IMPLEMENTATION OF SERVICE DESIGN METHODOLOGIES IN IMPROVEMENT OF MEDICATION MANAGEMENT PROCESS FROM PATIENTS' PERSPECTIVE

Master’s Thesis

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Health Care Technology
2015
Hereby I declare that this Master’s Thesis is my original investigation and achievement submitted for the Master of Science degree of Tallinn University of Technology.

Current work has not been submitted for any other academic degree.

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Kaitsmiskomisjoni esimees:
Lubatud kaitsmisele

(NIMI, ALLKIRI, KUUPÄEV)
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ABBREVIATIONS

EHR – Electronic Health Record

EHIF – Estonian Health Insurance Fund

DPC – Digital Prescription Centre

DDI – Drug-Drug Interaction

FD – Family Doctor

HP – Healthcare Professional

IS – Information System

MMP – Medication Management Process

OTC – Over The Counter medicines e.g. self-selection medicines

RX – prescription medicines

SD – Service Design

TP – Touchpoint
INTRODUCTION

Maintaining of a good healthcare system is a great challenge for any country. As costs keep on rising, service planners must constantly find new opportunities to reduce costs (Durack 2013). People live longer, but they do not live healthier, which leads to a rise in chronic diseases prevalence (Pittman 2012). Chronic diseases account for the majority of direct healthcare costs. But these costs can be reduced with careful care coordination and disease management, which results in improved quality of life and avoided visits to specialist or hospitalization (Mayer and Smith 2008).

Many healthcare organizations have acknowledged the opportunity that technology and IT systems provide to improve the service. The main problem at the moment is that each service provider has an independent and in most case isolated data processor providing functions for that service point only, resulting in that patient information is not shared efficiently across relevant counterparts. A challenge today is to find ways to integrate this fragmented system (Jones 2013).

Another transformation process that healthcare is going through is moving from the treatment-centred model towards more health-centred and co-created service model where patients are not passive receivers of care anymore but become active co-producers of their own well-being (Freire and Sangiorgi 2010, Reid et al. 2005). Patients are expected to take greater responsibility in their care process, but only well-informed patients are capable of doing this. Technology and eServices are seen as a means to provide accurate overview of their care process to empower patients to become more involved. But most of the initiative to create eServices today are technology-driven and being developed from the perspective of government. Little attention is given to the external users nor are they involved in the
development process. According to studies, the introduction of such public eServices provides expected benefits neither to public authorities nor citizens (Scandurra et al. 2013). As a result, Service Design (SD) is becoming more and more regarded as a useful design approach by both private and public service sector as it involves real users in the design process and helps to create services that people actually want to use (Whicher et al. 2013). The author of this thesis believes that SD helps to create more beneficial, user-friendly and favourable eServices for all parties involved – customers, users, providers and society.

The initial idea for the topic of this master’s thesis arose from the author’s personal experience a couple of years ago when a close family member suddenly had a serious health incident in Australia. Even though hospital pharmacist explained in detail to the caregiver (the author) everything before leaving the hospital and provided a printed medication list, it was still very difficult to manage with all these medicines and information. The author of this paper started to think what if this list was available electronically, connected to smartphone with functionalities like reminders, instructions and reporting of side-effects.

After attending a conference in Tallinn, “Polypharmacotherapy in Clinical Practice” on the 05th of November 2014, where the head of the Estonian Family Physicians Association Diana Ingerainen, with the support of pharmacists and other presenters, declared the need for an electronic medication list that would provide an overview of patients’ medicines intake that is shared between doctors, pharmacists and patients, the final decision in favour of this current topic for the master’s thesis was taken.

As of today, the Estonian Family Physicians Association and pharmacists have made an official request to the Estonian Health Insurance Fund (EHIF) to develop a new service, electronic medication list, which would help to better manage and keep track of patients’ medication. EHIF is seriously considering the possibility of adding such a service to the current prescription listing (Haigekassa kaalub… 2015).
The aim of the master’s thesis is to improve, using the SD process and methodologies, the medication management process (MMP) from the patient’s perspective. Subtasks of the thesis are the following:

1. To define problems related to MMP
2. To explore and survey the solutions developed earlier
3. To give an overview of SD processes and methods in general and in healthcare system
4. To examine how patients currently manage their medication related information and provide insight for the improvement of the current MMP
5. To identify the best way to collect data about OTC medicines in order to design an eligible process from patient’s perspective.

The master’s thesis consists of four main parts. The first part gives a comprehensive overview of background information relevant to the research topic of the thesis. The second part includes the theoretical basis for SD processes and methods in general and more specifically in healthcare services. This chapter ends with setting up the research problem and defining the objectives of the thesis. The third part describes the research methodology. In the fourth chapter the research results will be presented and analysed. Based on the research results, in this part of the paper, the primary Persona and Patient Journey will be created. To end this chapter, a new Service Blueprint for services related to MMP will be presented as a final result of the thesis, followed by a short discussion section.
1 BACKGROUND AND OVERVIEW OF THE MEDICATION MANAGEMENT PROCESS

1.1 Defining problems related to medication management process

Adherence to the prescription medