes the development project and the research done in the thesis, answers the research questions, evaluates the thesis process from a critical perspective, and discusses the future prospects of the development project.

2 Theoretical framework

The theoretical framework examines the central concepts of the thesis, which define the context and environment to which the development project was applied and the theoretical background for the application of the development approach. The concepts forming the theoretical framework are co-creation of value, customer experience, its relation to value and evaluation of customer experience, Living Labs as an environment for innovation and development processes, and lean startup and service design as complementary approaches to each other.

2.1 Co-creation of value

This subchapter discusses value creation and co-creation as described and defined in the contemporary management literature paradigm.

Co-creation has been defined in various ways by different authors, and from a broad perspective, it can be seen as an act of collective creativity involving at least two actors (Sanders & Stappers 2008). It is essential to note, however, that it implies creating together,

not just contributing (Ramaswamy & Ozcan 2014). In the contemporary management literature paradigm, co-creation is often connected to value as the concept of services has transformed significantly over the last decades. The transformation has affected the theories concerning value and co-creation, shifting from value seen as embedded in tangible goods exchanged to consider value as co-created in the interaction between the customers and the service provider (Vargo & Lusch 2004). In the current paradigm, co-creation is described, for example, as joint creation and evolution of value where stakeholders create value together with organizations (Ramaswamy & Ozcan 2014), co-creation itself acting as a function of interaction (Ojasalo & Ojasalo 2018b), emphasizing the customer having an active role in the value creation (Vargo & Lusch 2004). The interaction between the customer and the network surrounding the service form the basis of each co-creation experience (Prahalad & Ramaswamy 2004).

Traditionally value has been seen as determined by the producer and embedded in the outputs of company processes that are produced to the consumers as goods and products as a part of a value chain where the value outputs are passed to other actors along the chain (Ojasalo and Ojasalo 2018a; Vargo and Lusch 2004). This traditional business logic based on company-created value is called goods-dominant logic (GDL). In GDL, the outputs represent the fundamental units of value exchange that are produced in exchange (value-in-exchange) with the customer. The company is seen as the proactive actor, whereas the customer is seen in a more passive role. (Lusch and Vargo 2014.) The company and the customer have separate roles in the production and consumption, and the interaction occurs at the end of the value chain when a consumer or end-consumer buys the service or product (Prahalad & Ramaswamy 2004).

Vargo and Lusch introduced a new service-centered logic called service-dominant logic (SDL) in 2004, which emphasizes the active role of the customer, the dialogue between the customer and the company, and the co-creation of value where value is defined by the consumer and not embedded in the output as in GDL. According to SDL, the customers are not mere recipients of the goods but act as co-producers of the service. Value is no longer produced in exchange, but it emerges only as the service is used (value-in-use) and is defined as perceived by the customer based on their experience of using the service. SDL emphasizes that the company-produced goods act as transmitters of embedded knowledge, and customers use them in their value-creation processes. (Vargo & Lusch 2004.) The Nordic School of service logic has further argued that goods are not the only resource transmitters of service, but the service can include other resources, such as people, infrastructure, and systems. The resources form a process where they function in interaction with each other, and the customer's capacity and the functionality of the process affect the emerging value for the customer. (Grönroos 2006.) The integration and use of all resources affect the created value, and that all actors are involved in the value co-creation (Lusch & Vargo 2014). The current

presupposition is that co-creation forms the foundation of value (Prahalad & Ramaswamy 2004).

The companies can only offer value propositions to the customers. As value is always co-created, the service providers have to collaborate with and learn from the customers to adapt the service to their needs. (Vargo & Lusch 2004.) As such, the service-providers role is to create experience environments where co-creation with the customer can happen (Prahalad & Ramaswamy 2004), and co-creation of value is enacted through platforms that enable engagement between stakeholders (Ramaswamy & Ozcan 2014). As the customers participate as co-producers to the open processes where services emerge, the progress of the processes can also be directly influenced by the customers. Production and consumption of services are at least partly simultaneous processes where the production of the service is open to the customer, and the consumption of the service is open to the provider of the service. (Grönroos 2006.) Consumers use their capabilities and resources to achieve their own goals in the value creation process (Nenonen & Storbacka 2018). The service-providers role is to support and facilitate the value-creation process of the customer (Grönroos 2006).

Further on, SDL evolved the definition of value to encompass the larger context of value creation. The theory states that value is not necessarily co-created but is defined by the integration of contextually specific actors and resources (value-in-context) (Vargo & Lusch 2008; Lusch & Vargo 2014). Chandler and Vargo (2011) emphasize the unique nature of a particular context with its unique actors and unique reciprocal relations between the actors. Contexts are heterogenous, which affects the resources available for integration for a service. Context is defined by the resource-integrating process, which the actors execute through their interactions and all the situational factors relevant to the process. (Löbner & Hahn 2013.) As the broader context influences the value of a particular service, it is important to note that all the experiences related to the service are not co-created with the service provider, and as such, a broader perspective on interactions has to be considered (Heinonen et al. 2010). Thus, value creation and evaluation must be viewed from a holistic, systemic perspective taking into account all social and economic actors and keeping in mind that the beneficiary always determines the value (Vargo & Lusch 2008; Lusch & Vargo 2014).

Heinonen et al. (2010) argue that the service-provider-oriented perspective of SDL of facilitating the value-creation processes is not sufficient to understand the use of the service by the customer holistically. They present a customer-dominant logic (CDL) where the goal is to emphasize the understanding of the customer's life and a broader context before, during, and after the service. The focal points of CDL are to address "how value emerges for customers and how through a sense-making process customers construct their experience of the value of a service provider's participation in their activities and tasks" (Heinonen et al. 2010, 4.) and "how a company's service is and becomes embedded in the customer's

contexts, activities, practices and experiences” (Heinonen et al. 2010, 5.) To implement CDL the customers’ physical and mental inputs must be considered, and the companies have to understand the context of the customers’ processes and support those to discover the potential value of the service. Instead of starting from a product or a service, the starting point should be comprehending the customers’ activities and insights into the company’s role in supporting those. These understandings should be based on deep insights into the customers’ context, activities, and experiences. To successfully innovate services, it is crucial to understand the context in which the value is perceived, comprehend the representation of value-in-use profoundly, and develop the process of resource integration, respectively. (Ojasalo & Ojasalo 2018b.) As such, co-creation of customer value can be seen to demand increasing attention in the context of service innovation, and companies require practical frameworks to support the co-creation processes. The application of design thinking has greatly affected the process of business development by taking the customer understanding as a starting point to design new ways to support the customers’ activities and experiences (Ojasalo, Koskelo & Nousiainen 2015), leading to a growing need for in-depth ethnographical studies and facilitating and improving customers’ activities (Heinonen et al. 2010).

2.2 Customer experience and value

In this subchapter, the concept of customer experience is examined and defined, and the evaluation of customer experience is discussed.

The customer experience (CX) is a broad concept encompassing many terms, research orientations, and concepts from business economics and marketing. It can be described as a challenging concept to define (Saarijärvi & Puustinen 2020). However, in contemporary literature, the different definitions of CX contain several common characteristics (figure 2). The importance of interactions and touchpoints between the company and the customer forms an integral feature of CX. As such, one way of defining it can be describing CX as the sum of encounters and interactions, mental images, and emotions that a customer forms about a company’s activities (Löytänä & Korteso 2011) and as the sum all the interactions between a customer, company of a brand (Gentile et al. 2007). Watkinson (2013) emphasizes the qualitative aspect of the interactions when defining CX, while Meyer and Schwager (2007) highlight the subjectivity of the customer’s internal response to any direct or indirect interaction with the company. Helkkula (2010) continues that experiences are also intersubjective, meaning that other sources of information besides an individual’s personal perception often influences the experience.

The temporal nature of CX is another focal characteristic as CX is constructed over time between the customer and the company. The experience is not limited only to the buying or using services, but the customer journey has to be taken into account holistically. (Saarijärvi

& Puustinen 2020). Golding (2018) defines CX as the sum of interactions considering the duration of the relationship between the customer and the service provider. Supporting this view, Heinonen et al. (2010) state that the customers' earlier experiences of the company are always present in the construction of their CX and that new experiences update the experiences. Multidimensionality is a third important characteristic of CX as it encompasses the customer's and company's interactions emotional, cognitive, sensory, social, and behavioral dimensions. These dimensions form a holistic experience. (Bolton 2016; Saarijärvi & Puustinen.) Emotions and feelings are emphasized in several definitions, for example, Ahvenainen, Gylling and Leino (2017) define CX as the feeling or conception formed based on the interactions. As such, when examining the CX it has to be considered what kind of emotions the customer feels, how they experience the social interaction with other people, and what kind of subconscious interpretations they make (Saarijärvi & Puustinen 2020).

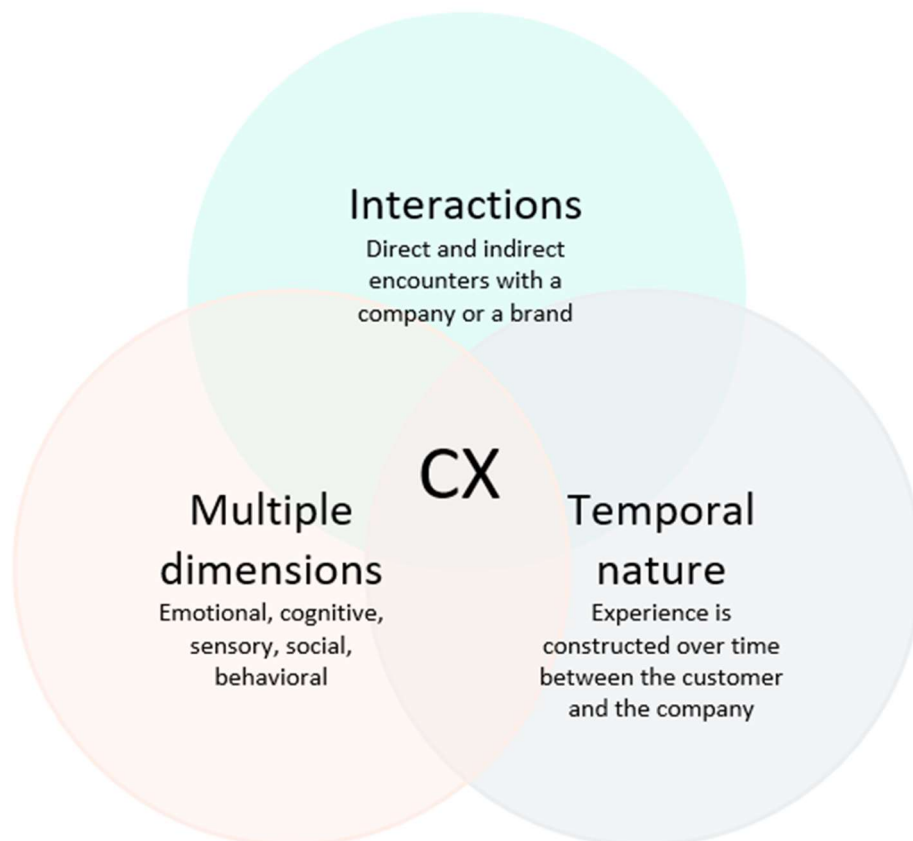


Figure 2: Characteristics of customer experience

As described in the previous subchapter, CX and value as defined by the user of the service are directly related to each other in the contemporary management literature paradigm. Value itself is defined in many ways, but one common definition is value as the experienced difference between benefits (service quality) and sacrifices (price, time, and effort) from

using a service (Heinonen 2004; Helander & Ulkuniemi 2012). It is influenced by the user's need for the service and how much the user wants something (Ståhlbröst 2012). As such, the company's total offering, including goods, activities, and the relationship between the company and customer, affects the perceived value as experienced by the customer (Heinonen et al. 2010). As the customer defines value, it must be considered that customer needs and expectations influence the definition of the CX's value. If they're fulfilled, the customers are content; if exceeded, they are happy, but if they are undercut, they are disappointed. Thus, it is equally important to manage, evaluate and validate the actualization of customer expectations when examining the value of CX. (Saarijärvi & Puustinen 2020.) Hence, it is not sufficient that the service is feasible and satisfies the customer's need; the CX has to be desirable as well.

Experiences are very subjective, making evaluating value challenging, as measuring how the customer feels is difficult (Ruuska et al. 2011). Emotions form a large part of the CX, and hence it cannot be assessed directly by sales or product metrics (Korkiakoski & Gerdt 2016). Value creation and evaluation of the value of CX must be viewed from a systemic perspective taking into account the holistic context of the customer. According to CDL, the service provider needs to understand how the customer perceives value through their own experience as to how value emerges when the service "becomes embedded in the customer's context, activities, practices, and experiences together with the service company's activities" (Heinonen et al. 2010, 9).

Evaluation of a service or a customer experience measures the interaction between the service provider and the customer, and it ensures the competitiveness of the service, which should be continuously developed to maintain the competitive advantage (Tuulaniemi 2011). Evaluating the complex phenomena of CX and value-in-context can even be seen as immeasurable, but several frameworks have been offered to assess them. For example, Löbner and Hahn (2013) propose a measurement framework based on an actor's experience of resource-integrating activities in a specific context. The framework was developed through a questionnaire based on the activities of the actor and the situations of use of a particular service in the relevant context. This method allowed the actors to refer to their relevant aspects of experiencing the service. According to the framework, the experience of the value of the beneficiary is unique; it is dependent both on time and space and is defined by resource-integrating activities of the actor, and the integrated factors, context, and situation further define the emerging value experience.

Key-performance indicators (KPIs) are a common way to measure the value and the success of a service or an organization. KPIs are defined as the critical indicators towards a goal or an intended result taking into account the performance of an organization both from the current and future perspective (Parmenter 2019). When defining which KPIs to use when evaluating

the performance of an organization or a service, it is crucial to consider the theories on how the service becomes embedded in the customer's context and how value emerges through the customer's activities and experiences. Tuulaniemi (2011) states that the metrics are often chosen based on the business goals but are often inadequate when evaluating the CX. Service providers are usually focused on the technical quality of the service, which is not sufficient as it does not solely reflect the value experienced by the user. The metrics should be selected and defined so that they assess the value hypothesis, which tests whether a service delivers value to the customers once they use the service (Ries 2011), and one way to measure the success of service design is to evaluate the improvement of the service process (Tuulaniemi 2011). Ruuska et al. (2011) emphasize that the target of the evaluation affects the chosen evaluation methods as long as they provide answers to the metrics being measured. Thus, KPIs are a useful tool to complement the evaluation of the experience, which is the basis for assessing the success of a service. The KPIs should be relevant to both the service provider and the customer, and they should convey which actions should be taken to improve the service (Parmenter 2019).

One common method of measuring the customer experience is the Net Promoter Score (NPS), which measures how satisfied customers are with the service and how likely they would recommend it if asked to do so. The standard NPS scale is 0 (would not recommend) to 10 (I would definitely recommend). Those who give the service a rating of 9 or 10 are considered promoters, 7 and 8 passives, and 0 to 6 detractors. The NPS score is determined by reducing the percentage of detractors from the promoters, and if the number is positive, it is considered good, and a score of over 50 is excellent. (Tuulaniemi 2011.)

2.3 Living Labs

This subchapter discusses Living Labs as environments for innovation and development processes. First, the definition of a Living Lab is examined, and second, the characteristics and principles of a Living Lab environment are discussed.

The European Network of Living Labs (ENoLL) defines Living Labs (LL) as open-innovation ecosystems based on user-centricity and systematic user co-creation, integrating research and innovation processes in real-life contexts. They operate between different stakeholders, such as citizens, companies, regions, and research organizations for joint value co-creation, prototyping, or validation to scale up businesses and innovations. (ENoLL.) Bergvall-Kåreborn et al. (2009, 3) define LL as “a user-centric innovation milieu built on every-day practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values” referring to LL both as a development setting and an approach. Schuurman and Tönurist (2017) further add that LL present an organized, practice-driven approach to

innovation based on active user involvement through various methods in a real-life setting. LL are physical or virtual interaction spaces used for multiple stakeholders to collaborate for co-creation, testing, prototyping, and validating new services, products, technologies, and systems (Leminen 2013). At the beginning of 2000, when LL started to emerge, the early focus was on testing new technologies in constructed environments resembling homes. Since their emergence, the concept of LL has constantly been developed to encompass different features, and it has been defined as an environment, methodology, and system. However, an essential condition throughout the various definitions of LL is that they are situated in a real-life context. (Bergvall-Kåreborn & Ståhlbröst 2009; Leminen 2013.)

Compared to other similar platforms for testing and prototyping, LL emphasize the level of design focus in comparison to testing finished products (Ballon, Pierson & Delaere 2005), the involvement of users being another distinguishing aspect (Eriksson, Niitamo, Kulki & Hribernik 2006; Mulder et al. 2007). LL are used to foster and facilitate collaborative open innovation, study user innovation processes, and develop new solutions. They generate concrete, tangible innovations that are based on user involvement and multi-stakeholder participation, advancing at the same time understanding of open innovation processes and principles. (ENoLL; Schuurman & Tönurist 2017.) From the perspective of research, LL enables examining and developing methods for user engagement and comparison of different approaches (Ståhlbröst & Bergvall-Kåreborn 2008).

Five core principles have been proposed on which all LL operations should be based: value, sustainability, influence, realism, and openness (figure 3). Value refers to the general goal of LL of creating value for all stakeholders, and the innovation processes used in LL emphasize this approach. They support the understanding of user needs and motivations for a service and the intensity of their attraction or repulsion towards it, and how the needs can be actualized through the innovation process, taking into account the real-life context. By allowing users to develop a service within their context they can determine whether the service provides value for them providing insights on how users perceive the value of the service guiding the innovation process further, and developing a service that the users want and need. (Bergvall-Kåreborn et al. 2009; Ståhlbröst 2012.) LL aim at adding value to innovation and validation; however, models for analyzing and evaluating the experiments should be further developed (Eriksson et al. 2006), bearing in mind that the context itself influences the evaluation results as LL experiments are conducted in a real-life context (Mulder et al. 2007).

Sustainability refers to continuous development and learning, emphasizing the part of the LL to evolve the generated knowledge to theories, methods, and models and the responsibility to the larger community around the LL (Bergvall-Kåreborn et al. 2009; Ståhlbröst 2012). Both human issues and technology should be considered when transferring knowledge to new

research (Eriksson et al. 2006). Sustainability also refers to the LL's goal to sustain themselves (Mulder et al. 2007) and that LL should, in general, address issues connected to sustainability. The principle of influence is defined by seeing the users as experts of their domain and as active and competent collaborators whose involvement is essential. To successfully implement the influence principle, LL need to make certain that participation between different stakeholders is in balance and that the innovation process is founded on actual user needs. As such, it is essential to motivate and empower the users to be involved in the co-creation process. (Bergvall-Kåreborn et al. 2009; Ståhlbröst 2012.) Being able to co-operate with users is not without challenges. Still, it has great potential for opportunities as well as the quality of the service and co-created value provided by it can be significantly increased through participation. One central challenge is taking into account the everyday context of the users. (Eriksson et al. 2006.) The challenge around the everyday context leads us to the principle of realism which refers to the focal condition of a real-life context that distinguishes LL from other user-centric approaches. The principle of realism considers that the context can be both physical and virtual and that it is crucial to understand how the service is integrated into and functions in the users' context based on their actual experience. (Ståhlbröst & Bergvall-Kåreborn 2008). Finally, openness stresses that the innovation process should be as open as possible with the stakeholders to make the innovation as attractive as possible by utilizing collective creativity (Bergvall-Kåreborn et al. 2009; Ståhlbröst 2012). The principle of openness also refers to the goal of interacting with a large population which is needed to leverage the full systemic potential of creativity (Eriksson et al. 2006.)

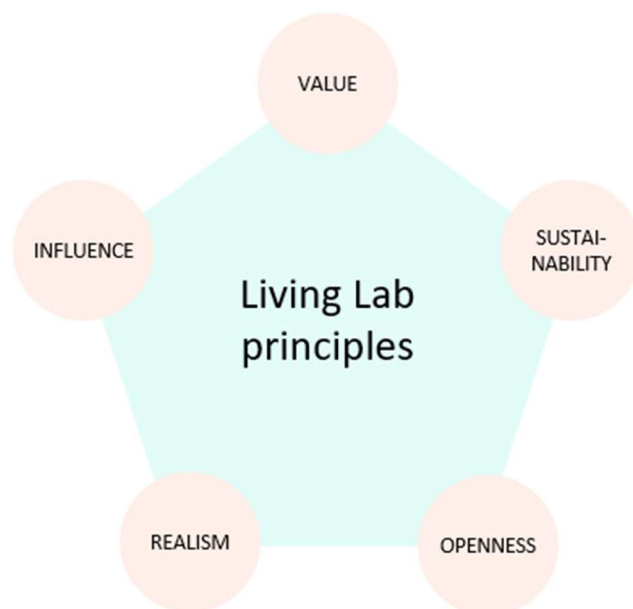


Figure 3: Living Lab principles (adapted from Bergvall-Kåreborn et al. 2009)

Living Labs have common characteristics, but various implementations and each implementation of a LL is an adaptation of the characteristics and principles defining the LL concept. As such, a definite methodology doesn't exist that could be reproduced and applied from one LL to another. Each LL requires an organization and co-creation methods fitting for the specific circumstances and context. (Ståhlbröst & Holst 2012.) Thus, service design methods can be used in a versatile manner in the different phases of the LL innovation process (Ruuska et al. 2011). Choosing the correct methods is not sufficient, however, as the facilitation of innovation and co-creation processes to develop a service or a product are required as well. Hence, one of the significant factors of a successful LL organization is the involvement of qualified people to facilitate and guide the innovation and co-creation processes. (Mulder et al. 2007). It has been recognized that it is challenging to create a milieu that incites and motivates stakeholders to share knowledge and collaborate, as the motives of engagement vary between different groups and contexts, and as such, they need to be identified and taken action upon (Bergvall-Kåreborn et al. 2009). According to Ojasalo and Ojasalo (2018b), the challenge of customer involvement in co-creation and innovation has been largely ignored in the literature, which gives a false conception of the ability and willingness of customers to participate. The authors highlight language, suitable infrastructure, logistics, and lack of incentives as examples of said challenges.

2.4 Lean startup and service design

This subchapter examines the connection between startup theories and service design. Both approaches strive for iterative development and customer understanding and are increasingly popular (Lichthenthaler 2020). The possibilities of these two approaches complementing each other have also been recently examined, and as such, they both provide relevant principles and methodological modes of operation in the context of this thesis. Startups present a relatively novel field for the application of service design but offer a fruitful environment for it to create substantial value (Grimes 2019).

The definition of a startup in management literature is debatable. Still, in general, startups are characterized by the degree of innovation and level of novelty they bring to the market and the ability to scale the business model. (Beverly 2017.) Startups are also referred to as projects to change their environment by creating significant economic value, often through innovation or occasionally by creating a new economic sector (Szathmari, Varga, Molnar, Nemeth & Kiss 2020) while Blank (2013) emphasizes the temporary nature of the startup as an organization that is designed to find a scalable and reproducible business model. Auler (2013) differentiates startups from other new small business entrepreneurs as Innovation-Driven Entrepreneurship (IDE) in comparison to Small to Medium Entrepreneurship (SME). IDEs distinguish themselves from SMEs by being more ambitious and taking more risks, focusing on broader markets, having a more diverse base of ownership, and starting by losing money and

requiring investment that does not respond quickly as revenue, cash flow, or jobs. Ries (2011) accentuates the extremely uncertain conditions of startups where they strive to design or create new products and services.

Startups can be considered a risky form of business, as shown by several studies presenting various rates for the failure of startups. For example, Krishna, Agrawal & Choudhary (2016) propose the failure rate of startups being 90%, and Mahr (2020) concludes in his analysis that 89% of 800 studied European startups had failed within the first eight operational years. A study based on more than 2000 companies conducted in 2012 concluded that 75% of all startups don't return their investors' capital and can be thus considered failures (Blank 2013, Gage 2012). Maurya (2012) states that one of the distinguishing factors between successful and unsuccessful startups is not starting with a better initial plan but the ability to change and adapt the plan to one that works before coming to an end of resources.

To decrease the risk of failure, experimental, iterative, and innovation practices have become increasingly popular from the beginning of 2000, and these principles have often been labeled as lean or agile. The term "lean" itself has been initially used in the motor vehicle mass industry production, whereas the term "agile" has been widely adopted by the software development industry (Ojasalo & Ojasalo 2018b). The core of lean production is the principles of differentiating value-creating activities and waste from each other and minimizing the last in the supply chain (Ries 2011). Agile focuses on iterative and incremental development responding to changes in the whole production environment, including customers' needs based on frequent customer communication and feedback. Traditionally lean and agile methods have been focusing on technical improvements, but the principles and practices behind both concepts have currently been embraced by various fields of business, startups, and small-and-medium-sized enterprises. (Ojasalo & Ojasalo 2018b.) Both lean and agile development models can be described as iterative development approaches, defined by multiple iterative collaboration rounds between cross-functional teams and key stakeholders. Iterative development approaches emphasize adaptive planning, evolutionary development, continuous improvement and promote rapid and flexible responsiveness to change (Ries 2011; Stickdorn & Schneider 2011).

Blank (2007) has proposed a framework based on iterative and incremental development approaches aimed at startups, emphasizing the need for a process to understand the customers, focusing on customer interaction and feedback to complement the product development process. The framework is nowadays called the lean startup, and it has grown to be one of the most popular and influential practice-oriented paradigms in business development (Ojasalo & Ojasalo 2018b; Shepherd & Gruber 2020). The lean startup has developed into a framework for startups that aims to lessen the risk of failure by discovering the viability of the startup business model and shortening the iterative product development

cycles. The viability is discovered by validating the business ideas emphasizing the importance of insights formed through customer interaction, qualitative and quantitative feedback, experimentation, and validated learning. (Blank 2007; Ries 2011.) Compared to traditional business development methods, the lean startup emphasizes the discovery of value by including the customers in each phase of the iterative process (Ojasalo & Ojasalo 2018b).

The lean startup aims to create a continuous feedback loop that involves the customers during the development of the service (Maurya 2012), and in the center of the framework is the iterative and cyclical Build-Measure-Learn feedback loop (figure 4). The loop starts by building a minimum-viable product (MVP) based on initial ideas as quickly as possible. An MVP is a prototype that allows experimentation and measuring the products or services impact on the customers, even though it lacks essential features. Service providers measure and collect data to learn from MVPs and connect customer-centric ideas to product development. (Ries 2011.) Thus, when entering the measure phase, the focal challenge for the startup is to evaluate where the product or service development has led to progress, which leads to the challenge of choosing the real metrics for the evaluation (Ries 2011) as the company has to be able to measure the impact of the product or service (Ojasalo & Ojasalo 2018b).

Actionable metrics are a central concept of the measure phase, which Ries (2011) describes as metrics that relate the importance of product improvements from the customers' perspective, measure the impact on customer behavior, and develop an understanding of what customers want and don't want. The metrics must demonstrate cause and effect, offer insights into how and why something happens, and lead to an understanding of specific actions necessary to change the service and reproduce the results (Ojasalo & Ojasalo 2018b). In the final phase of the loop, the startup must determine whether the development is leading to desired progress and if the original hypotheses are true or false and choose whether it should persevere in the same direction or pivot to avoid failure. The startup should aim to minimize the time to complete the loop and evolve the product or service to a more advanced level. (Ojasalo & Ojasalo 2018b; Ries 2011.) The evolution of the product or service from minimum viability to a scalable product starts once the product has been validated its desirability for a larger group of consumers (Blank 2007).

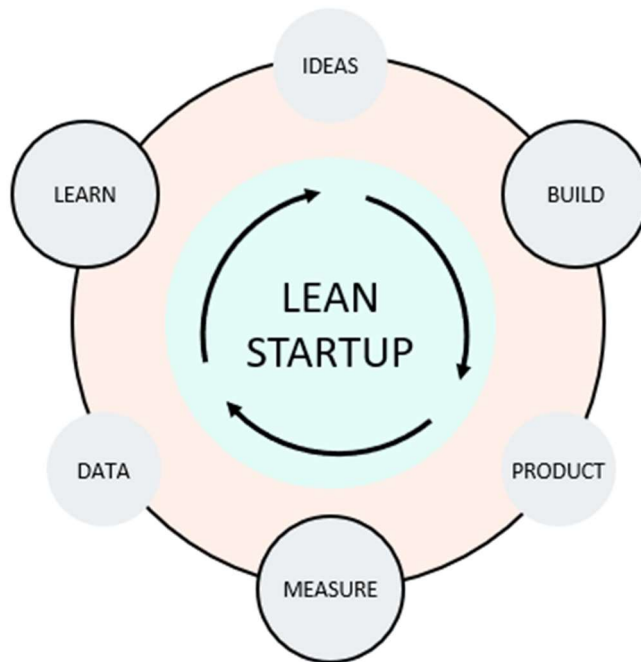


Figure 4: Build-Measure-Learn feedback loop (adapted from Ries 2011, 75)

Felin et al. (2020) present a critique towards lean startup, arguing that it relies too much on easily observable feedback to validate ideas and value, thus only building incremental value instead of enabling the development of hypotheses for novel theories and ideas. They further state that the lean approach is not suitable for startups seeking to create significant value and radical innovations as the approach was initially developed for manufacturing and continuous improvement of existing products. The authors agree with lean startup's importance of focusing on customer interaction but identify several issues concerning it, such as at which stage of the development process should the interaction occur and does interacting with an MVP produce learning to support the creation of radically new products. They also highlight the lack of tools and methods to bolster the startups' ability to make sense of the customer feedback and filter and analyze relevant data provided through observation and interaction. The authors conclude that entrepreneurs should focus on composing a theory and hypothesis to increase the impact of the experiments and customer interaction to reach clear conclusions to test the hypothesis.

Bocken and Snihur (2020) counter Felin et al. (2020) arguments by stating that lean startup is not a tool for early-stage ideation, but a framework for experimentation and testing during the innovation process. The authors also identify useful contexts for the lean startup to generate novelty and impact positioning it after forming the initial business model and vision (figure 5). The iterative experimentation process enables the involvement of stakeholders and reduces uncertainty by supporting collective learning leading to testing the assumptions

before high-cost implementation. The authors further state that the value creation hypothesis needs adjustment, which is best achieved through co-creation activities to increase the impact and support continuous innovation. In the suggested context, the iterative co-creation activities consider stakeholder expectations in an early phase, supporting the understanding and framing the context of the service, strengthening the stakeholder engagement, and aiding in co-constructing a viable business model. The experimentation can also lead to unexpected radical and incremental innovations as a side-effect of the initial testing process when actors with different perspectives encounter and interact with each other and create shared understanding. The authors conclude that both successful and failed experiments enable the identification of needs, challenges, and solutions, providing novel information across companies, industries, and ecosystems, increasing learning at a more holistic level and context.

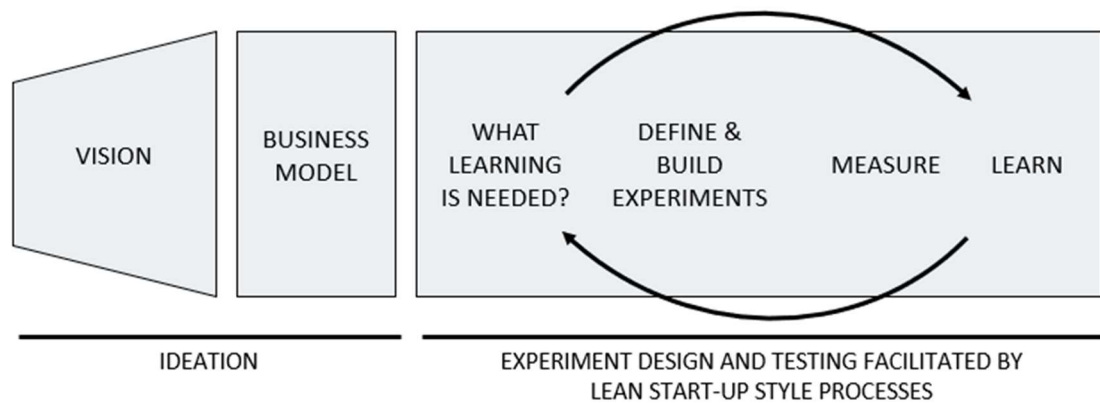


Figure 5: Framework for Lean startup (adapted from Bocken & Snihur 2020, 3)

Both SDL and lean startup have an emphasis on understanding and co-creating the value, which is defined as perceived by the customer, but according to Ojasalo and Ojasalo (2018b), these have not been connected in management literature. As such, they have proposed a new model called Lean Service Innovation (figure 6), combining the principles between the two approaches. The authors have recognized knowledge gaps in the theory and the application of SDL and suggest creating a holistic innovation process that aims to understand value-in-use and value-in-context. In addition, the process creates an understanding of how the value is perceived and how to develop the resource integration process according to the context of the developed product or service. The lean service innovation process complements lean development methodologies emphasizing the early inclusion of the customer to the process to understand the central elements of customer value as quickly as possible. The early phases of the process include elements such as deep customer understanding, which acts as a basis for the whole process and co-creative ideation, based on which only the most promising idea is chosen for development. The initial development should include only a limited amount of service features as the focus should be on developing experiments to evaluate the value as

perceived by the customer. The service can then be incrementally complemented during the innovation process and experimenting in the field, continuous learning and incremental development being central elements in implementing the lean approach. As a complete co-creative innovation process, the model aims to include the customer systematically and is based on the following phases and activities: deep customer understanding and cocreation, need and problem identification, solution idea(s), solution development, experimenting, and rapid prototyping with customers and other stakeholders, evaluation, full-scale implementation, possible abandonment, and possible identification of new customer needs and problems (Ojasalo & Ojasalo 2018b, 31). In addition, the authors propose using different service design methods to systematically include the customer throughout the process and create an iterative process founded on learning based on both qualitative and quantitative feedback from testing and experimenting with customers. The cyclical, repetitive lean service innovation process aims to increase value incrementally through discovering and utilizing latent customer needs in co-creation, emphasizing the case and context-specific nature of measures and metrics to assess the value. (Ojasalo & Ojasalo 2018b.)

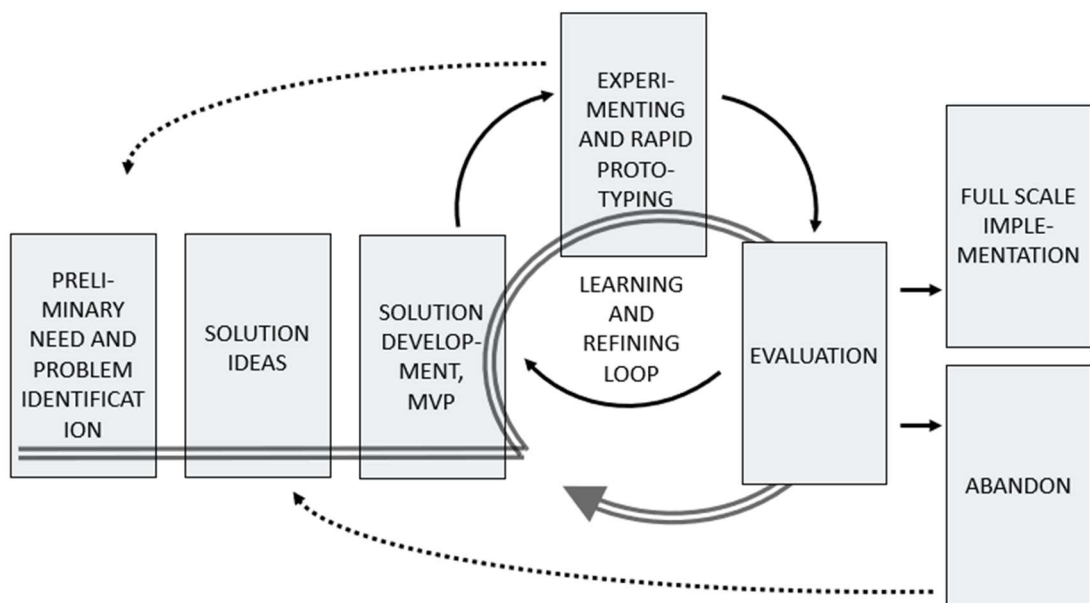


Figure 6: Lean Service Innovation (adapted from Ojasalo & Ojasalo 2018b, 32)

Other authors have also proposed that the lean startup framework should be complemented with design thinking principles and methodology as they share common characteristics, such as user research and a focus on customer needs, iterative experimentation, and development cycles to adapt the service according to feedback (Mueller & Thoring 2012; Lichtenthaler 2020, O'Connor 2020). For example, Maurya (2012) has presented various ways to implement the lean approach in practice highlighting the importance of listening to customers and

involving them early and throughout the innovation process. Based on the comparison between design thinking and lean startup processes, Mueller and Thoring (2012) state that lean startup might be a more suitable framework if a service provider already has a business idea to bring to the market, whereas design thinking is more fitting to search for a business idea but conclude that both approaches can benefit from each other. O'Connor (2020) emphasizes the benefit of design thinking in creating many ideas for options in comparison to the lean startup's approach of improving an existing concept or service. Design thinking could significantly benefit from testing the hypothesis earlier in the process than usual and implementing quantitative metric-based evaluation, as design thinking primarily relies on qualitative metrics. On the other hand, the lean startup would primarily benefit from structured frameworks of qualitative methods to better identify and analyze customer needs and challenges and the evaluation of the qualitative feedback to better understand which pivoting measures should be taken. Additionally, the lean startup should adapt creative ideation methods to support the iteration within the process better. (Mueller & Thoring 2012.)

Grimes (2019) and Lichtenthaler (2020) have identified key contrasts between lean startup and service design approaches. Grimes states that the lean startup is too focused on a product mindset, which is often based on a focus on developing a new, technology-driven solution to sell, instead of first creating a deeper understanding of the problem and researching the holistic context of the product or service. This view is supported by Lichtenthaler, stating that idea generation has a different role in design thinking, whereas lean startup has an existing idea as a starting point. He continues that lean startup focuses on implementation and late-stage activities of the innovation process instead of the general problem-solving approach of design thinking. Grimes also proposes that it is problematic that the lean startup methodology provides a very shallow customer understanding focusing on solution validation and buying intent. Instead, it should properly research the customer's context to provide deep insights into their activities and context and how they experience their problems, emphasizing that the product development should not be separated from the larger context and the users' real-life experience. Grimes concludes that the service design approach supports lean startup with tools and techniques for different stages of the innovation process and recognizes the value based on research and prototyping co-creatively with the customers. Lichtenthaler views the two approaches as mutually beneficial regarding the agility of innovation processes and bringing technically feasible solutions in an implementable form to the market quickly with design thinking emphasizing the early stage and lean startup on the late-stage innovation process.

2.5 Theoretical framework and the development process

In this subchapter, the previously studied theoretical framework (figure 7) is discussed from the perspective of the thesis describing how the framework supports the implementation of the development process.

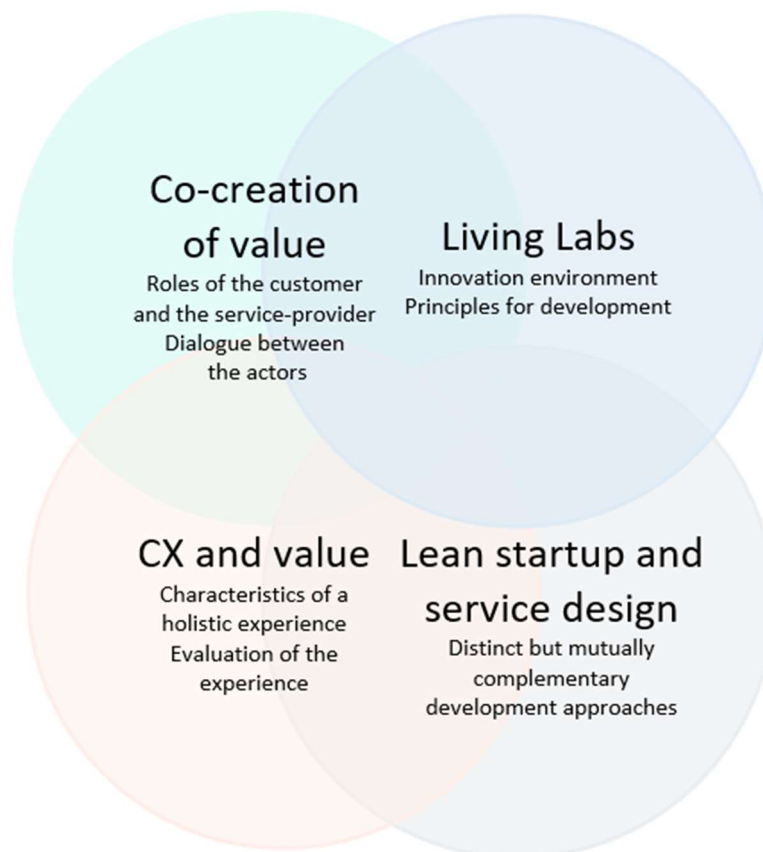


Figure 7: The theoretical framework

The relationship between value and co-creation in the contemporary management literature paradigm constitutes the theoretical foundation of the thesis. The development project must especially consider the roles of the customer and the service provider throughout the process. The customer should have an active role and be engaged in the value creation process (Nenonen & Storbacka 2018), whereas the service provider offers an environment (Prahalad and Ramaswamy 2004) and a platform (Ramaswamy & Ozcan 2014) for engaging interaction and dialogue. The role of the service provider includes supporting the customers' value co-creation process through facilitation (Grönroos 2006); as such, the author facilitates such the process as part of the design team, and the applied development approach promotes active participation and engagement.

The pilot that constitutes the context for the development project is situated in a public healthcare organization's Living Lab (LL) environment. The LL provides a possibility to develop the service in an authentic setting in collaboration with the users in their real-life context, and the definition of LL frames the development process, which is focused on user-centricity and systematic co-creation (ENoLL). The principles of value, sustainability, influence, realism, and openness are considered in the thesis (Bergvall-Kåreborn et al. 2009; Ståhlbröst 2012). Of the principles, the development process has a specific emphasis on value as it is the connecting concept between all the parts of the theoretical framework. The process aims to create value for all the stakeholders, and the pilot's goals define the value from the different stakeholder's perspectives. For the service provider, the value is derived from gaining practical experience of the use of the new service in a real-life context and from developing the service based on the pilot; for the healthcare organization, the value originates from examining the new service's suitability to their context and from evaluating the value of the service to support the decision-making concerning the implementation of the service; and for the healthcare professional's as the internal customers the value is in the service's customer experience.

The primary purpose of the development project is to improve the healthcare professional's customer experience, but the other stakeholders' perspectives on value are also considered. The concepts of value-in-use (Vargo & Lusch 2004) and value-in-context (Vargo & Lusch 2008), and the principle of how value is perceived by the customer (Heinonen et al. 2010) are essential when aiming to create incremental value and assessing the service's value. In addition, the theoretical framework supports taking into consideration the different characteristics that form a customer experience: interactions between the company, brand, and the customer (Gentile et al. 2007; Löytänä & Kortesoja 2011; Meyer & Schwager 2007), the temporal nature (Golding 2018; Heinonen et al. 2010), and the multidimensionality of CX (Bolton 2016; Saarijärvi & Puustinen 2020). The theoretical framework also provides a foundation to evaluate the experience's value. The evaluation metrics are defined to assess the value hypothesis, testing whether the service is creating value for the customers (Ries 2011). Various qualitative methods, such as storytelling, as proposed by Ruuska et al. (2011), are applied to assess the CX's value. The evaluation is based on a structure of continuous interaction with the customers who provide feedback to support the development of the service through qualitative and quantitative feedback, supporting collective learning and the formation of an iterative process (Ojasalo & Ojasalo 2018b). The evaluation metrics and KPI's are constantly developed during the process to provide actions to support the development of the service and the evaluation of the customer experience providing the design team with actionable metrics (Ries 2011).

The thesis is based on a method of development combining service design and lean startup, with an emphasis on service design, as these approaches have been seen as complementary to each other, as described previously in this chapter. The organization of the pilot process in the LL environment is based on a structure of bi-weekly feedback sessions, which constitutes the foundation for the Build-Measure-Learn loop that is adapted to fit and serve the development focus of the thesis and the goals of the pilot. For example, the startup does not provide an MVP but a late-stage prototype of the service, and several features of the service are developed in parallel during the process. The pilot process is formed around the earlier development phases of the service, and the limited resources of the LL environment affect how the principles of lean startup, SDL, CDL, and service design are applied in the project. The organization and co-creation methods of the LL are chosen to fit the specific circumstances and context by the design team as deemed necessary by Ståhlbröst and Holst (2012), and the author provides their expertise as a service designer to develop, facilitate and guide the innovation process. As the theories discussing lean startup suggest, ethnographical methods are applied to create a holistic understanding of the context and the customers' activities early in the process, and the practices and experiences form the basis of the whole development process (Bocken & Snihur 2020). The systematic inclusion of the customers throughout the process through service design (Ojasalo & Ojasalo 2018b) rose as another essential feature of the development project, especially as a need for structure for qualitative methods (Mueller & Thoring 2012) and properly researching the customers' context (Grimes 2019) have been identified as significant benefits that service design can provide to lean startup.

3 Service design as a development approach

This chapter discusses service design theory, processes, and methods which form the foundation for the applied development approach. First, the definitions and principles of service design are examined. Next, different service design process models are reviewed. Last, the subchapters describe the phases and methods through the Double Diamond process model to give a broad overview of the entire process.

Service design is not an easily definable concept (Tuulaniemi 2011), and it can still be seen as a concept that is not well understood (Patrício, Gustafsson & Fisk 2018), and that is in the process of establishing itself (Miettinen & Valtonen 2013). Service design is not a new innovation, but it has drawn and combined ideas, methods, principles, and tools from several fields, merging them to a multidisciplinary entity that can be seen as a constantly developing field both as an academic discourse and as a practice (Miettinen & Valtonen 2013; Tuulaniemi 2011). It is an evolving approach that integrates multiple disciplines to a holistic field that

aims to innovate and improve services in order to make them useful and desirable for clients and efficient and effective for organizations (Moritz 2005).

Penin (2018) describes service design as an established discipline and practice that is a part of the broader design discipline. At the core of design are the principles of having ideas and creating inventions that change the current state towards a preferred future, defining new relationships between the ideas and the contexts around them, and visually communicating and sharing the ideas. Service design is based on the design thinking approach, and it applies design tools and methods in practice to develop services to match people's needs to technologically feasible solutions and viable business strategies to create customer value and market opportunities (Liedtka 2015).

The complex and multidisciplinary nature of service design manifests itself clearly in the various ways that service design can be seen as a mindset, a shared framework of both thinking and doing, as a toolkit, and as a process (Stickdorn 2013; Tuulaniemi 2011). Service Design Thinking and Doing are also the titles of two famous books in the literature of the field. In *This Is Service Design Thinking*, Stickdorn and Schneider (2011) came to the conclusion that as there exists no commonly shared definition for service design and hence, a common language for the discipline should be developed. They proposed a set of five core principles for service design: user-centered, co-creative, sequencing, evidencing, and holistic. In the follow-up book, *This Is Service Design Doing* (Stickdorn, Lawrence, Hormess & Schneider 2018), the authors noted that there still was no common definition for service design and re-iterated the principles (figure 8). In addition to these principles, the core value of user-centricity is achieved by founding the design process on an understanding of the users, their tasks, and environments, refining and directing the design by user-centered evaluation, and by considering the holistic user experience (Curedale 2013).

Human-centered	Consider the experience of all the people affected by the service
Collaborative	Stakeholders of various backgrounds and functions should be actively engaged in the service design process
Iterative	Service Design is an exploratory, adaptive, and experimental approach, iterating toward implementation
Sequential	The service should be visualized and orchestrated as a sequence of interrelated actions
Real	Needs should be researched in reality, ideas prototyped in reality, and intangible values evidenced as physical or digital reality
Holistic	Services should sustainably address the needs of all stakeholders through the entire service and across the business

Figure 8: Service design principles (adapted from Stickdorn et al. 2018, 27)

Service design is most commonly applied as a process. There are several variations of the process, and while they differ from each other, they share the same principles and design-thinking-based mindset (Stickdorn et al. 2018; Tuulaniemi 2011). Service design processes are based on creative problem-solving principles and iterative phases of increasing and decreasing possibilities, or divergent and convergent thinking (Design Council 2015; Stickdorn et al. 2018; Tuulaniemi 2011). However, it is important to note that it is not possible to define or describe service design as one definite process as developing services is always about creating something new, and hence each process is unique. Thus, the ability to apply the different frameworks and process models is an essential skill of a service designer (Tuulaniemi 2011), and the most successful processes are the ones that are adapted in relation to the problem to be solved (Stickdorn et al. 2018). Some of the influencing factors relevant to correctly adapting the process are, for example, the available resources, the people, and capabilities involved, the complexity of the challenge, the culture, the organization, and the general context and situation (Ojasalo et al. 2015; Ruuska et al. 2011; Stickdorn et al. 2018). The processes are often visualized as linear and may appear as such to most of the stakeholders, but it is critical to take into account the iterative nature of the design process in all of its phases (Design Council 2019).

One of the most famous service design processes is the Double diamond model (figure 10) developed by the UK Design Council and launched in 2004 (Design Council 2007). It has since gone through several iterations, but the principles (figure 9) of the model have stayed the same as the design process is still separated into four phases: Discover, Define, Develop, and Deliver (Design Council 2019). The diamond shapes refer to two different mindsets adapted during the process: divergent and convergent thinking. The first means approaching the design challenge initially by generating ideas and alternatives, gathering diverse perspectives to the issue, which leads to exploring it widely and deeply. The second is all about summarizing, focusing, evaluating alternatives, and prioritizing. (Kaner 2014; Design Council 2019.) The principles of the Double Diamond model in dividing the process into phases and applying recurring patterns of divergent and convergent thinking are visible, for example, in Stickdorn et al.'s (2018) depiction of the design process, where the phases are named as Research, Ideation, Prototyping and Implementation, and in Tuulaniemi's (2011) presentation of the process, where the main phases are called Define, Research, Planning, Production, and Evaluation (figure 10). The principles, methods, and tools in the processes overlap but follow the same main logic.



Figure 9: Principles of the framework for innovation (adapted from Design Council 2019)

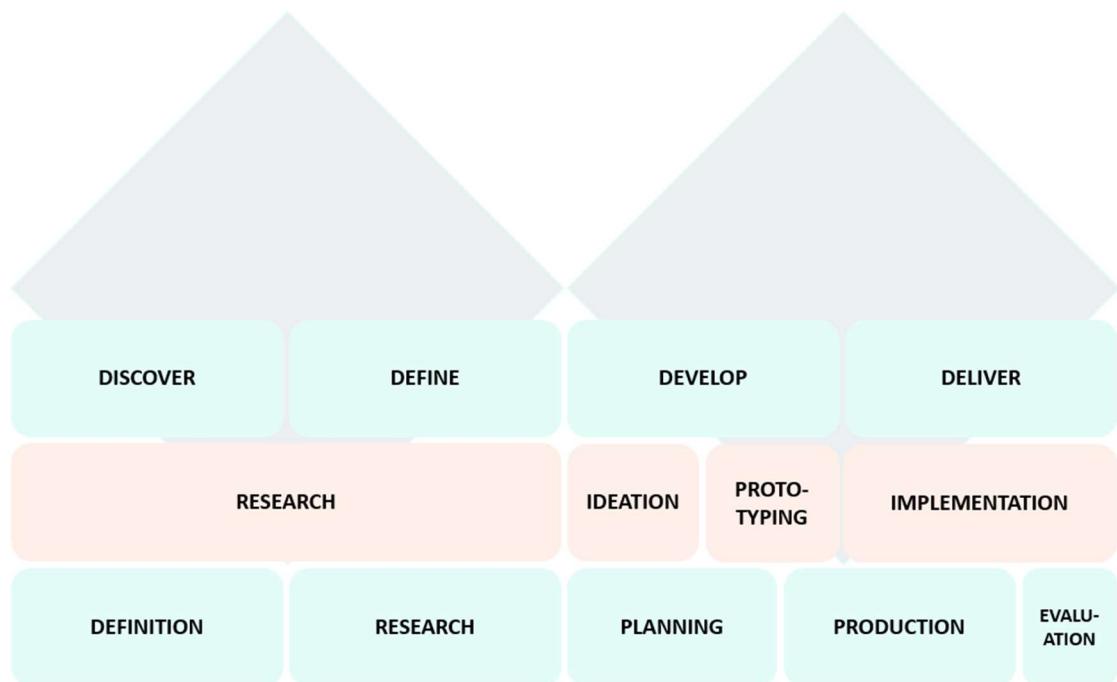


Figure 10: Comparison of different service design processes (adapted from Design Council 2019; Stickdorn et al. 2018, 92-93; Tuulaniemi 2011, 218)

The process applied in the case development project of the thesis is described by using the Double Diamond model, but it is important to note that the process followed the principles of all of the three process depictions mentioned above, adapting them to the context of the development project. The Double Diamond was chosen as the main process framework due to its simplicity and ability to describe the whole process visually and clearly, and as such, it was the most useful for this thesis' development purpose. The principles of the process phases are described in the following subchapters and the application of the process in chapter 4.

3.1 First diamond: discover and define

The design process begins with the aim of understanding the people related to and affected by the issue instead of assuming and focusing on exploring and researching the topic through various methods and tools (Design Council 2019). The first phase allows the service designers to empathize with the people that the service is being designed for, recognize their motivations and behavior, immerse themselves in the service context (Stickdorn et al. 2018). It builds a shared understanding of the target of the development project, the context, the environment, and the needs of the users, including the importance of mapping out the client's goals concerning the design process (Tuulaniemi 2011).

The design research aims to seek out the problems through various methods such as interviews and observation. It is fundamental for the service design process to create a holistic understanding of the challenges, human realities, and the context of the development project (Penin 2018) considering the operational environment, the users or the customers, and the organization (van der Pijl, Lokitz & Solomon 2016). It is essential to research how the users have adapted their context through their designs and keep the user needs in the focus of the development throughout the whole process (Curedale 2013). Despite exploring the broader context, it is important to concentrate the research in the service and aim to discover specific patterns, pain points, and latent demands. The researcher should not get overwhelmed by attempting to know everything possible about a certain topic and to keep in mind that the research aims to produce insights that can be used to benefit the service design process. The insights should be focused on creating an understanding of what the customers are trying to accomplish by using the service and how they are actually using it, their goals and objectives concerning the service, and the problems that could be solved by using it. (Penin 2018; Polaine, Løvlie, Reason & Lovlie 2013.) It is also essential to consider the temporal nature of the experience and find out what the users are trying to accomplish prior, during, and after using the service and what their responsibilities are at each stage (Bettencourt 2010; Heinonen et al. 2010). The first phase of the process may include trend research and exploring the ecosystem surrounding the subject of the design process before focusing on the more defined context of the service. It focuses on creating a deep understanding of the context and practices of the people who use the service and allows the designers to work past previous assumptions through exploratory research and confirm whether previous assumptions are validated. (Stickdorn et al. 2018.)

Standard methods for the discovery phase are, for example, desk research, such as trend research and benchmarking, ethnography, participant observation, interviews, and cultural probes. The chosen research methods and tools are guided by the defined design challenge and how the gathered information can be used to solve the challenge. (Stickdorn et al. 2018.) Data and information from the discovery phase can be both quantitative and qualitative, but the understanding achieved by qualitative methods has, in practice, been proven to be more meaningful for the design process (Tuulaniemi 2011). Penin (2018) supports this view emphasizing the importance of ethnographic methodology in design research which puts everyday life at the center of the development process and generates meaningful insights to be used in the later stages of the process (Stickdorn and Schneider 2011). However, it has to be considered that ethnography has a long history as a scientific field, and it is only broadly interpreted and applied for design research acknowledging the principles of understanding and documenting social and cultural groups their relationships and context through research (Polaine et al. 2013).

The second part of the first diamond of the design process is centered around one goal: defining the right problem to be solved by gathering and analyzing the data from the discovery phase (Design Council 2019). The discovery phase aims to produce rich data providing multiple perspectives to the issue at hand. Thus, a central challenge of the define phase is to synthesize and consolidate the data to be interpreted and analyzed to enable informed decision-making. (Penin 2018.) Well-analyzed data forms a basis for customer understanding. Identifying and understanding customer behavior and the value-producing issues helps develop valuable service concepts for both the company and the customer. (Tuulaniemi 2011.)

Service design utilizes many visual tools, such as canvases and maps, which help collect data and synthesize it, as the tools help in seeing the holistic, big picture at once and enable clustering and prioritizing the data. Visual canvases allow for co-creation practices, and hence, for example, research walls, affinity diagrams, empathy, and journey maps and personas are common methods when analyzing data. Data analysis allows the recognition of parameters, themes, and patterns to define the main aspects of the problems. Making sense of the research findings enables framing the problem and translating the deep understanding into actionable inputs. (Penin 2018.) This process is also referred to as sensemaking as the designers are trying to make sense of all the information and possibilities identified in the discovery phase (Design Council 2015; Stickdorn et al. 2018).

An essential part of the define phase is to move from understanding the current situation to recognizing opportunities through synthesis to enable the imagination of preferred futures (Penin 2018). Identifying the gaps in the service and finding out the right problem to solve is a focal challenge and a crucial step of any service design process, and it has to often be re-framed to a clearly defined design brief of the central challenge. A good design brief states the goals and constraints but should not be too specific or detailed to leave room for creativity and ideation, acting as a point of reference for the rest of the design process. (Design Council 2015.) When defining the challenge, it is often useful to re-frame it to a question form, such as How might we questions (Stickdorn et al. 2018) to help bridge the gap between customer understanding and ideation, keeping in mind that the questions should not lead to either too narrow or broad answers to leave room for creativity which needs to be directed into solving specific issues (Penin 2018).

3.2 Second diamond: develop and deliver

After the right problem has been recognized, clearly defined, and re-framed, the process moves on to the second diamond and co-creating, ideating, and developing different possible solutions to address the problem. In the develop phase, it is crucial to test which ideas work, prioritize, develop the most potential solutions further, and discard those that do not. (Design Council 2019.)

Changing the mindset from research and analysis to ideation, exploring different possibilities, and developing new concepts is challenging as the process shifts from convergent thinking to a new divergent phase. The chosen methods and tools should at the same time offer a structured framework to encourage and enable creativity, refrain from early judgment, and allow building on the ideas of others. (Penin 2018.) Stickdorn et al. (2018) refer to the first part of this phase as ideation, where the goal is to generate a multitude of ideas, cluster, rank, and select the best ones for further development in a structured manner. Sufficient understanding of the problem space and the definition and reframing of the problem creates the foundation for the ideation process. Both Stickdorn et al. (2018) and Tuulaniemi (2011) point out that it is often crucial to slice the larger entities into smaller parts so that they can be productively accessed and ideated upon. Tuulaniemi (2011) states that generating as many ideas as possible is often seen as one of the main goals of ideation, as thus it is in general more likely that they include essential parts to solve the defined problem. He continues that ideation consists of both divergent and convergent phases and that the target is narrowed down as the process develops. Although ideation aims to develop many ideas, it should focus on the defined problems and what is sought to be achieved (Penin 2018). Ideation is almost always its own phase in the service design process, but it is essential to note that ideas may present themselves in all stages of the process, and it is important to gather them then as well, as they may serve a purpose later (Ruuska et al. 2011; Stickdorn et al. 2018).

In order to generate a large number of ideas, service design processes lean heavily on co-creation, where stakeholders are intensely involved in the design process to emphasize the importance of user participation, empowering them, and increasing creativity during the process (Ruuska et al. 2011). It is vital that the participants of the ideation phase feel psychologically safe, the whole group functions in an equal manner and that everybody's ideas are treated equally (Tuulaniemi 2011). Service design literature and other sources offer many ideation techniques and methods, but in principle, they follow the logic of first generating many ideas, then evolving and combining them, and choosing which ones to prioritize for further development in the following phases. Common characteristics of the methods are visuality, which enables the communication between the co-creating stakeholders and sharing the ideas early to emphasize the iterative nature of the process in that the presented ideas are not supposed to be perfect, but drafts to support building on

them together and combining them and creating shared ownership over the process (Penin 2018; Stickdorn et al. 2018).

After a variety of ideas has been generated, the develop phase moves to a convergent phase where decisions have to be made on which ideas should be developed further and which should be discarded. Giving up on ideas is thus a crucial service design skill. The change of mindset from divergent to convergent thinking can be difficult, as it is not easy to discard ideas and make decisions, especially as ideas can be on very different levels, from reframed needs to more complete solutions. (Stickdorn et al. 2018.) Kaner (2014) refers to this phase as the groan zone reflecting the challenges of discomfort in the middle of the decision-making process. It should not be seen as an obstacle but rather as a necessary phase of the process. Service design methods offer several tools to support the decision-making, but it is important to note that instead of making an actual decision, they often aim to create a mutual understanding by sorting and clustering information and reframing the decision to smaller and more manageable parts. The goal is not to find the perfect idea but to identify the ones with the potential to be developed further, as the whole purpose of the phase is to develop the ideas collaboratively. (Stickdorn et al. 2018; Tuulaniemi 2011.)

The ideas with the most potential are taken further to prototyping to enable additional learning and support decision-making towards implementation and the final form of the service through an iterative process of testing and refining (Penin 2018). Prototyping is a quick and cost-efficient way to test whether the developed services work as intended in practice, create an additional understanding of the service concept, and minimize failure risks. As ideation, prototyping can be used in both divergent and convergent ways. In service design prototyping, it includes the more holistic perspective, where the whole context of the service and the experience and the more detailed aspects of the service and the critical parts of its implementation are considered. (Stickdorn et al. 2018.) In Tuulaniemi's (2011) depiction of the service design process, prototyping forms the second part of the planning phase, and it consists of building a rapid model of the service to assist the development by testing by interacting with the users and customers as well as the service providers. Creating an environment to prototype the service, engaging the right people as early as possible is thus essential for the development process (Polaine et al. 2013).

Service design combines prototyping methods from various fields to support testing both the details and the multiple dimensions of the holistic experience (Penin 2018). Prototyping enables evaluating the feasibility of the service concept, and the chosen methods depend entirely on the context of the service and what needs to be prototyped. It is essential to consider that different methods provide tangibility to the otherwise abstract nature of services and activate and influence people in different ways. (Tuulaniemi 2011.) As such, prototyping can consist for example of physical objects, dialogues, rough visualizations, and

interactive digital interfaces, enabling the designers to define the touchpoints and interactions of the service with the user and what should happen during them by enabling people to experience the touchpoints (Penin 2018) as prototyping must consider that even the smallest details can have a big effect in the customer experience (Polaine et al. 2013). To be able to prototype the holistic context and experience, storytelling methods such as user scenarios and storyboards enable the communication of the values and benefits of the services, especially when the value is not dependent on only the actions of one user (Ruuska et al. 2011).

One of the goals of prototyping is to provide data and information for the design process and to support the decision-making, which should be based on the iterative testing and evaluation of the service concepts (Ruuska et al. 2011). Tuulaniemi (2011) emphasizes that the metrics to evaluate the service have to be included in the service system in an early phase of the design process. He continues that in addition to KPIs, it is critical to recognize the conversions, which are the most critical stages of the service. Conversions exist both at micro and macro levels, the first meaning the stages of the process leading to the primary target, the macro conversion. As described earlier, the experience of the service is often the target of evaluation, and hence service design methods have an emphasis on qualitative data, but quantitative data and KPIs can be used to complement the assessment (Ruuska et al. 2011).

After generating multiple solutions in the develop phase and choosing the best ones to be developed even further, it's time to put those solutions to a small-scale test in the deliver phase and see which solutions are worth developing further and which ones should be rejected (Design Council 2019). The last phase in the Double diamond process is called deliver, and it is also referred to as implementation (Stickdorn et al. 2018) or production (Tuulaniemi 2011). It is a critical stage of the service design process that occurs after experimenting and testing, albeit the borders between prototyping, piloting, and implementation are not rigid. As with every service design process, the scale of implementation may vary significantly between each project. (Stickdorn et al. 2018.)

Tests in the last phases of the design process are often executed in the form of pilots, which are small-scale projects testing new services in limited contexts. Pilots can be seen as the last phase of prototyping (Ruuska et al. 2011), prototypes of implementation (Stickdorn et al. 2018), or as a bridge between prototyping and implementation (Penin 2018) but not yet counted as actual implementation (Tuulaniemi 2011). Pilot projects are conducted in real-life environments, engaging real customers, users, and employees, enabling testing the service concept, and focusing on specific touchpoints exposing the new service to various challenges and learning by experimentation (Penin 2018; Tuulaniemi 2011). It is crucial that piloting provides measurable results so that the design team can conclude which parts of the service are working and which are not, and to recognize the bottlenecks in the production of the

service and make necessary changes to training, tools, and the service environment (Tuulaniemi 2011). In comparison to live prototyping that are often one-off events in real-life contexts, pilots usually last several weeks or months and are constructed of multiple rounds of testing, allowing for the development and modification of different features of the service during each round. Pilots enable the testing of various features, touchpoints, and channels of the service at different times. (Penin 2018.) The evaluation of the service often changes as the service evolves towards implementation, and new metrics are introduced as the focus shifts to business goals instead of innovation (Stickdorn et al. 2018; Tuulaniemi 2011). Pilots are an important mechanism leading to the actual implementation of the service. Key implementation elements are that the product or service functions in a real-life context and are embedded into existing environments. (Penin 2018.) It is vital that the customer understanding, the crucial ideas, service concepts, and other critical components are delivered in a concrete form to the customer when implementing the service (Tuulaniemi 2011).

Penin (2018) emphasizes the importance of feasibility and the sustainability of the service over a more extended period of time, considering the following implications to the business and taking into account the integration of resources required for the service to be successfully implemented. Full implementation might require considerable modifications to the service environment, but this depends mainly on the scale of the change that the service implementation requires, and implementation can even be seen as its own project within the design process (Stickdorn et al. 2018).

4 The development process: Improving the customer experience - Case Medified

In this chapter, the empirical part of the thesis and the applied service design process are described. The process is explained through the Double Diamond process in two subchapters following the diamonds as the outline for the project. However, as the service design process was applied to the pre-defined structure previously agreed by Medified and the public healthcare organization, and the initial pilot period was not successful, the different phases of the service design process are intertwined. From the service design process perspective, the scope of the thesis is limited primarily to the first three phases of the Double Diamond process (figure 11). The design process was naturally limited by the pilot's goals from the public health organization's perspective as the aim was to evaluate the suitability of the service and not to implement it. Thus, the thesis' scope is confined to the beginning of the deliver phase. However, as the development process was adapted to the pilot as it proceeded, it was not possible to map out the whole process beforehand, and as such the scope of the thesis was defined in parallel with the process. The development process of this thesis focused first on understanding the key challenges identified by the startup based on

their previous experiences and pilots, the context, needs, and value expectations of the healthcare professionals concerning the new service. Second, the customer experience of the new service was co-creatively developed between the design team and the healthcare professionals.

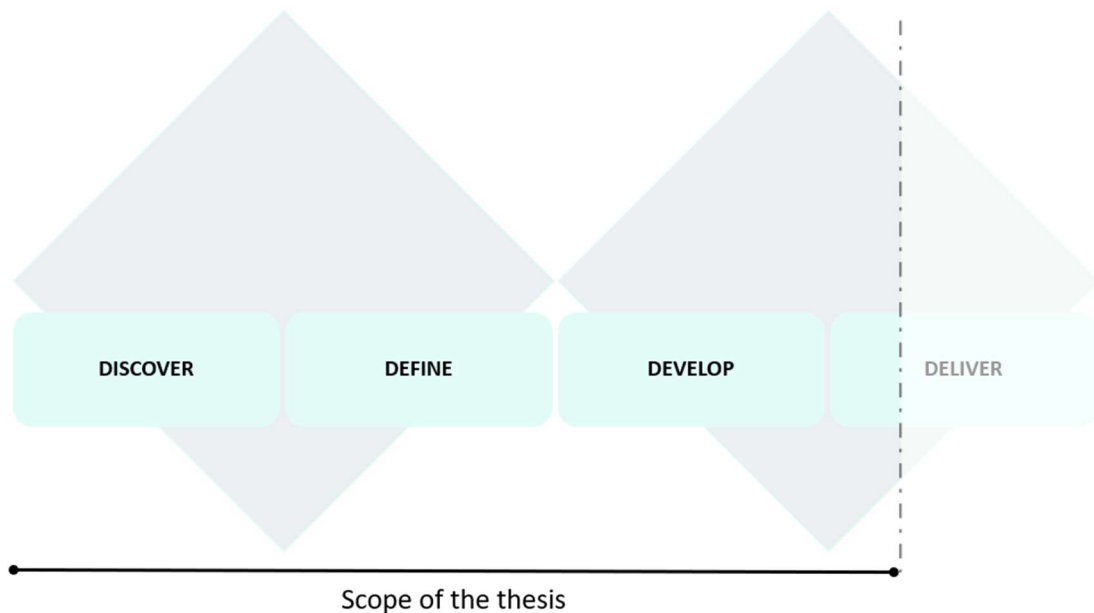


Figure 11: Scope of the thesis

The practical development project was conducted in two parts as initially the pilot process had been agreed to last from September to December 2020, but due to the mandatory information security assessment, a second pilot period was agreed at the end of the first one. The second pilot period lasted from January to May 2021. The Living Lab structure was built around bi-weekly feedback sessions, as explained in subchapter 1.2. In addition to the feedback sessions, the author held meetings with the representatives of the client and with the design team throughout the development project (figure 12 and figure 13). The feedback sessions formed a structure for the iterative rounds of the pilot, as discussed in subchapter 3.2, enabling the testing of different features of the service concept. This cyclical structure affected how the SD approach was applied, as it had to consider both the short cycles of the pilot and the broader outlines of the service design process.

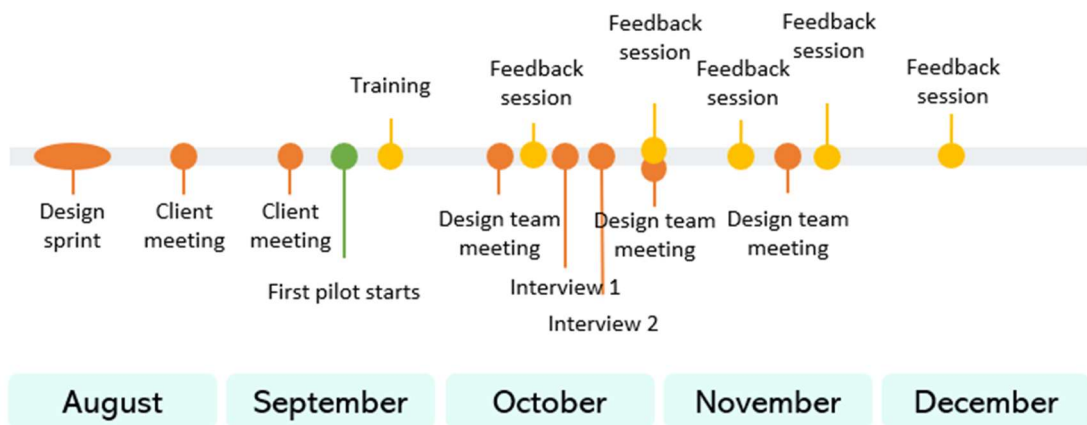


Figure 12: The initial pilot period

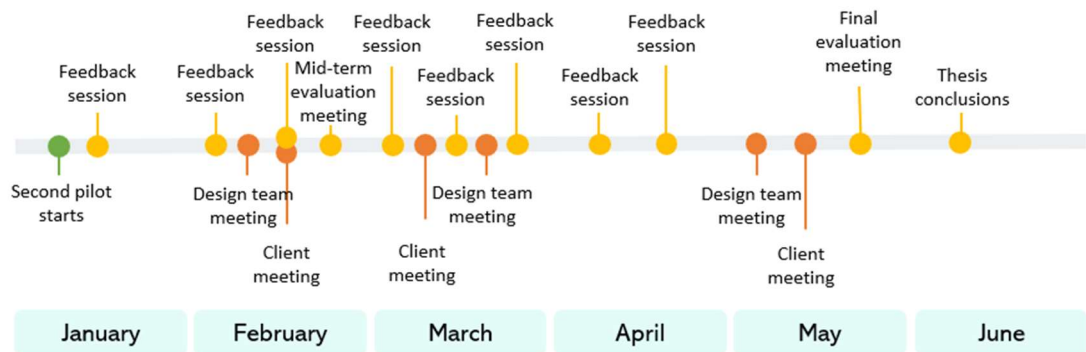


Figure 13: The second pilot period

4.1 First diamond: understand, identify, and define

This subchapter describes the first diamond of the development process which was comprised of design research and defining the problems. The thesis started in the form of a design sprint, which is discussed first as it occurred before to the start of the pilot process. Second, the research concerning the actual pilot environment is described. Last, the first diamond is concluded by the defined and re-framed problems concerning the customer experience and the pilot process. The author conducted two meetings with the client to discuss the purpose, scope, and content of the thesis and the role of the author as a service designer during the pilot process.

4.1.1 Design Sprint

The discovery phase of the process started in an uncommon fashion as the client company was not chosen as a case for the thesis in a traditional way. The author participated in Laurea's course 'Agile methods in service design' (Ketterät menetelmät palvelumuotoilussa) as a student in August 2020, where the thesis case company Medified acted as a client. The design process during the course followed the design sprint framework (Knapp, Zeratsky & Kowitz 2016) developed by Google Ventures employees. Design Sprint is a five-day-long process where each day represents a stage of the design process: Map, Sketch, Decide, Prototype and Test.

Each student group was given a different design challenge, and our group's assignment was the integration of the application developed by Medified to the public mental healthcare services. The more specific challenge was solving the application deployment issue from the healthcare professionals to the patients as the client had recognized this issue as a crucial stage and a bottleneck in the service during earlier experiments and tests. The design sprint process starts with identifying the design challenge and choosing a target for the process, understanding the context of the service, mapping the current state of the service as and choosing success metrics for the sprint in the form of questions (Knapp et al. 2016). Our team identified the goals of the design challenge both on a larger scale and narrowed them down to fit the scale of the design sprint. The large-scale goals of our team were to provide easier access to mental healthcare and intensify the early stages of the treatment. The narrowed down goals were integrating the service to the existing healthcare context and environment and creating a feeling of being encountered by the patient. Our team also identified potential failures for the service in general and the significant challenges to which the service tries to answer and developed success metrics in the form of sprint questions.

Based on the client's information, our team created a journey map of the service and interviewed the case company representatives on the initial ideas and challenges. The journey map is a simplification of the service, focusing on the most significant phases from the customer's perspective. The map includes a few most relevant actors providing a crude overview of the design challenge. (Knapp et al. 2016.) Based on the given information, the team created How might we questions to re-frame the identified challenges and identify the target group and the focus phase of the service process we aimed to solve during the sprint (figure 14). The How might we questions narrow down the focus to the most crucial points of the service by grouping the questions thematically together on the journey map enabling the design team to choose the target for the process (Knapp et al. 2016). The team then revisited the sprint questions to confirm that we had chosen the correct objective for our design process against the selected metrics.

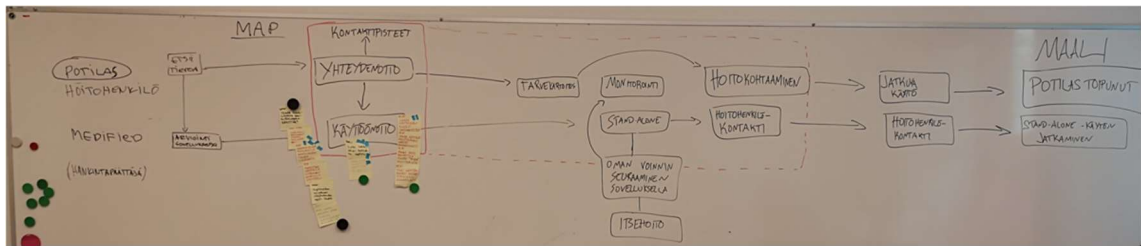


Figure 14: Journey map

The second phase of the design sprint process is Sketch, where the focus shifts to divergent thinking, seeking inspiration, and ideation for possible solutions to the identified design challenge (Knapp et al. 2016). The phase started with each group member individually seeking inspiration from good services that were somehow related to the design challenge, and the examples were then presented as quick Lightning Demos to the rest of the groups who took notes and wrote the inspiring ideas upon the shared whiteboard. The presentations acted as a basis for the ideation, which is conducted in the design sprint in the form of sketching. Sketching enables the transformation of abstract ideas to be communicated as tangible solutions. The sketching process is divided to four steps and is based on the idea of an individual being able to generate ideas, which are later reviewed within the team. The ideation process is conducted at a fast pace, and it includes both a divergent and convergent phase. The limited timeframe and the Crazy 8s force the team to sketch eight variants of the same idea and to reflect on alternative options. (Knapp et al. 2016.) During the sketching stage, each group member individually first reviewed the available information, sketched up first ideas and inspirations, and then utilized the Crazy 8s -method to diverge more on the original ideas and find other variations of the same solution idea, after which a final, more detailed solution concept was sketched.

The third day of the design sprint is focused on further converging, making decisions, and choosing the best idea concept for further development and prototyping (Knapp et al. 2016). All the final ideas for solutions were hung up in an art gallery so that each group member could review them by themselves and put notes on parts of the solution concept they found interesting, and questions raised by the concept (figure 15). After the art gallery, the solution concepts were reviewed one by one by the whole team. Each group member voted for the parts of a concept with the most potential or the whole concept by placing stickers and explaining their reasoning for their voting. Voting provides an efficient decision-making method that includes argumentation and feedback. The heat map formed of the stickers gives a quick overview of the best solutions to the whole team. (Knapp et al. 2016.) The solution concepts were then presented to the client representative, who gave a final decision on which solution should be carried forward. In our group's case, it was a combination of all the

solutions concepts presented which were combined into one storyboard (figure 16), representing the whole service concept of how to solve the original design challenge. The storyboard is a method used to give a good overall perspective of the solution to enable the creation of shared understanding by clarifying the concept and enabling noticing the weak spots of the solution being developed (Knapp et al. 2016).

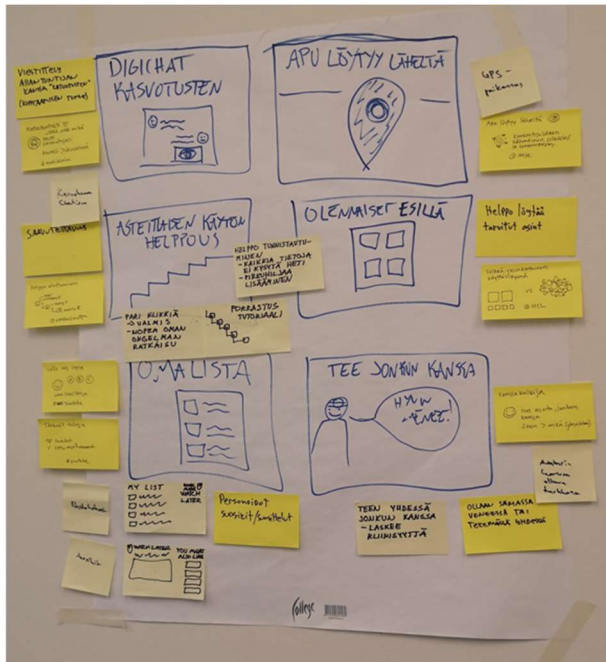


Figure 15: Service concept draft

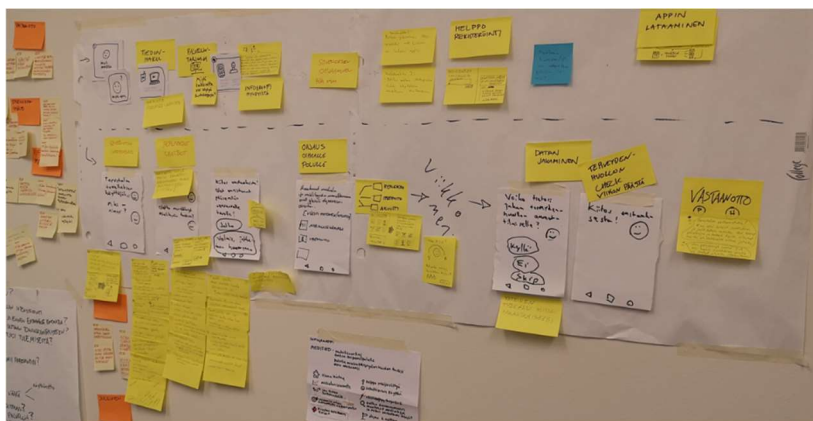


Figure 16: Storyboard

The prototyping of the solution concept is the theme of the fourth design sprint day, where the design team creates rapid representations of the solution that aim to provide more information through testing (Knapp et al. 2016). The team decided to split the concept into smaller parts and work in smaller units within the group to have a more holistic prototype of the concept available for testing. The parts of the concept chosen to be prototyped were the

telephone contact situation of the patient to the healthcare services where the patient's motivation was to book the first appointment and communication materials of the application in the form of an infographic (figure 17). Our team developed a manuscript for the contact situation for the healthcare professional and a visual leaflet for the infographic (figure 18) explaining the application concept to the patient.

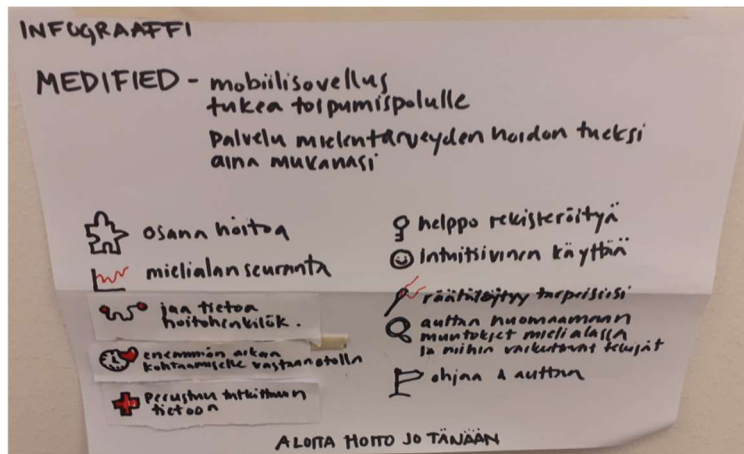


Figure 17: Early-stage prototype of the infographic



Figure 18: Late-stage prototype of the infographic

The last day of the design sprint is about testing the developed prototypes with real customers. The tests enable capturing their feedback and perspectives, which provide a foundation for the next steps of the service's development. (Knapp et al. 2016.) For our test, we recruited people who had previous experience of using public mental healthcare services as patients. Our team conducted five test interviews by video calls that simulated the contact situation between the patient and the public healthcare professional. We presented the infographic and asked for their feedback on both prototypes. One group member, in turn,

PALVELUPOLKU

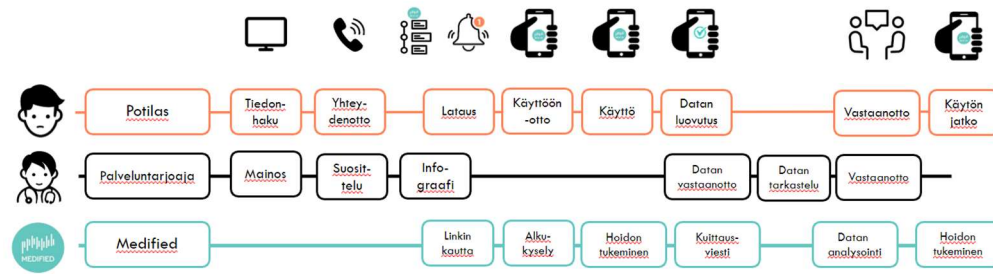


Figure 20: Journey map

Infograafi

Maksuton mobiilisovellus mielenterveydenhoidon tueksi

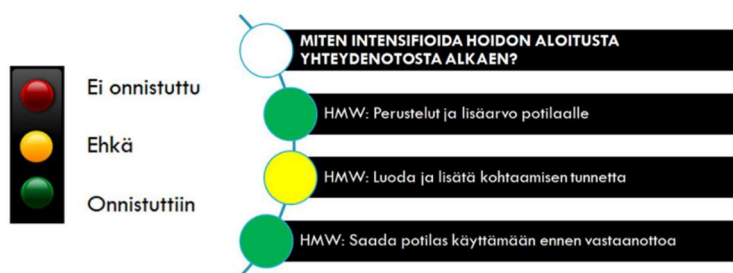
Yhteinen työkalu sinulle ja terveydenhuollon ammattilaiselle nopeuttaa hoidon aloittamista ja tukee toipumista

MEDIFIED
Mielipäiväkirja

Osana hoitoa	Nopea rekisteröityä
Maksuton ja helppo käyttää	Mielialan seuranta
Auttaa ymmärtämään omaa oloa	Tietoa ja työkaluja itsehoiton tueksi
Jaa tieto suoraan ammattilaiselle	Räätyäilytyy tarpeisiisi
Enemmän aikaa kohtaamiselle vastaanotolla	Perustuu tutkittuun tietoon

Lataa sovellus ja aloita käyttö jo ennen ensimmäistä vastaanottoa!

Figure 21: Final version of the infographic



YHTENVETO SPRINTISTÄ

Figure 22: Evaluation of the sprint

4.1.2 Contacting the client and agreeing on the thesis project

Once the design sprint was over, the author contacted Medified to inquire if they had opportunities for a service design thesis project as they had mentioned that they had new pilots potentially starting. The author got recruited as a service designer to conduct their next pilot in a public healthcare organization's Living Lab environment.

4.1.3 Preparatory research and observation

The design sprint acted as both preparatory research and a miniature service design process, which gave a good starting point for the development project as the author had created an in-depth understanding of the challenges concerning the development of the service in collaboration with the client. However, the thesis project was conducted during the Covid-pandemic; it was executed entirely remotely after the design sprint, which affected the development process and the applied methods. For example, the author did not have the possibility of doing preparatory research concerning the operational environment and context of the pilot process, except for meetings with the client before the start of the pilot at the end of September 2020. The design research was thus mainly conducted in parallel with the pilot process through observation and interviews.

Observation is a general term encompassing several service design methods that aim to provide research data of the target group in their situational, allowing the researchers to immerse themselves in the users' context and observe their activities. The observation can be passive or active, structured, or unstructured, covert, or the participants can be informed about the observation, depending on the context and goals of the research. (Curedale 2013; Stickdorn et al. 2018.). One standard observation method is shadowing, which means observing the customers' behavior using the service. The method provides invaluable data of how people actually use the service, what kind of interactions and touchpoints it includes, and aids in identifying gaps in the service process and ideating solutions for them (Tuulaniemi 2011).

Due to the remote working context, the author did not have many opportunities to observe the mental healthcare professionals before they started using the service and adapting it to their work context. The sole occasion was during the introduction training by Medified concerning the start of the pilot process of the service in the healthcare organization. The author observed how the training was provided and what kind of questions, comments, and observations the professionals gave concerning the adaptation of the service to their work context. Further observation was conducted during the feedback sessions with the professionals. Still, the remote work denied the author of possibilities of observing how the professionals actually used the service during the receptions or outside them. The initial observation gave additional information to conducting the rest of the research and forming

relevant interview themes. The observation during the feedback sessions provided the author and the design team with further insights on the professional's experience through their general attitude towards the service and engagement to the pilot process.

4.1.4 Interviews

Semi-structured interviews were the primary source of data during the first diamond. The target group of the interviews was the public healthcare professionals who would be piloting the service. The plan was to interview all the professionals participating in the pilot in as early stages of the pilot process as possible. The interviews concerned both the customer experience of the professionals, which was the primary development aim of the thesis, and the pilot process; the final focus of the thesis was still open during the early stages.

Interviews are a central service design method that provides the researcher information about the customer's life, their thoughts, and experiences, creating an understanding of their everyday context. The interview questions should be constructed to let the interviewee answer what the customers do and why to, which enables discovering their apparent and latent motivations and needs and challenges. Interviews are not only limited to the customers as other relevant stakeholders can be interviewed to gain a more holistic understanding of the whole context and environment and different stakeholders' expectations, needs, problems, and concerns. (Tuulaniemi 2011.) To achieve the goals of the interviews, building rapport between the designer and the participant is an essential skill that requires the interviewer to concentrate on listening to the interviewees and leaving their views and expected outcomes out of the interview situation (Portigal 2013). The interviews can be either structured, semi-structured, or unstructured. However, in service design, the emphasis is often on the middle one to both provide structured data and allow the interviewees to describe their own experiences. Interviews can be either contextual, where they are conducted in a relevant situational context, such as the operational service environment or workplace, or in-depth interviews, which can be described as more intensive and intimate situations. (Stickdorn et al. 2018.) The interviews can be conducted either one-to-one or in groups, but it is important to consider that this often affects what kind of answers the interviewees provide. For example, in a naturalistic group, the participants know each other, which leads to more natural discussion during the interview than between participants that are not familiar with each other (Curedale 2013).

The themes of the interview must be decided beforehand to support the goals of the research and formed into an interview script or a field guide (Hirsjärvi & Hurme 2008; Portigal 2013). The themes were discussed with the service provider, and the author formed the final version of the interview field guide (appendix 1). The interviews were structured to understand the health care professionals' experience of the service from a holistic perspective. The questions

aimed to discover how the interviewees had experienced the beginning of the pilot so far; and what kind of information and support they would need to integrate the service to their work context better. Second, the interviews aimed to create an understanding of their experience of the pilot in general, why the pilot was taking place from their perspective and how the outcomes of the pilot should be evaluated. The third purpose of the interviews was to understand the healthcare professionals' work context, needs, and challenges related to it and their value expectations of the service, and their perspectives on what kind of challenges could the service potentially solve, considering that they had already been introduced to the service earlier before the start of the pilot process. As the pilot was already ongoing and the pilot would benefit significantly from rapid progress, the last goal of the interviews was to understand the context of the service deployment from the healthcare professionals to the patients, which had been the main focus of the design sprint as well. In addition, the author interviewed the Living Lab coordinator of the public healthcare organization to create an understanding of the context of the pilot process and the needs and goals of the healthcare organization for the service, and the role of the author as an external service designer.

Conducting and analyzing the interviews

As the professionals were very short on any additional time for the pilot besides the feedback sessions, the author conducted two group interviews with three professionals in one group and two in the other. The groups were naturalistic as the participants knew each other before the interview. The interviewees had been asked for permission to record the interviews as they were conducted as video calls remotely using MS Teams, and both the interviews lasted for an hour. The interviews followed the field guide, but as according to the principles of a semi-structured interview, the interviewees were allowed to talk and discuss freely, but the author guided the discussion through active listening and additional questions, keeping the goals and scope of the interviews in mind (Hirsjärvi & Hurme 2008; Silverman 2011). The interviews were transcribed from the recordings immediately afterward, which was done by writing the interviews as MS Word documents with time codes that helped the author to go back and review the most relevant parts of the interviews. The transcription was not literal, as the emphasis was on the pre-defined central themes and most relevant and interesting information.

Analyzing the interviews started already during the interviews, which is a standard method when conducting qualitative research. For example, the analysis is done by paraphrasing the interviewee and making notes of central themes or novel information during the actual interview, which allows the interviewer to dive more in-depth into relevant themes for considering both the interviewees' experience and the interviewer's goals (Hirsjärvi & Hurme 2008).

The transcriptions were then coded by highlighting them with various colors to emphasize specific themes and findings. The coded parts were copied to Miro for further grouping and labeling according to the affinity diagram method (figure 23) as the analysis based on the interpretation of meanings includes summarizing and classifying them (Hirsjärvi & Hurme 2008; Silverman 2011). The affinity diagram is a standard design method used for structuring and analyzing qualitative data enabling the discovery of relationships and connections within the data (Curedale 2013). The data is displayed on a whiteboard or similar ample space, and each piece of data is written on a separate post-it note and placed on the board. The post-its are then studied and grouped under connecting themes, which are then labeled. Grouping and labeling enable identifying relevant information from amongst the data and creating a holistic perspective to the research themes at one glance. (Tuulaniemi 2011.)



Figure 23: Sample of the affinity diagram used for interview analysis

The results of the interviews provided the design team with insights into the professionals' value expectations. The central insights considering the value expectations were that the service would provide information to the professionals between the receptions, as the receptions provided a very limited time to interact with the patient; it would act as an instrument to help assess the quality of the treatment by enabling following short and long-term progress of the patient's wellbeing, and it would support the patient's self-reflection outside the receptions by allowing them to analyze and actively reconstruct days that effect their wellbeing positively. The value expectations also included perspectives on the service providing additional tools for the collaboration and sharing the responsibility of the treatment between the healthcare professional and the patient and that the service would commit the patient to follow the treatment process.

"Can I influence the day to come by doing the things to make it a good day" - Interviewee

"It lessens my frustration when I see that the patient is committed and engaged" - Interviewee

In addition to the value expectations for the service, the interviews provided insights on the pilot process, which were centered around the need for additional information and use experience concerning the service and its value to both the healthcare professional and the

patient. Being more fluent in using the service before presenting it to the patients would be beneficial and additional experience would influence the deployment process as well, as it would be easier to convince the patient of the service's benefits if the professionals would know the service better themselves. Additionally, the insights reflected a need for additional marketing and information material to support the deployment to the patient.

4.1.5 Feedback sessions

The first feedback sessions can be seen to be included in the discovery phase due to the delay of the full adoption of the service to the healthcare professionals' work context caused by the mandatory information security assessment. The focus was on collecting feedback on their initial thoughts and experiences of using the service by themselves, as the security assessment prevented deploying it in full to the patients and the start of the pilot process in general.

The feedback sessions were conducted every second week (figure 12). Each feedback session was voluntary to the healthcare professionals participating in the pilot. They were led by the author in a facilitating role and attended by the rest of the design team in a supporting role. The design team always planned the rough lines of the sessions collaboratively to address the most relevant themes. The sessions were analyzed by the team both during and after each session. As the whole development project was executed remotely, all the feedback sessions were conducted using MS Teams for video calls and Miro as the co-creation platform.

The use of an online collaboration whiteboard enabled visualization during each feedback session, which is one of the principles of service design. Visualization supports the formation of understanding both for each individual and within the collaborating group. As such, it can be used as a tool for both planning and communication. Visualization enables the concretization of information, making abstract things tangible, expediting the design process, and enabling iteration. Sticky notes or post-its are a core tool for visualization in service design, permitting the organization and structuration of data in manageable sizes. (Stickdorn et al. 2018; Tuulaniemi 2011.)

A key element of the feedback sessions and thus the whole development project was the facilitation of each session and the process as a whole. Facilitation is a core skill of service designers, and Stickdorn et al. (2018) describe the facilitator's function as complex as they must consider three levels at the same time: the overall process, the group in question, and each individual participating. The facilitator must be able to support equal and engaged participation, promote the creation of shared understanding and responsibility, and ensure that the decision and created solution are based on the inclusion of the whole group (Kaner 2014). The role of a facilitator can vary significantly between processes and the steps of each process. Schwarz (2017) has identified several possible roles for a facilitator depending on

their membership to the group being facilitated, whether the person facilitating has a stake in the issue, and expertise concerning the subject matter. The author describes other roles as possible for the facilitator, but the principle is that they should not belong to the group, not have a stake in the issue, and not be experts on the matter to create the best impact. Kantojärvi (2017) supports this view by describing the facilitator's role as a neutral guide for a group through a process where the content is provided by the participants. The facilitator plans the group process, chooses the best methods, and ensures that the full capacity of the group is utilized. According to her, in addition to neutrality, a good facilitator is transparent, impartial, an active listener, enables clarity, and supports decision-making. The facilitator manages the energy levels of the group and helps them keep focus, utilizes group memory, and takes care of documentation. Group memory is enabled through simple methods, such as writing down the participants' observations so that they are visible to all. Group memory enhances participation significantly as the participants can see that their ideas are being valued. It also acts as an extension for each individual's memory allowing the participants to revisit the previous observations and creating space for thinking. (Kaner 2014).

A significant emphasis was on empathy during the feedback sessions. The ethnographical research methods aim to examine people in their context, and the researcher strives to embrace the perspective of the target of the research through empathy, which is an essential skill of a service designer to create genuine interest and deep understanding during the design process (Tuulaniemi 2011). As the development project spanned over eight months and the author acted as a facilitator in each feedback session and designed the overall process in collaboration with the design team, the role of facilitation was emphasized. The rapport developed between the author and the participants of the pilot process was built on and strengthened throughout the development project, which was integral to its success as the healthcare professionals had to be engaged throughout the process. Thus, the methods chosen were adapted to fit the feedback sessions, and similar methods were repeated to make the participation to each session and the overall process as easy as possible. The group memory was utilized by documenting each feedback session to Miro, which was accessible to all participants throughout the process. The methods used during the first feedback sessions were adapted and combined from various facilitation and service design methods, such as me-we-us, green and red feedback, and empathy map.

Me-we-us is a simple but effective facilitation method that enables equal participation within the group. As can be deduced from its name, the method is divided into three phases: individual work, working in pairs or small groups and working with the whole group. In the individual phase, each participant has the chance to ponder on the issue at hand and write notes. Second, the participants discuss and share their individual observations either in pairs or in small groups, which creates a safe environment even for quieter people to participate.

Last, the pairs or groups share points of their discussion with the whole group. The method is suitable for both divergent and convergent phases. (Kantojärvi 2017.)

Green and red feedback is a simple method that allows the participants to first ask questions to clear any possible misconceptions, then first focus on giving feedback on positive aspects concerning the object and then focus on the negative or developmental aspects, which should be delivered in constructive form (Stickdorn et al. 2018). An empathy map is a method to create empathy towards the desired group of people and understand them and their context. An empathy map commonly has six fields: think and feel, see, say and do, hear, pains, and gains. These fields are filled based on research, such as interviews or observations from the target group's perspective. (Curedale 2013.) The me-we-us method acted as a foundation for most feedback sessions. The participants were first asked to write down their own remarks to the feedback question either on sticky notes straight to the Miro board or by pen to paper if they were having technical issues or otherwise preferred this method. Then each participant was asked to go through their remarks so that the author as the facilitator could write them down to the shared Miro board, grouping the sticky notes simultaneously. The green and red feedback was used to understand the professionals' own experience of the service. The feedback questions were formulated so that they could first ask any clearing questions, then give concentrated and constructive feedback on issues they found positive or supporting and issues they found negative or inhibitory. The professionals were also asked to provide any development suggestions to the service based on their experiences. The empathy map was adapted and used with the aim to understand the healthcare patients better as there was no direct access provided to them due to ethical policy standards. The professionals were asked to use the empathy map fields as a foundation to collect observations of the patients both during the receptions and outside them.

During the initial pilot period, the feedback sessions focused on the professionals' general experience of the service and taking it to use. Even though the information security assessment prevented the full adoption of the service, it was nevertheless possible to collect initial views and experiences of the patients as the professionals introduced the service and the pilot to them. Based on their previous tests and experiments, Medified had developed communication materials to support the adaptation of the service by the healthcare professionals and the deployment of the service to the healthcare patients. The communication materials were further tested during the initial pilot period as a part of the service concept. The feedback collected from the professionals was used to further develop the material to better answer the needs and use context of both the healthcare professionals and the patients.

4.1.6 Identifying the gaps and defining the problems

As the mandatory information security assessment issues continued longer than initially expected, the whole pilot and the service design process were further adapted to the existing conditions. Thus, the latter part of the initial pilot period was focused on analyzing and making sense of the understanding gathered during the first stages of the pilot and narrowing down the feedback from general experience to the deployment of the application to the patients. This had been previously recognized as a crucial phase of the service both from a customer experience and service process perspective. The insights gathered during the pilot process supported the prior identification of the deployment as a gap in the service process. As it became more apparent that due to the information security assessment issues, the pilot could not be completed during the initial agreed period, this was seen as an opportunity by the design team to improve the Living Lab pilot process. Thus, another focus area of the second phase of the initial pilot period was identifying and defining issues concerning the general pilot process that was deemed necessary to achieve the pilot's goals. The facilitation and service design methods used during the latter part of the first diamond and the initial pilot period were similar to the first part. For example, resembling the green and red feedback method, the professionals were asked to identify both inhibitory and supporting factors concerning the deployment of the application based on their user experiences so far and to provide ideas for the development of the service.

Based on the interviews and the feedback collected in the first part of the initial pilot period, the design team was able to identify several gaps in the customer experience of the healthcare professionals, which were validated collaboratively with the customers. First, the general challenges related to their experience were summarized into three main themes (figure 24). However, it must be noted that the patient's experience heavily affected the professional's experience, as the service was intended as a tool for collaboration between the two actors. The design process was also adapted following agile guidelines so that many issues risen during the feedback sessions were aimed to be solved as quickly as possible in order of priority already during the initial pilot period. Second, in co-creation, the customers and the design team were able to profile potential users for the service to facilitate the challenges related to the deployment of the service from the healthcare professionals to the patients categorizing the patients into three sections, portraying them through supporting or inhibiting traits (figure 25). The potential users were an adaptation of the persona method used in service design to depict a group of users through an archetype, who share common characteristics, such as goals, motives, and behavioral patterns in general or related to a specific context or service. The personas enable the identification and empathy through a description of an individual that applies to a larger group of people, which allows for scaling up design solutions. (Curedale 2013; Tuulaniemi 2011.) However, the potential users were not

full personas, since due to lack of direct access to the patients, there was not sufficient information available to create them.

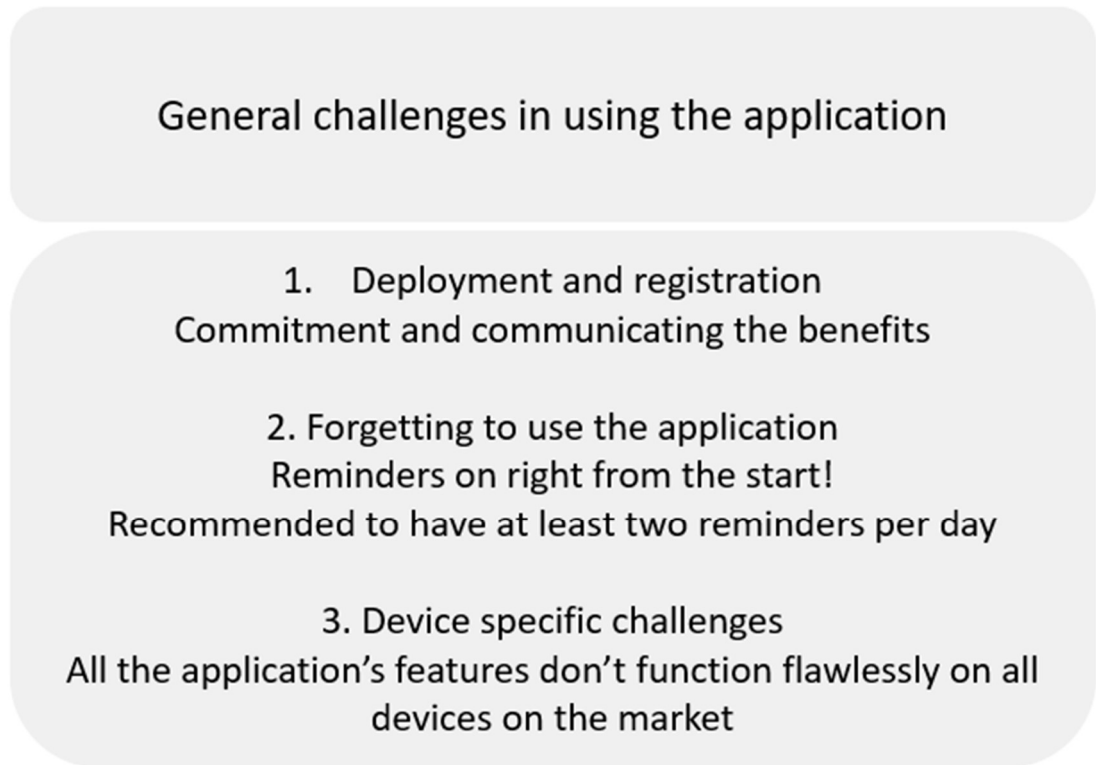


Figure 24: Summary of general challenge or the customer experience

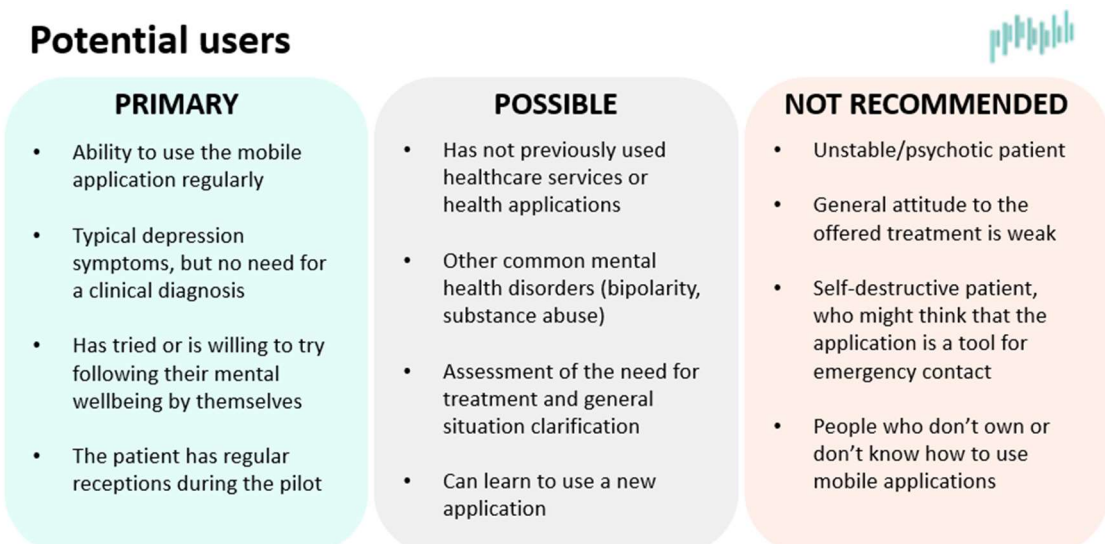


Figure 25: Potential users of the service

Based on the understanding gathered during the initial pilot period, the design team and healthcare professionals were able to consolidate several perspectives of the pilot process as well. The problems were defined and divided into two general categories (figure 26). The defined problems were re-framed during a facilitated discussion to How might we questions to form a basis for co-creative ideation. How might we questions is a method based on research and insights to rephrase them to a question format. They may focus only on the defined challenge or include the target of the ideation and their motives, goals, and needs, which the service aims to fulfill or achieve. It is important that the questions leave enough room for creativity but give focus and direction for the ideation. (Penin 2018; Stickdorn et al. 2018.) In this case, the questions were created to encompass the pilot process from the professionals' perspective and the service process development from the patients' perspective, considering the needs and motives they had expressed to the healthcare professionals. The problem definition and re-framing can be seen to have concluded the initial pilot period. In general, despite the issues concerning the whole pilot process and especially the unforeseen prolonged bureaucratic steps and mandatory information security assessment, the results of the initial pilot period as all the involved stakeholders agreed that the starting point of the new pilot was much better than the initial pilot.

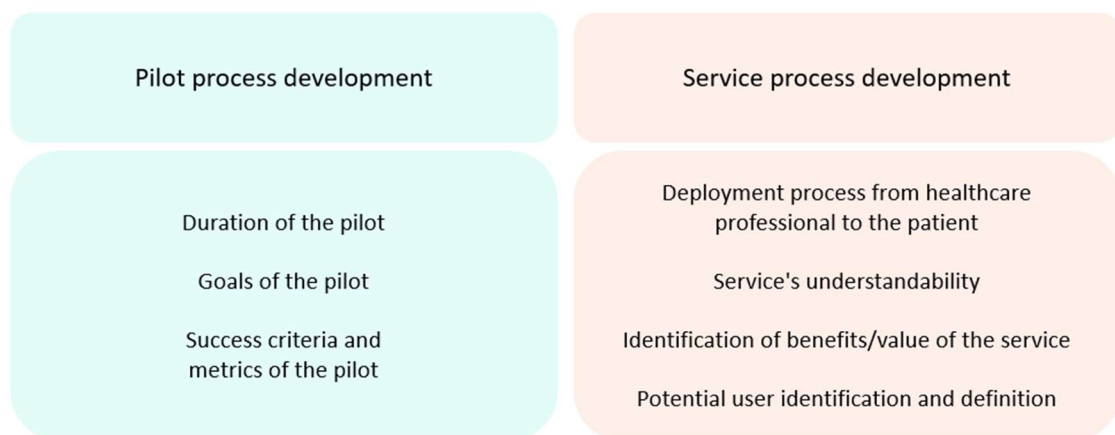


Figure 26: The defined problems

4.2 Second diamond: develop, test, and evaluate

In this subchapter, the second diamond of the service design process is discussed. First, the stakeholders co-created ideas developing the service concept further. Second, the co-created solutions were taken into testing from the start of the second pilot period, and the service concept was evaluated by the healthcare professionals. Third, the developed service concept was further embedded in the customers' activities and context. Last, the whole pilot was evaluated at the end of May, which concluded the pilot process.

4.2.1 Ideation and concept development

The second diamond can be seen to have started at the end of the initial pilot period when the defined and re-framed problems were presented to the healthcare professionals to be co-creatively solved in the last stage of the initial pilot period. In addition to a separate ideation session, the development approach adapted for the pilot emphasized generating ideas as they appeared during the feedback sessions throughout the whole process. Stickdorn et al. (2018) highlight that these ideas can be useful, and thus they must be stored and revisited. The ideas that emerged during the initial pilot period had been collected to the Miro whiteboard, and thus they were easily accessed by the design team and the participants of the pilot. The implementation of the development approach followed the process depiction (figure 5) of Bocken and Snihur (2020), where ideation has a more considerable emphasis before the experiment design and testing phases, which were the main focus of the development project.

During the actual ideation session, the healthcare professionals ideated solutions for the re-framed problems, and the best ideas were selected as solutions to be applied during the new agreed pilot period, which was decided to start after the Christmas holidays at the beginning of January 2021. The applied ideation method did not follow any particular design method but instead was based on the previously used me-we-us method, where each participant ideated their solution to the re-framed problems. The ideas were presented one by one, combined and evolved through facilitated discussion, and the most potential ones were chosen for further development.

Based on the results of the first diamond and the following ideation, several changes were made to the service process related to the customer experience and the overall pilot process (figure 27). The design team also visualized two journey maps: a new service journey map (figure 28) to aid the deployment of the service and a service concept map (figure 28) depicting the outlines of the new deployment concept and the following treatment process. A journey map is a standard service design method that commonly describes the customer's path as they use the service, and it is based on the touchpoints describing the encounters between the customer and the service. Journey maps are often used to depict the whole service concept as an entity, but they can focus on particular parts of the service as well, depending on the goals they aim to achieve. Maps can only give the customer's perspective, but they can include other actors, environments, objects, and channels related to the service as well. (Stickdorn et al. 2018; Tuulaniemi 2011.)

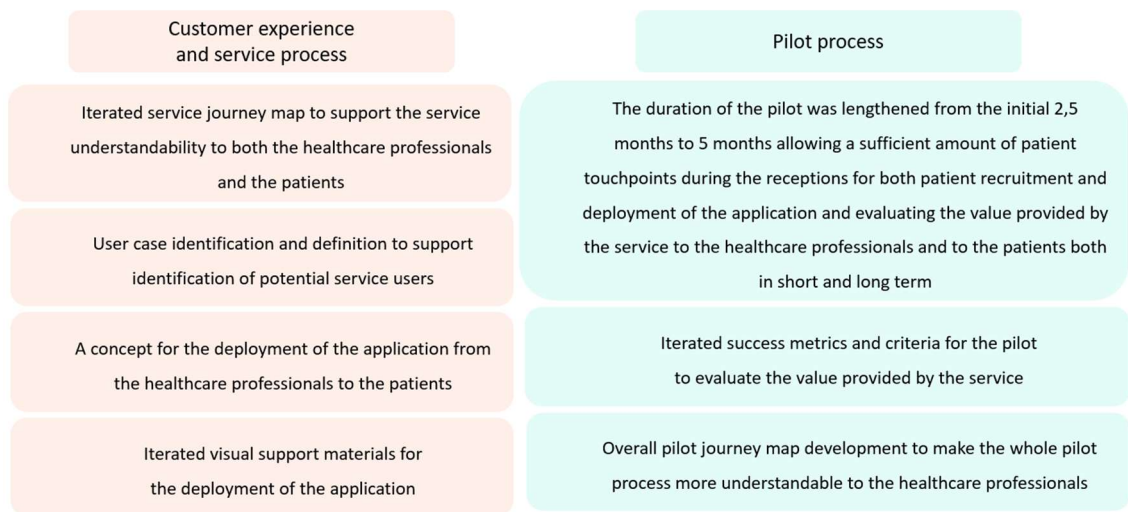


Figure 27: Co-created changes to the customer experience, the service process, and the overall pilot process development



Figure 28: Service journey map

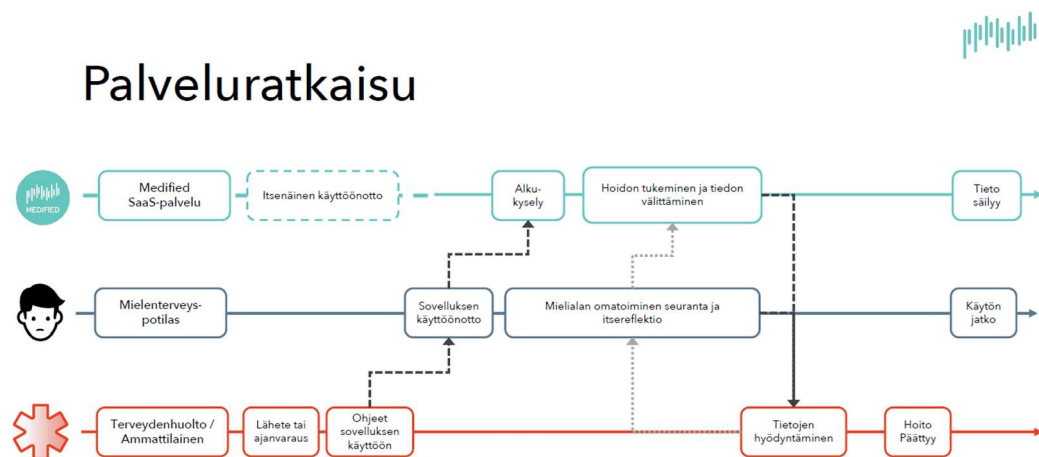


Figure 29: Service concept map

The development phase's emphasis in the applied service design process was in testing the developed ideas, solutions, and concepts in a real-life context during the second part of the pilot process, which lasted from January to May 2021. The used service design methods followed the same principles as during the initial pilot period, and feedback was gathered during co-creative feedback sessions with the healthcare professionals every two weeks. The concept and prototype development followed the idea of prototyping loops and iterative nature of the process, where each round of prototyping should have a clear structure and goal following the pattern of prototype building, testing the prototype and synthesis and analysis (Stickdorn et al. 2018). Due to the feedback structure, the concept of prototyping was heavily adapted for the pilot process following the principles of the lean startup Build-Measure-Learn loop as described in subchapter 2.4. and the description of Penin (2018) where the service features are iterated, the modifications tested, and the focus can be on different channels and touchpoints at various stages during the pilot. The applied development approach enabled the improvement of both technical aspects and broader aspects of the service in parallel.

During the initial stages of the second pilot period, feedback was gathered mainly on the healthcare professionals' overall customer experience and focusing on specific touchpoints and solutions of the service at a time. Feedback was collected on the co-created solutions and improvements to the service process, such as the concept for the service deployment from the healthcare professionals to the patients, including the visual support materials, the service journey map, and the identified potential users. Regarding the user experience, the results of the real-life context tests were varied. For example, the new deployment concept and the supporting communication materials received in general positive feedback. Additional pain points were also discovered, especially concerning the service's potential users, which made it clear that a uniform deployment concept was very challenging to develop as the

needs and situations of the patients were very individual, and their contexts varied significantly. The technical features of the service were examined using the green and red feedback method. They received positive notions, especially concerning the general ease of use, enabling reflective touchpoints for the patient. Additional development issues were also gathered supporting partial customization of the service according to the patient and enabling following long-term development of the patient's wellbeing.

The benefits of using the service were collected separately to assess the value of the service. In addition, all the feedback gathered so far during the pilot was analyzed, clustered according to the affinity diagram method to thematic entities, and labeled. The feedback clusters were then compared to the value expectations analyzed during the design research to see how well the service had matched the value expectations and challenges (figure 30). This created an understanding of how the value of the service had emerged during the pilot so far as the professionals had gained more extensive customer experience of the service. The comparison results were positive as the service matched the value expectations very well, and additional value had emerged besides the original expectations.

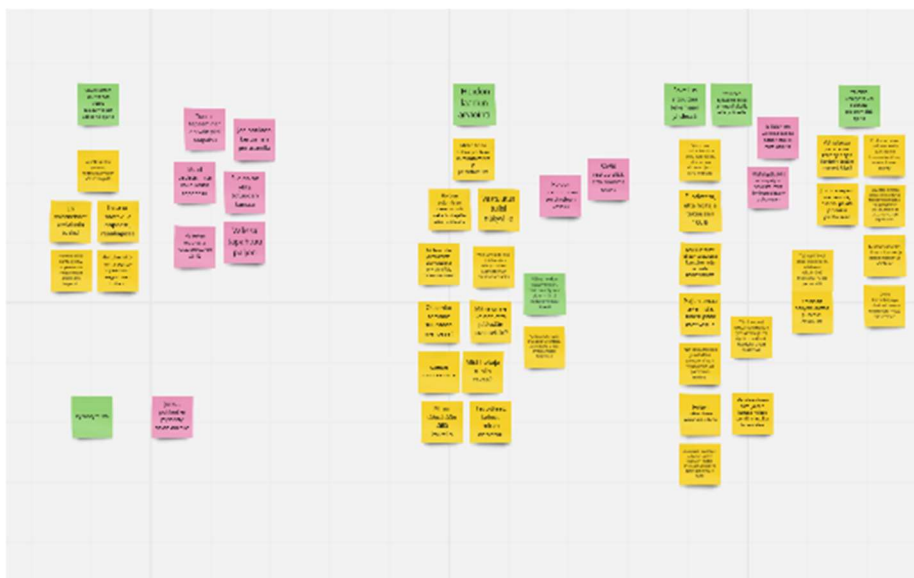


Figure 30: Sample of the value expectations and challenges affinity diagram

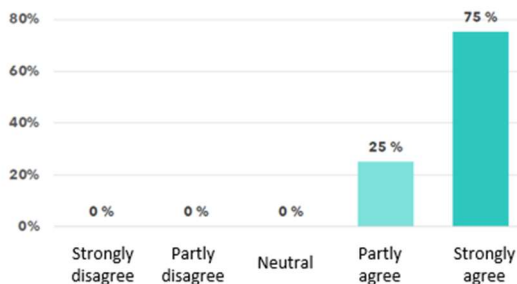
4.2.2 Mid-evaluation

As the pilot process advanced, the focus shifted more to collecting both quantitative and qualitative feedback to support evaluating the developed solutions and concepts. In addition, feedback was collected on the pilot process to ensure that the changes made after the initial pilot period were correct and sufficient. Quantitative feedback was collected twice. The first questionnaire was addressed to the healthcare professionals in February 2021. The second questionnaire was addressed to both the professionals and the patients at the end of the whole pilot process in May 2021. The criteria for the questionnaire forms were co-creatively developed and iterated by the design team based on the feedback and insights gathered during the whole development process. The first questionnaire was deployed to the eight professionals participating in the pilot during the second pilot period. The low numbers of respondents affect the validity of the results, especially as they were presented by percentages. Using fractions to present the results would have been more justified.

The results of the quantitative evaluation and initial qualitative evaluation (figure 31; appendix 2) were presented by the design team to the lead of the healthcare organization’s administration in February 2021 as they were responsible for the decisions of the final implementation of the new service to the organization based on the pilot. The feedback discussion with the administration’s leadership focused on creating a shared understanding of the value from both the healthcare professionals’ and the patients’ points of view based on the results of the feedback sessions and the mid-evaluation data. The qualitative results can be summarized in that the application increased the impact of the treatment, supported the patient’s self-reflection, and helped to identify factors influencing the wellbeing. In addition, the value drivers of the leadership of the administration were discussed and compared to the value that emerged as defined by the customers of the service.



The application is easy to use



The deployment of the professional’s application was easy

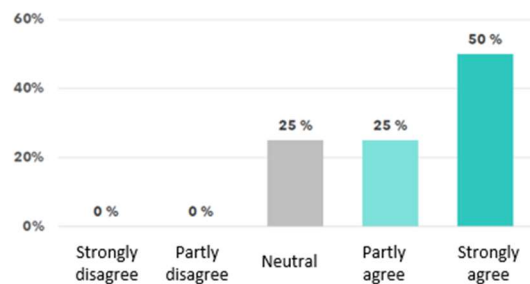


Figure 31: Sample of mid-evaluation quantitative data

4.2.3 Embedding the service

After the mid-evaluation, the concept development was continued with a focus on the deployment concept. Despite the overall positive evaluation results, the metrics of the deployment of the application from the professionals to the patients were still not promising, and the pain points discovered during the feedback sessions supported the metrics. The low deployment numbers posed a threat for achieving the goals and the overall success of the pilot as based on the number of patients using the service, and it seemed that the value of the service could not be evaluated on a satisfactory level at the end of the pilot. The developed deployment concept and the visual support materials were collaboratively reiterated with the professionals. A shared decision was made to test a new deployment concept during a limited period. The new concept proved successful, and the user number metrics rose quickly to satisfactory levels.

In addition to developing and assessing the new deployment concept and the developed features, such as the trend of following the patient's wellbeing in long-term, the focus of the last phase of the pilot process was to co-creatively identify use scenarios and ways to embed the new service into the work context of the healthcare professionals. The identified use scenarios (figure 30) enabled prototyping of the experience from a holistic perspective, emphasizing the importance of the customer's own experience, as active customer participation has to be highlighted. (Ruuska et al. 2011.) As the professionals were able to gain more experience using the service, the design team collected user stories from the professionals to support the evaluation of the customer experience and the value of the service. Storytelling is a design method that is suitable especially for the evaluation of a holistic experience in a real-life context. The stories can convey the different values of the service and validate the functionality of the service in its real environment, making visible the details that form the service experience. They also highlight the collaboration between people and bring forth the integration of different resources. (Miettinen & Koivisto 2009; Ruuska et al. 2011.) Several user stories were collected and shared amongst the professionals during the feedback sessions to create a shared understanding of the value of the service and potential use scenarios of the service in the work context. The storytelling method enabled evaluating the value of customer experience by combining both the patients' and the professionals' views in the stories.

In addition to the previous feedback sessions, the activities related to the treatment and the use of the service were discovered during a feedback session where each professional was asked to describe their practices before, during, and after the reception situation with the patient. In addition, the professionals told how they had embedded the new service so far during the pilot. The facilitated discussion created a shared understanding of the individual practices and ways of embedding the new service to the reception encounters and the whole

treatment process. Based on the feedback session, the healthcare professionals and the design team jointly co-created a shared holistic model based on scenarios of applying the new service (figure 32). Scenario-based design visualizes the service concept, creating a narrative from the user's perspective. Scenarios are a tangible form of the service's use but are still easy to iterate, bolstering engagement and participation. (Miettinen & Koivisto 2009). The scenarios created a shared understanding of the service concept, which all the professionals agreed to attempt to adapt to their treatment processes and work context practices during the final stages of the pilot process. The use of scenarios and user stories were integral methods in embedding the service.

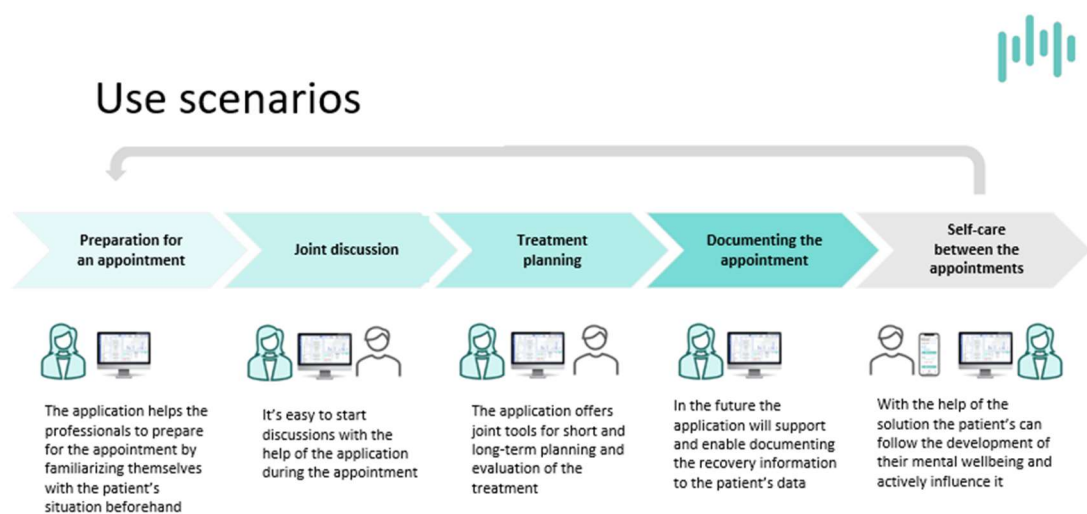


Figure 32: Use scenarios of the service

4.2.4 Final evaluation

The second pilot period ended in May 2021, and the final feedback sessions were used to collect quantitative feedback and evaluate the actualization of the value expectations co-created earlier and iterated during the whole process.

The second questionnaire was sent to eight healthcare professionals, of which five answered, and to 21 patients, of which nine answered. The numbers affect the validity of the quantitative data, but it complemented the qualitative data, nevertheless. The affinity diagram method was used again to collect, cluster, and analyze the various developed features, touchpoints, and channels of the service and the holistic service process, analyzed, and evaluated through the feedback. The diagram enabled labeling and identifying the different ways value of the service was defined by the internal customers and by the patients as the external customers as viewed by the healthcare professionals as there was no direct contact to the patients.

The results of the feedback and the questionnaire (figure 33; appendices 3 & 4) were used to evaluate the customer experience of the service and how the conclusions of the pilot were presented to the leadership of the administration at the end of May. The discussion was focused on the customer experience of the healthcare professionals and the value of the service as they had perceived it. The metrics presented were based on the user stories, the co-created use scenarios for the service, the quantitative feedback collected, and the qualitative benefits of the service collected during the pilot. The patients' customer experience and value were presented through the quantitative data and qualitative feedback based on the questionnaire, which included both numeric evaluation and open feedback concerning the service. The qualitative data can be summarized in that the application gives the patient a feeling that they are taken care of, that the service helps to prepare for the appointment, the visualization helps project wellbeing and change, the information is reliable, and that it enables discussion and recollection helping to focus on the essential issues and leaving more time to the appointment. Based on the data, the patients had reflected their wellbeing proactively and can influence their wellbeing and achieve a feeling of control.

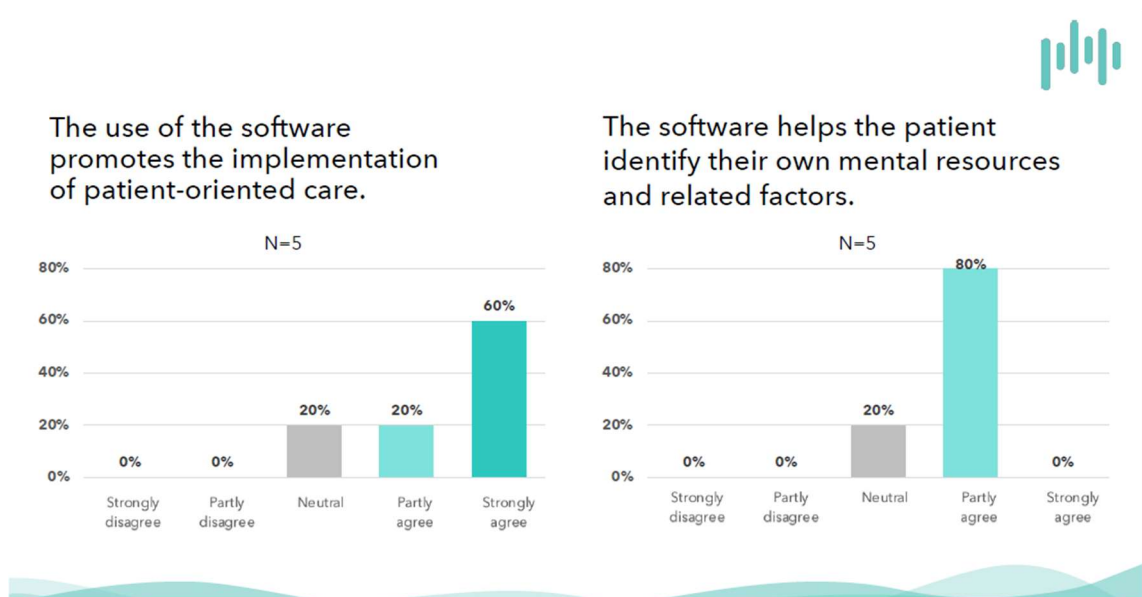


Figure 33: Sample of the quantitative data from the professional's perspective

The results based on all the metrics were very positive. For example, both the professionals and the patients gave the service an NPS score above 8.3., though the relatively low numbers of respondents should be considered. The use of both qualitative and quantitative metrics enabled the evaluation of the healthcare professionals' holistic customer experience, which was complemented by user stories enabling understanding the value as emerged through the professionals' activities, processes, and context. The evaluation of the patients' experience and value was not as comprehensive as it was primarily based on the questionnaire and as

perceived by the healthcare professionals. Still, it nevertheless complemented the overall evaluation data well.

4.2.5 Concluding the development process and implementation of the results

The development process of the thesis ended in a joint feedback session in June 2021 between all the relevant stakeholders of the pilot, where the author presented the service design process adapted to the Living lab pilot structure, the principles of the development approach and how they were applied, and the different methods used during the process. After the concluding discussion of the development project, the case company, and the leadership of the administration of the healthcare organization evaluated the success of the pilot and discussed the potential implementation of the service, but this part was excluded from the thesis' scope.

The results of the thesis were deemed as successful by the case company whose representative gave the author the following testimonial of the development project:

During our cooperation, [the author] showed that he has an excellent ability to systematically plan and promote professional-level service design working methods as well as facilitate insightful workshops with different stakeholders. He proactively sought solutions to the occurring problems and, by doing that, promoted the achievement of the common goals of the project. Thanks to these actions, we were able to identify current challenges and develop the service as a whole which eventually led to the successful completion of the project with excellent results.

- Valtteri Korhikoski, CEO & Co-Founder at Medified Solutions Oy

The results of the thesis have been implemented by the case company to further develop the service in the following pilot processes. The depiction of the professional's workflow and model of applying the service have been developed further (figure 34) and are currently being used to train new professionals and to explain the possibilities of using the service in collaboration with the patient. The co-creation model developed and iterated during the development project of this thesis is utilized in currently ongoing similar projects, and they are always proposed to new customers of the service, and the proposals are mostly accepted. The collected feedback is being utilized in developing the service software further as new features are being added. In conclusion, the results of the thesis helped the case organization to develop the service's deployment concept and methods for collecting continuous feedback. The results strengthened the design thinking process of the company and gave practical tools and methods to implement it.

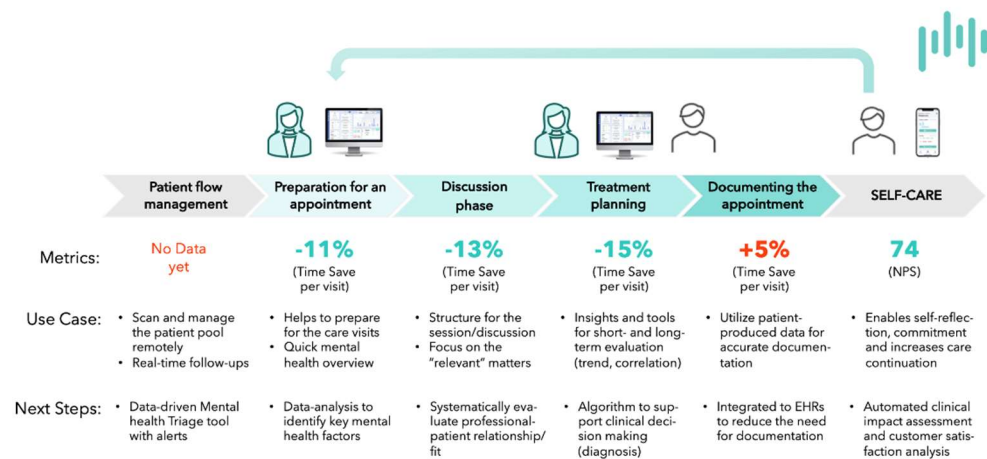


Figure 34: Developed use scenarios

5 Conclusions and discussions

In this last chapter of the thesis, the theoretical framework is reviewed, and the results of the thesis are concluded first by answering the four research questions that have guided the development project. Next, the research process and its limitations are examined and reflected. Finally, the next steps are discussed from both the perspective of the developed service and the theoretical transferability of the results. In general, it can be concluded that the thesis contributes to evolving a development approach based on service design principles and methods to developing a new service in a Living Lab environment. The theoretical framework of the thesis consists of the co-creation of value and the concept of value according to service-dominant logic and customer-dominant logic; the characteristics of holistic customer experience and the evaluation of the value of a customer experience; Living Labs as a development environment for services and innovation processes; and lean startup theory and the complementary possibilities of lean startup and service design approaches. The development work focused on understanding the healthcare professionals as the internal customers of the service, their work context, and activities, and value expectations of the service, the co-creation of the new service, and the evaluation of the service.

5.1 Research questions, answers, and final results

In this subchapter, the answers to the four research questions are summarized. Additionally, the final results in relation to the purpose and aim of the thesis are examined. As described in subchapter 1.3, the purpose of the thesis was to improve the customer experience of a new service in a public healthcare context, and the aim of the thesis was to apply a service design approach to the pilot process to co-creatively improve the customer experience, and an develop an improved late-stage prototype of the service.

The following research questions have guided the development process:

1. How to apply a process based on service design and lean startup principles in a Living Lab environment in a public healthcare organization?
2. How can the customer experience of the new service be improved to create incremental value during a pilot process?
3. What are the public healthcare professionals' value expectations of the new service, and how can the service be improved during the pilot to meet the value expectations?
4. How can the metrics for the evaluation of the value of the customer experience be developed during the pilot, and how can the customer experience be evaluated?

1. How to apply a process based on service design and lean startup principles in a Living Lab environment in a public healthcare organization?

The literature review gave the author insights into the Living Lab as a development environment which were further researched by interviewing the Living Lab coordinator to provide the author with an additional understanding of the specific context of the development project. The theories showed that the development process should aim to create value for all the involved stakeholders, and the users' needs, and motivations should be understood and considered to achieve this aim. To achieve this, the users were allowed to develop the service within their context to determine whether the service provides value. To fulfill the principle of value, the needs should be actualized through the innovation process implemented in the real-life context. (Bergvall-Kåreborn et al. 2009; Ståhlbröst 2012.) According to SDL, the value creation process occurs in the interaction between the customers and the service provider, and the customer has an active role in the value creation (Vargo & Lusch 2004). These theories supported the implementation and facilitation of the SD approach, which enabled the formation of deep customer understanding and a co-creation process. The service provider created an experience environment for the interaction and co-creation (Prahalad and Ramaswamy 2004) and supported and facilitated the value-creation process (Grönroos 2006), providing a possibility for an active role for the customer. In addition, the principle of influence affected the development process. The application of the SD approach aimed for equal participation between the stakeholders, with a clear emphasis on the healthcare professionals as the service's internal customers, treating them as experts of their domain and founding the process on their needs. The co-creation methods and facilitation motivated and empowered the customers to participate in the process. The principle of realism was fulfilled by conducting the development process in a real-life context, and the SD approach provided an understanding of how the service is integrated into the customers' context through their actual experience. As described in subchapter 2.3, each

implementation of a LL requires a structure and co-creation methods that are suitable for the particular circumstances and context. (Bergvall-Kåreborn et al. 2009; Ståhlbröst 2012.) The public healthcare organization set limitations to applying the SD approach. There was no time for individual interviews, and each feedback session was only one hour long, and often multiple issues had to be covered during one session. Hence, the SD approach was adapted to the LL environment taking into account the relevant factors.

The co-creation methodology was adapted and implemented based on the service design development approach and complemented with the principles of the lean startup methodology as it formed the foundation for the development of the service created by a third-party startup. As described in subchapter 2.4, the lean startup has been criticized for several reasons, and the complementary potential of design thinking, service design, and the lean startup has recently been discussed in the management literature. The discussion on how to combine lean startup and service design and apply service-dominant logic through the adaptation of these methodologies guided the author in applying the principles of both development approaches throughout the project with an emphasis on service design theory and methodology. As theories concerning lean startup and service design suggest, the stakeholders' expectations were considered early in the process to frame the context and strengthen the engagement of the customers in the development process (Bocken & Snihur 2020). The starting points were in comprehending the customers' activities and how the service provider could support those. The customers were systematically included in the process through the application of the SD approach, and the iterative process was founded on learning based on qualitative and quantitative feedback. (Ojasalo & Ojasalo 2018b.) As according to Mueller and Thoring (2012) the development approach provided a structured framework of methods to identify and analyze the customers' needs, and to provide arguments and information for pivoting measures. The SD approach had an emphasis on properly researching the customers' context, as Grimes (2019) suggests, supporting the process with tools and techniques throughout the process, and recognizing the value based on research and co-creative prototyping. The constant interaction with the customers reduced uncertainty and decreased the risk of failure of the pilot and achieving its goals. The development process enabled the recognition of the value that was based on design research, co-creation, and prototyping and formed around understanding what learning was needed, defining problems, building experiments, measuring the activities, and learning (Bocken & Snihur 2020).

2. How can the customer experience of the new service be improved to create incremental value during a pilot process?

The theoretical framework set the foundation for the improvement of the customer experience giving the author insights on different definitions and perspectives on the concept. Through the literature review, it became clear that customer experience is comprised of several characteristics which have to be taken into account when developing the experience. As discussed in subchapter 2.2, the touchpoints of a service (Gentile et al. 2007; Löytänä & Kortesoja 2011), the temporal nature (Golding 2018; Heinonen et al. 2010), and multiple dimensions (Bolton 2016; Saarijärvi & Puustinen 2020) all affect the formation of a holistic experience. The literature reviews on SDL and CDL theories provided the author a theoretical framework for the connection between co-creation and value (Vargo & Lusch 2004), the need for a holistic understanding of the customer's context, and how value emerges through the customer's experience (Heinonen et al. 2010). The adaptation and implementation of a SD approach to the pilot allowed for the co-creation of value between the customers and the service provider. The design research gave the author a deep understanding of the factors influencing the customer experience and the context and activities of the healthcare professionals. The research was not limited to the early stages of the design process but continued throughout the process through the feedback sessions. The SD approach applied systematically throughout the process enabled the consideration of the healthcare professionals' customer experience's different characteristics. Key elements were the customer's systematic involvement by a structured framework of co-creation and qualitative feedback methods and the empathy and rapport built between the author and the customers through continuous facilitation. The facilitation of the feedback sessions allowed for observing the different characteristics influencing the experience, such as emotions and behavior and both subjective and intersubjective factors.

The iterative nature of the process and the development methodology applied to the pilot process offered possibilities to develop and test different features and touchpoints of the service at a time. The SD approach combining service design and the lean startup-based Build-Measure-Learn loop (Ries 2011) with an emphasis on the customer's systematic inclusion through service design methods (Ojasalo & Ojasalo 2018b) permitted the design team and the service provider to develop the service throughout the pilot process so that it created incremental value during the development project. The holistic customer experience was continuously co-created and evaluated in the course of the process. The SD approach allowed the customers to define the value and create a shared understanding of its perception between the involved stakeholders. The customer experience was improved by considering the relevant factors influencing the formation of the experience and forming an iterative, cyclical process that enabled the involvement of the stakeholders and supported collective learning (Bocken & Snihur 2020). The learning guided the development of both technical

features and the service process, creating a shared understanding of what actions should be taken at each stage of the development project to enable the continuous improvement of the customer experience and the creation of incremental value.

3. What are the public healthcare professionals' value expectations of the new service, and how can the service be improved during the pilot to meet the value expectations?

The critical factor regarding the third research question was the application of ethnographical methodology during the development process. The need for applying methods to create a deep understanding had become clear through the literature review, as suggested, for example, by Grimes (2019), Ojasalo & Ojasalo (2018b), and Bocken and Snihur (2020). The design research and especially the in-depth interviews provided the author an understanding of the healthcare professionals' value expectations of the new service. The value expectations can be summarized in that the service provides information to the professionals between the receptions, acts as an instrument to evaluate the quality of the treatment, supports the patients' self-reflection and the analyzing and active re-construction of positive days for the wellbeing of the patient, it provides a tool for working together and commits the patient and the professional to collaborate and acts as a tool in the transition towards digital services. The understanding and the insights on the value expectations guided the development process of the service concept already from the early stages of the project.

The literature review made it evident that the management, evaluation, and validation of the customer expectations are essential (Saarijärvi & Puustinen 2020). As such, the application of the service design process and supporting principles of the lean startup during the pilot enabled a continuous evaluation and development loop through the customer feedback of how the late-stage prototype of the service matched the value expectations. The SD approach based on empathy and deep interest towards the healthcare professionals throughout the development process engaged the professionals to test the co-created solutions enabling the iteration and providing the design team with actionable metrics as proposed by Ries (2011). The metrics guided the development of the service by assessing the value hypothesis based on the value propositions and the value expectations. The applied co-creation methodology allowed for rapid development cycles to improve both the service processes and the technical aspects in parallel to form an improved holistic customer experience. The continuous collaboration either ensured that the improvements were correct or provided information to pivot and iterate. The SD approach enabled the validation of the value expectations throughout the development project by revisiting the qualitative data and insights formed in the early stages of the process, verifying that the right actions had been taken in the development of the service concept to match the value expectations.

4. How can the metrics for the evaluation of the value of the customer experience be developed during the pilot, and how can the customer experience be evaluated?

As described in subchapter 2.2, evaluation of a customer experience is a challenging task (Ruuska et al. 2011), but it was a pivotal factor for the success of the development project. First, the purpose of the thesis was to improve the customer experience of the new service, which required the development of metrics to evaluate the experience. The metrics were developed based on the theoretical framework of the characteristics of a customer experience and on the theories of how experience can be assessed, as discussed by Löbler and Hahn (2013) and Tuulaniemi (2011). Based on the theories of SDL and CDL, the development process applied a combination of both qualitative and quantitative metrics as the first have proven to be essential in providing the design team understanding on how the value is perceived by the customers (Nenonen & Storbacka 2018) and how it emerges through their activities (Heinonen et al. 2010). Quantitative metrics were developed based on the co-creation activities during the feedback sessions to reflect how the customers defined and perceived the value of the service based on the characteristics of customer experience. The quantitative data was based on a relatively low number of respondents but contributed to the overall evaluation, nevertheless. The quantitative metrics and the NPS score measurement complemented the qualitative metrics and served the purpose of the thesis by evaluating the customer experience twice during the second pilot period.

Second, the goals of the pilot were to gain practical experience of the use of the MEDIFIED solution in a clinical healthcare context and to develop the solution and the treatment process. The goals also included examining the suitability of the service to the context of the public healthcare organization, and the pilot aimed to provide data to support the decision-making on the potential implementation of the service to the healthcare organization after the pilot. These goals guided the development of the metrics. They provided information to the service provider on what actions should be taken to develop the service and the value-in-use and value-in-context of the service, and how further value can be co-created. Both the qualitative and quantitative metrics were also developed to provide the healthcare organization with the correct information to assess the implementation potential of the service. The qualitative metrics were initially based on the value propositions of the service provider and the value expectations researched during the early stages of the process, which formed the value hypothesis of the service. The metrics were evolved continuously throughout the project as the customers gained broader use experience of the service and could thus evaluate it from different perspectives. The qualitative metrics were used to prove that the customer experience was improving during the development project. As they were based on a continuously evolving understanding of how the service was becoming embedded in the customers' context and how the value was emerging (Heinonen et al. 2010), the

qualitative metrics enabled the assessment of the value hypothesis from different perspectives. The applied SD approach ensured that the metrics were relevant to both the service provider and the customer and communicated the next actions to be taken to improve the service as described by Parmenter (2019).

The combination of qualitative and quantitative data and metrics was used to gain a holistic understanding of the customer experience. The different characteristics were considered assessing the customer experience through, for example, storytelling methods as suggested by Ruuska et al. (2011) and co-creating a shared understanding of the service process, which was also evaluated, as proposed by Tuulaniemi (2011). Summarized qualitative and quantitative data were presented to the leadership of the healthcare organization administration to support the decision-making on the service's implementation. The applied SD approach thus enabled the development of the metrics and the evaluation of the customer experience.

5.2 Evaluation of the research and lessons learned

In this subchapter, the development and the research process are reviewed from different perspectives: the suitability of the service design approach as a development method for new services in the Living Lab environment; the effects of the COVID-19 pandemic and executing the process remotely on the process and methods used.

Piloting new services developed by third-party startups in public sector Living Lab environments offers an interesting context for implementing service design as a development approach in the future. Startups are a growing field of business in general and offer great potential as an actor for the development and digitalization of public services. The Living Labs in the public sector aim to offer real-life contexts for developing new services and solutions and require suitable methodology and structures to create value for all the involved stakeholders and fulfill their other principles. The implementation of service design principles and methods required constant application and adaptability from the author and the rest of the design team to direct the development project towards its goals and achieve the pilot process's goals from all the different stakeholders' perspectives. The adaptation proved to be the greatest challenge for the author as they had previously not applied a service design process to late-stage prototype development in a real-life context and most of the service design literature is more focused on developing new, innovative services or taking a different perspective of developing an existing service and this development project falls in between of the two more common applications of a service design process. However, the theoretical framework supported the author in creating an understanding of how the process should be adapted and which methods should be emphasized to achieve the best possible results during and after the development project.

The main limitation of the research was the lack of direct access to the patients. The customer experience of the service is based on the interaction between the healthcare professional and the patient, and thus, engaging the patients in the co-creation process would have provided crucial information to develop the service. During the development project, the patient's perspective was provided only by the healthcare professionals and the final evaluation questionnaire, and it is undeniable that their inclusion from the early stages of the development project would have had significant benefits. A second limitation was imposed by not including the leadership of the healthcare organization's administration in the development process systematically. Their value expectations should have been researched early in the process to give further guidelines to the service's development. Further on, the limited timeframe and the author's inexperience as a service designer posed challenges in creating a shared understanding and a clear design brief with the client and agreeing on how the service design should be applied within the previously agreed Living Lab structure. The way of working was also novel to both the case company to some extent and almost entirely to the healthcare organization. In retrospect, the author could have used different service design methods during the process, such as identifying gaps in the service, ideating solutions, and creating an understanding of the patients' perspective. Nevertheless, the results were very positive both during and at the end of the process, and as such, the application of the service design approach can be considered successful, and the lessons learned can be applied both in the future development of the service by the case company and improving the Living Lab processes of the public healthcare organization.

The issues concerning validity are a part of the limitations of this research, which should be acknowledged and examined. The first issue is the research questions, which can be challenged. The lean startup and service design theories could have been examined more thoroughly, and especially applications of SDL and CDL could have been included further to the theoretical framework, as these paradigms form the backbone for the formulation of the research questions. Improvement of the customer experience was the primary purpose of the thesis, yet the developed framework for the customer experience's evaluation was not so rigorous as it could have been. Further research on the evaluation of the different characteristics of customer experience could have been conducted to create a framework to assess the improvement. The development process was adapted to a specific context with specific participants, which affects the validity of the research as it is based only on one case example. Nevertheless, the results of the development project have been carried forward and implemented by the case company, strengthening the validity of the results. The researcher's personal bias affects the validity of the research as well, and it should be considered when examining the results. The author identifies a personal motivation to utilize a service design approach for development to the thesis' context. As, such it cannot be assumed that the conclusions and analysis are completely unbiased despite the author's efforts of being critical

of their own approach, considering at the same time that personal bias cannot completely be separated (Galdas 2017).

The effects of the COVID-19 pandemic on the development project are undeniable as all the interactions between all the stakeholders during the project were executed remotely. All the service design methods and the implementation of the principles had to be converted to a digital context. The application of a service design approach was challenging to the context in general. It was a new way of working to some extent for most of the actors involved, and the digital aspect and remote working multiplied the effect of these previous challenges. However, the author and the rest of the design team overcame these challenges by adapting the methods and facilitation to the customers' context to enable an experience environment and a platform for the co-creation of value. The purpose of the thesis was to improve the customer experience of the healthcare professionals, and the theoretical framework emphasized a deep understanding of their context and activities to enable the co-creation of value, and yet most of the context and activities were executed in a physical environment. This created a challenge to understanding how the healthcare professionals actually work and use the service in their context and what kind of activities are included, for example, the reception encounter with the patient. It would have been beneficial for the author to be able to observe the customers' physical context at various points of the development project. Creating and upholding rapport and engagement is also a challenging task in a digital environment. Still, the interviews at the early stages of the process and the facilitation methods used by the author proved to be successful in responding satisfactorily to these challenges. Nevertheless, the digital context proved challenging when attempting to apply service design methods, such as brainwriting and empathy map during the feedback sessions or independently by the customers, and as such, the methods chosen were limited to a few, and those were often simplified adaptations of the originals.

5.3 Final discussion, next steps, and transferability of the results

This subchapter discusses the future prospects of the thesis, including insights and takeaways for further development of the service and the transferability of the results.

The next steps in developing the service from the perspective of the case company have already been taken after the development project examined in this thesis. The results have been implemented and carried forward as described in subchapter 4.2.5; to summarize: the adoption of the service to new contexts has been improved by the developed features, such as the use scenarios of the service concept and the development approach based on co-creation has been utilized in ongoing projects and is proposed to new customers as a part of the service's development and adoption concept. The feedback collected during the project has been utilized to support the development of the different features of the software, and in

general, the results of the thesis have benefited the case company, especially to improve the deployment of the service and the methods of collecting continuous feedback supporting involvement of the design thinking process and offering practical methods to implement it. As such, it would be useful to research the current stage of the service, how it is being developed, how the results from this development project have been transferred to further pilots and experiments, and how the possible implementations of the service could be improved.

To further evolve the development approach, the possibility for directly researching the patients and involving them in the co-creation process should be examined, as their experience of the service is crucial to the overall value to all the related stakeholders and to further improve service concepts features. The development approach should be evolved to better understand the context, challenges, and activities of both the internal and external customers of the service. In addition to the customers, the other stakeholders related to the pilot should be included in the early stages of the development process. Especially, the preliminary research should be evolved to include the administration of the healthcare organization. This would give the design team a more accurate overall picture of the goals of the pilot process and the value-drivers of different stakeholders within the healthcare organization to better guide the overall development project and, in particular, the development of the evaluation metrics. The applied service design methods could be further evolved to support the development context and goals. For example, the use scenarios could be elaborated to a full-scale service blueprint and a customer journey providing perspectives on both the healthcare professional and the patient. Personas could be developed based on the design research depicting both professionals and patients.

The Covid-19 pandemic set restrictions to the co-creation methods and ways of working during the thesis. However, the facilitation methods and the use of virtual collaboration platforms, such as Miro and MS Teams, proved successful as the participants were engaged throughout the process and inspired by the use of new digital tools, despite inevitable challenges along the way. Nevertheless, the development process would benefit from possibilities for physical research and face-to-face interactions. The complementary nature of virtual and physical encounters and co-creation should be examined further to create the best possible practices for the future environments of developing the service.

The results of this thesis prove that actors piloting a new service should consider adopting a service design approach to gain a deep understanding of the service's customers' context, activities, value expectations, and capabilities. It has also been established that lean startup theory should be complemented with service design to create a holistic iterative methodology to develop a service. The role of the service provider is to facilitate the customer's value creation processes and to create experience environments for co-creation. The service

approach implemented, and the process facilitated in this thesis provided an understanding of the value perceived by the customers and how it emerges as the service is used and becomes embedded in the customer's context. These findings support similar future development projects as the importance of design research in the early stages of the process and building a co-creative framework for incremental development of a service and structure for continuously collecting and analyzing qualitative feedback have been confirmed. The results of the thesis can be transferred to further improve the lean startup theory and to support the discussion concerning the complementary nature of the lean startup and service design approaches, and to evolve new models for startups and similar actors for developing new services. The new models can be evolved based on this research to consider the holistic customer experience and how to develop actionable metrics to evaluate it. The thesis establishes an adoption of a customer-centric service design process to a particular context acknowledging its limitations, which can act as a foundation for similar development projects. The results of this thesis can help identify essential factors to applying SDL and CDL and combining them with the lean development approaches.

Finally, the thesis supports the improvement of Living Labs as environments by transferring knowledge to evolve new methodological innovation processes. Especially, this thesis supports the implementation of the principles of value, influence, and realism. Value is the connecting theme of all the sections of this thesis' theoretical framework. It has been established that applying the researched theories through a SD approach provides value to all the stakeholders, even though the methodology requires further development. The principle of influence was realized by applying the SD approach as well, and future implementations of Living Labs can use this thesis to support the understanding of choosing the right methodology fitting their circumstances and context. The understanding of the fulfillment of the sustainability principle was affirmed by the thesis by providing new learning and supporting further avenues for further research on the topic.

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Figures

Figure 1: Healthcare professionals' desktop application and healthcare patients' mobile application.....	8
Figure 2: Characteristics of customer experience	19
Figure 3: Living Lab principles	23
Figure 4: Build-Measure-Learn feedback loop	27
Figure 5: Framework for Lean startup	28
Figure 6: Lean Service Innovation	29
Figure 7: The theoretical framework	31
Figure 8: Service design principles.....	35
Figure 9: Principles of the framework for innovation	36
Figure 10: Comparison of different service design processes	37
Figure 11: Scope of the thesis	44
Figure 12: The initial pilot period	45
Figure 13: The second pilot period.....	45
Figure 14: Journey map.....	47
Figure 15: Service concept draft	48
Figure 16: Storyboard	48
Figure 17: Early-stage prototype of the infographic.....	49
Figure 18: Late-stage prototype of the infographic	49
Figure 19: Test analysis.....	50
Figure 20: Journey map.....	51
Figure 21: Final version of the infographic	51
Figure 22: Evaluation of the sprint.....	51
Figure 23: Sample of the affinity diagram used for interview analysis	55
Figure 24: Summary of general challenge or the customer experience	60
Figure 25: Potential users of the service	60
Figure 26: The defined problems.....	61
Figure 27: Co-created changes to the customer experience, the service process, and the overall pilot process development	63
Figure 28: Service journey map	63
Figure 29: Service concept map	64
Figure 30: Sample of the value expectations and challenges affinity diagram	65
Figure 31: Sample of mid-evaluation quantitative data	66
Figure 32: Use scenarios of the service.....	68
Figure 33: Sample of the quantitative data from the professional's perspective	69
Figure 34: Developed use scenarios.....	71

Appendices

Appendix 1: Interview field guide	92
Appendix 2: Mid-evaluation quantitative and qualitative data	93
Appendix 3: Final evaluation professionals' quantitative and qualitative data	95
Appendix 4: Final evaluation patients' quantitative and qualitative data	99

Appendix 1: Interview field guide

Healthcare professional interview field guide
Medified pilot, public healthcare organization
October 2020

Experience of the pilot

Needs and value expectations of the piloted service concept

1. Introduction

- Name
- Title
- Job description
- Work experience
- Experience in current organization

2. Pilot experience

- What has happened in the pilot so far?
- How have you received information concerning the pilot?
- What kind of information would you have required?
- What would you have needed to support the start of the pilot?
- How should the pilot be evaluated?

3. Needs and value expectations of the service

- Why is the service being piloted?
- What is the most important aspect of the service concerning your job?
- What kind of challenge does the service aim to solve?

4. Deployment of the service

- What would make the patient deploy the service?

5. Conclusion

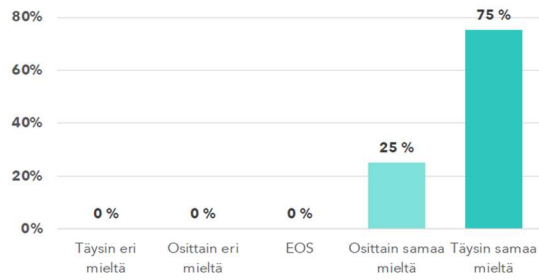
- What important do you think was not addressed during this interview?
- Anything you would like to add?

Thank you for the interview!

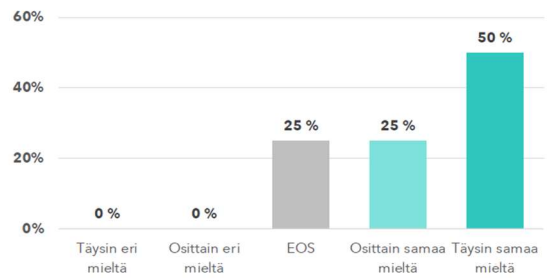
Appendix 2: Mid-evaluation quantitative and qualitative data



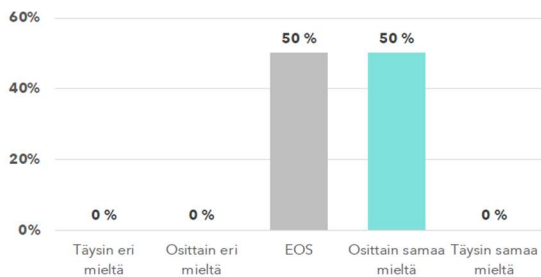
Ohjelmisto on helppokäyttöinen



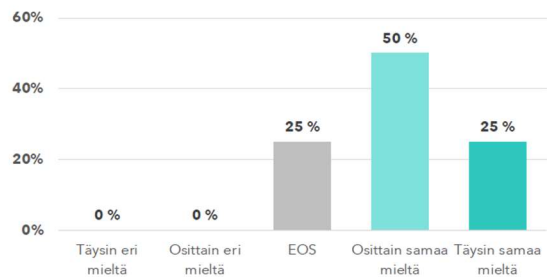
Ammattilaisen sovelluksen käyttöönotto oli helppoa



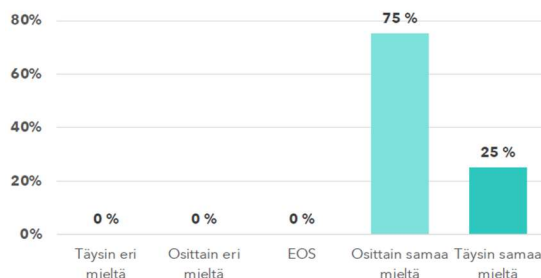
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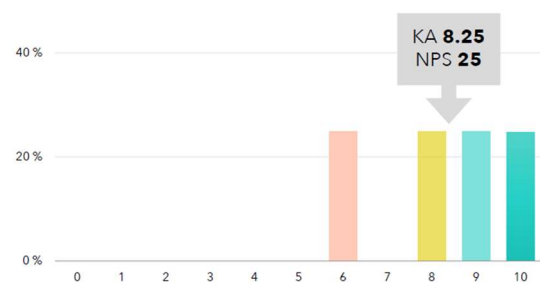
Sovellus auttaa valmistautumaan vastaanottotilanteeseen



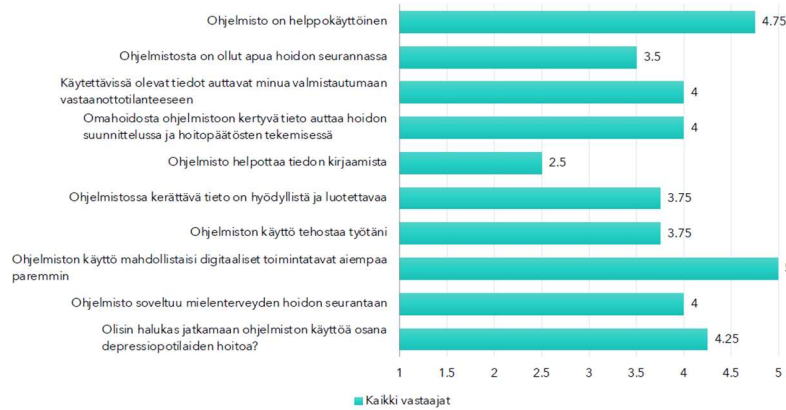
Olen halukas jatkamaan ohjelmiston käyttöä...



Kuinka todennäköisesti suosittelisit ohjelmistoa kollegallesi hoitotyöhön...



Lisää tuloksia välipalautteesta



Alustavat havaitut kvalitatiiviset hyödyt

- Sovellus lisää hoidon vaikuttavuutta
 - Vaikuttavin osa hoidoista vastaanottojen välillä
- Auttaa huomaamaan, mikä on vaikuttanut päivään
 - Hyvien päivien koostumuksen avaaminen ja monistaminen
- Auttaa ymmärtämään omaa oloa
 - Potilas kiinnitti itse huomiota siihen, mikä vaikutti vointiin
- Pystyy näyttämään toteen että vointi vaihtelee
 - Luo toivoa
- Mukana ja saatavilla, toisin kuin paperiversio
- Muistutukset ovat iso vaikuttava tekijä
- Tietoturvallinen
 - Kukaan ei voi löytää päiväkirjaa

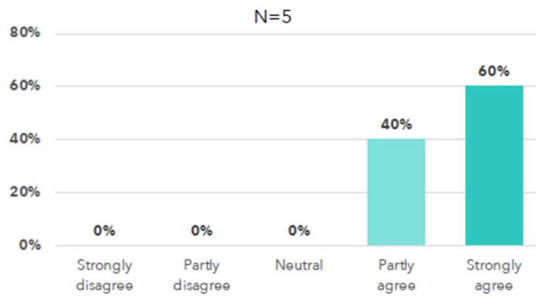
Yhteistyön ja kokeilun arviointi



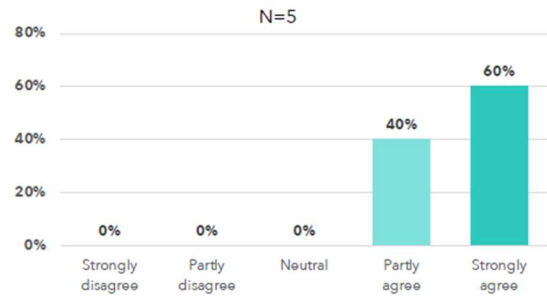
Appendix 3: Final evaluation professionals' quantitative and qualitative data



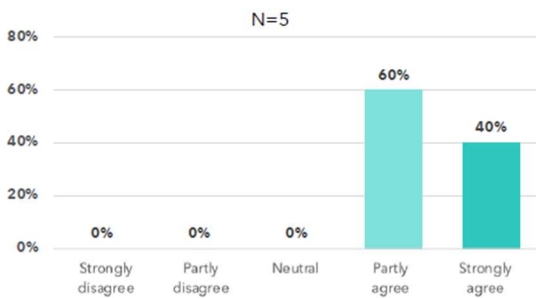
The information accumulated in the software helps to prepare for an appointment.



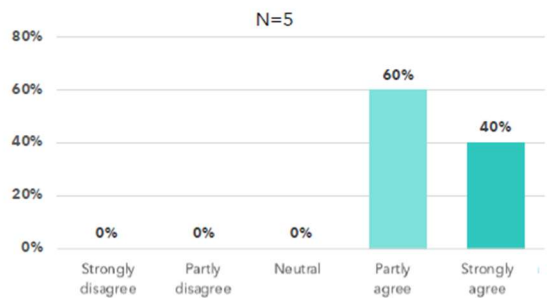
Using the software speeds up preparation for an appointment.



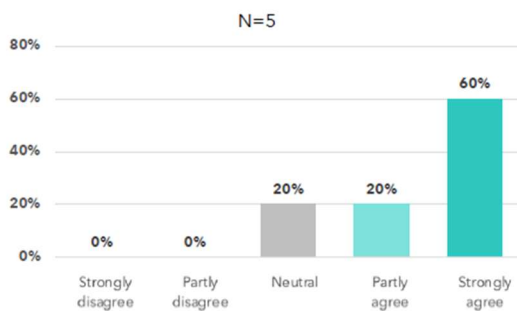
The use of the software during an appointment directs the discussion to issues regarding the patient's treatment.



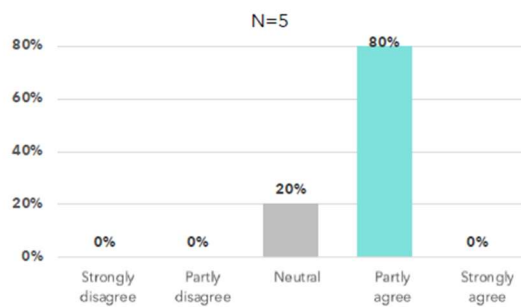
The information accumulated in the software helps in the planning of treatment.



The use of the software promotes the implementation of patient-oriented care.

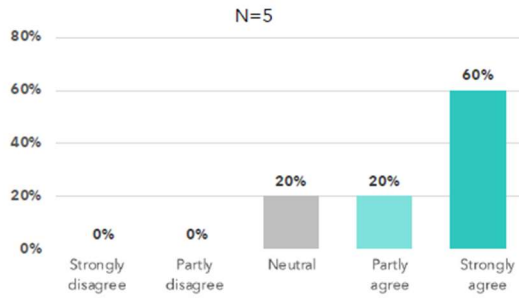


The software helps the patient identify their own mental resources and related factors.

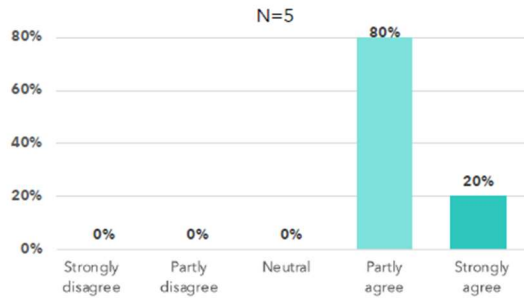




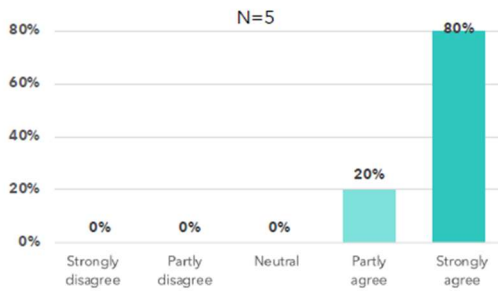
The use of software as a part of patient care helps to achieve the goals set for treatment.



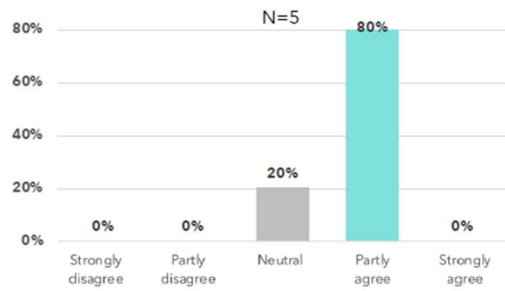
The information accumulated in the software helps in making treatment decisions.



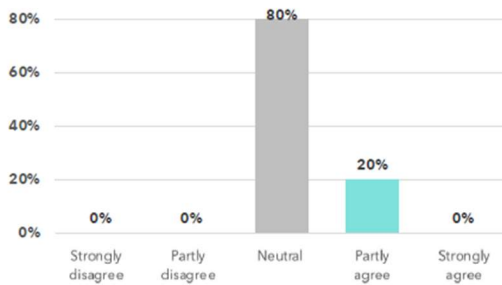
The software helps patient treatment monitoring.



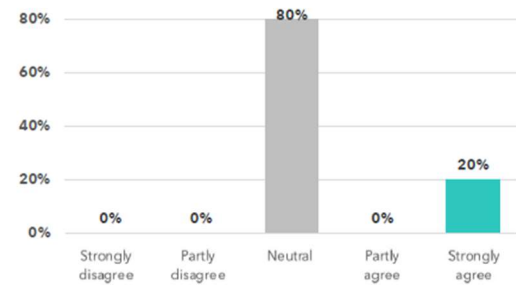
Using the software promotes patient recovery.



Using the software improves the quality of recording information.

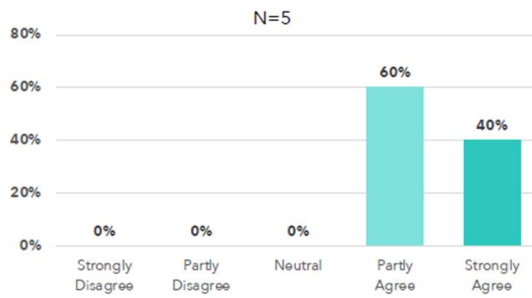


Using the software facilitates reporting situations.

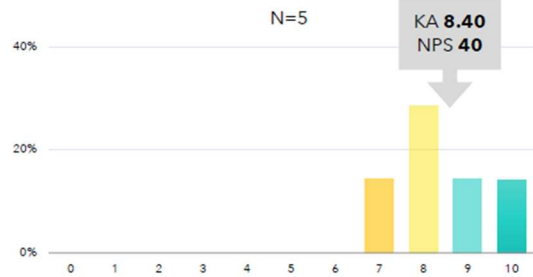




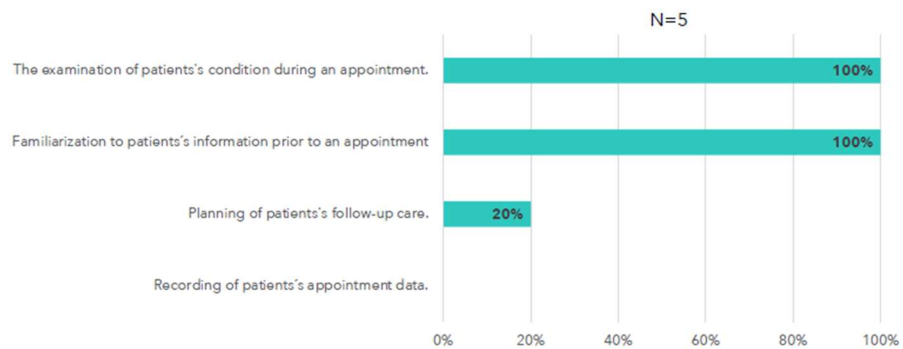
I am willing to continue to use the Medified software.



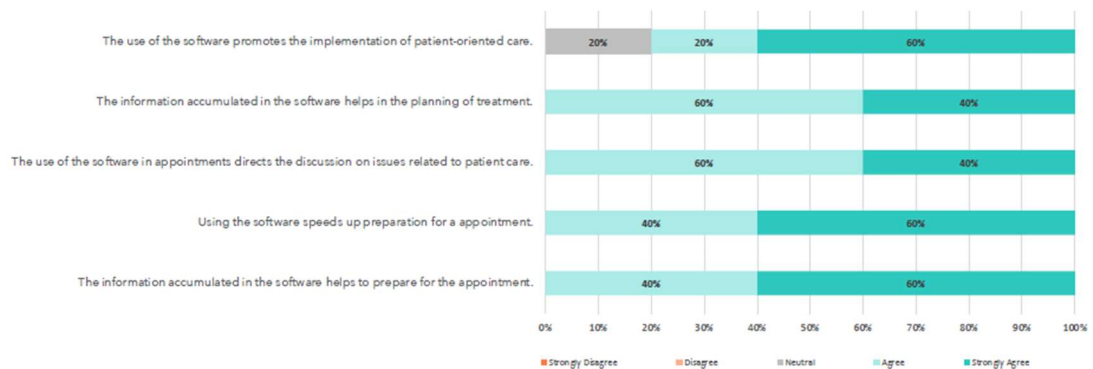
How likely you are to recommend the Medified software to others?



To what stages of patient care process does the Medified software add value?

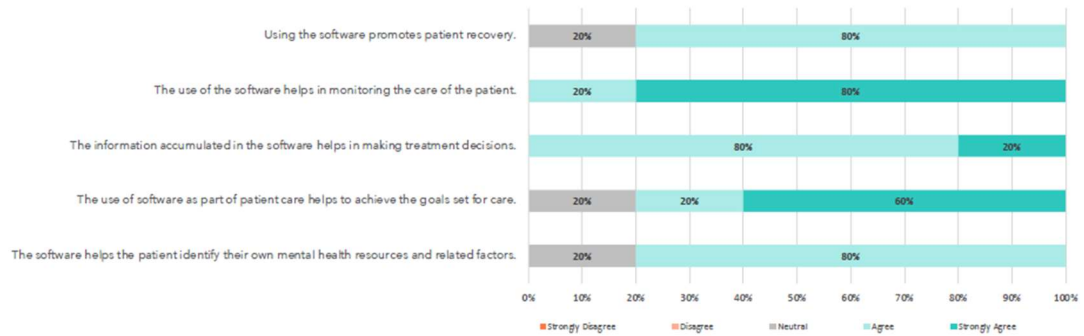


Care process

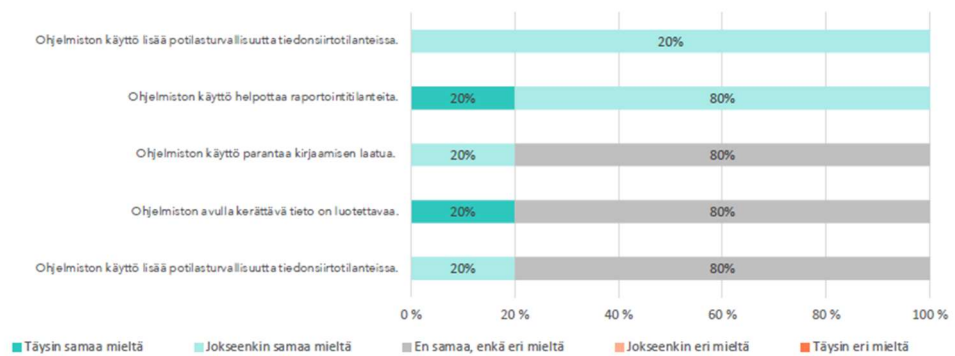




Patient benefits



Reliability, quality and patient safety



Kokeilun aikana havaitut kvalitatiiviset hyödyt

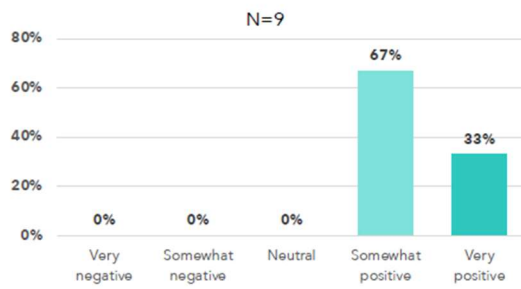


- Antaa asiakkaalle tunteen, että heistä on koppi täällä
- Auttaa valmistautumaan vastaanottotilanteeseen
- Visualisointi auttaa havainnollistamaan oloa ja muutosta, voi seurata yksittäisiä tapahtumia sekä lyhyttä ja pitkää aikaväliä
- Tieto on luotettavaa ja sitä kertyy pitkältä ajalta, sovelluksesta pystyy tarkistamaan, mitä on tapahtunut
- Mahdollistaa keskustelun ja muistiinpalaattelun, auttaa keskittymään olennaiseen ja vastaanottotilanteeseen jää enemmän aikaa
- Näkee hyvin, että kaikki ei ole aina huonosti ja pystyy seuraamaan oireita kokonaisvaltaisemmin
- Näytön yhdessä katsominen ja keskustelu tuo lisäarvoa
- Potilas, joka ei tuota vastaanotoilla mitään on uskaltanut kirjoittaa isoja asioita sovellukseen
- Asiakkaat havainnoivat omaa oloaan ja kykenevät aktiivisesti vaikuttamaan mielialaansa
- Kun asiakas huomaa hyviä asioita, hän voi saada hallinnan tunteen itselleen

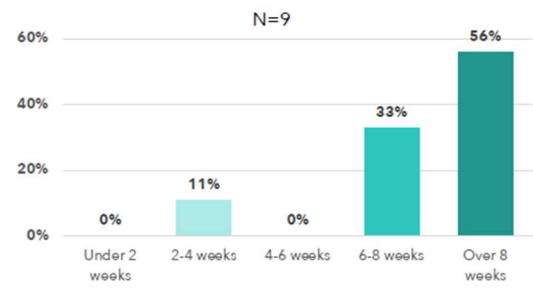
Appendix 4: Final evaluation patients' quantitative and qualitative data



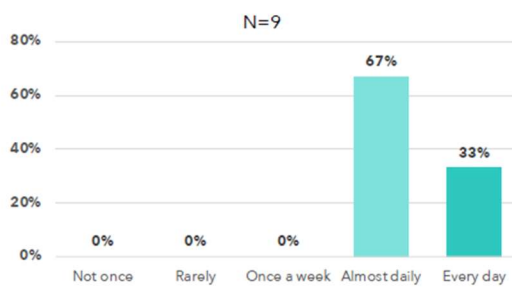
How would you appraise your first reaction to using the Medified mobile application?



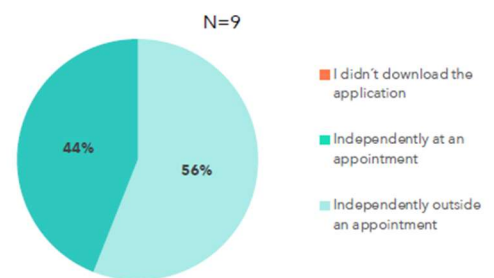
I used the application for



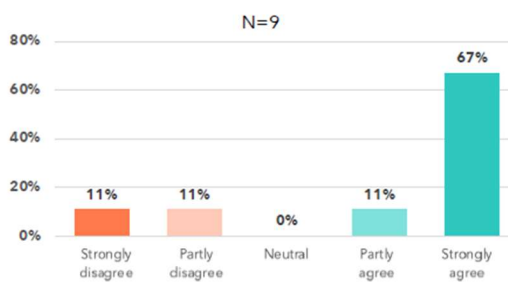
I used the application



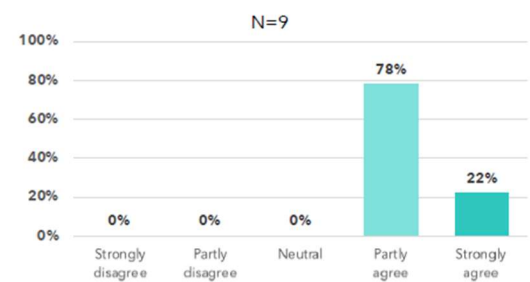
I downloaded the application on my phone



Deploying the application was effortless.

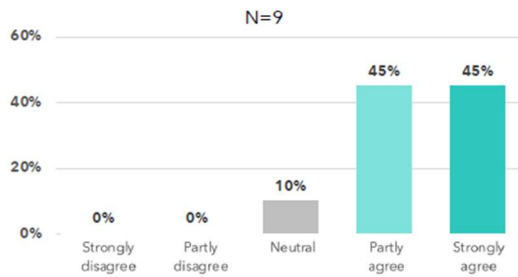


I have been satisfied with the use of the application.

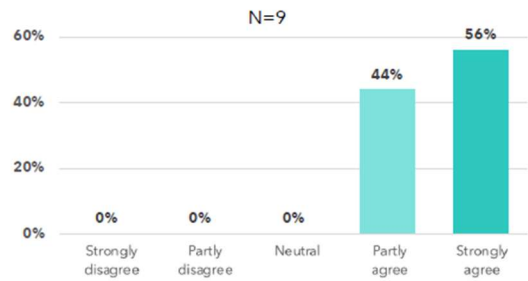




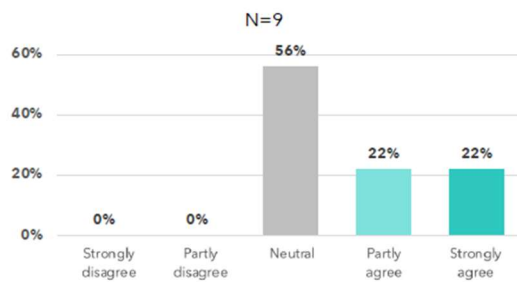
The app has helped with identifying factors related to your mood.



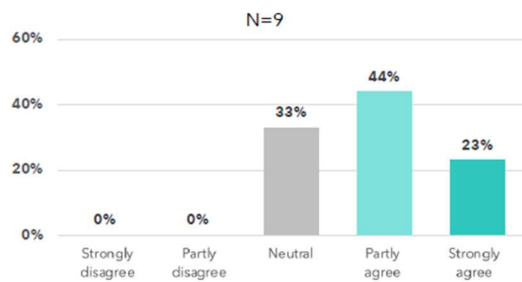
Using the application in everyday life feels natural.



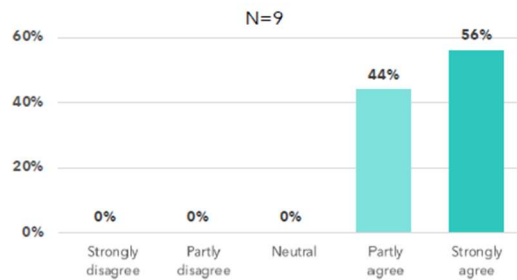
The app has improved my mental health.



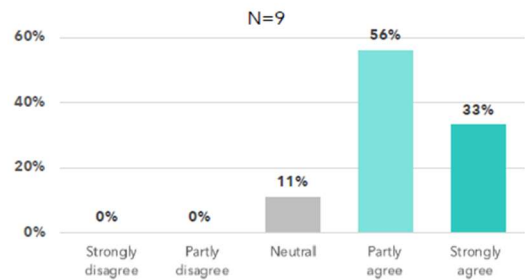
The app is useful to me.



The application is easy to use.

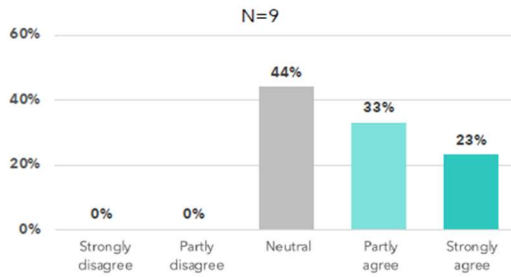


The app supported my independent self-care in between appointments.

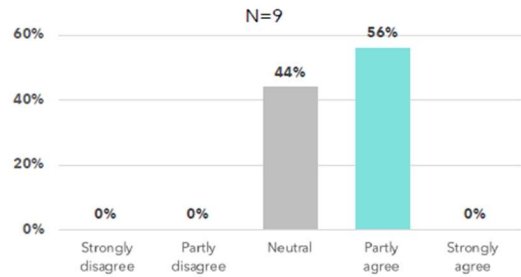




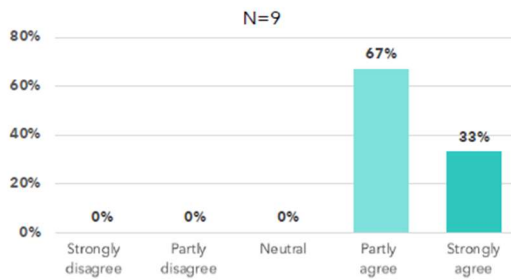
The information accumulated by the application was useful during appointments.



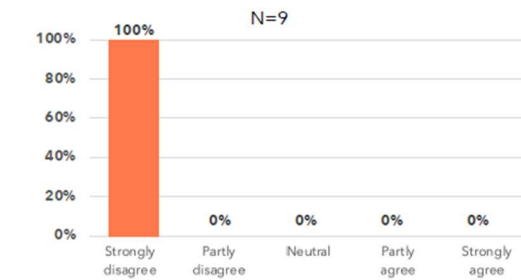
The application helped the professional to better understand my state of mind.



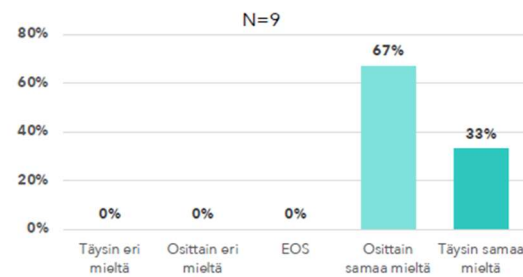
The application is suitable for its intended use.



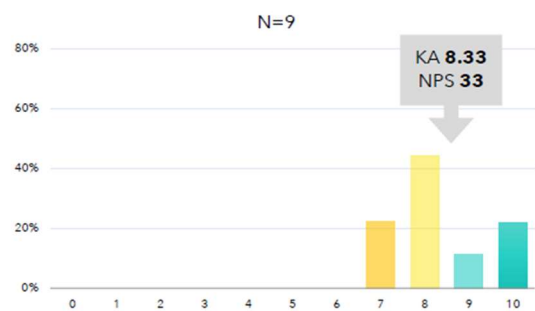
Using the app weakened my state of mind.



I am willing to continue to use the Medified application as a part of treatment.



How likely you are to recommend the Medified application to others?





Patients' more detailed description of the benefits and added value of the application:

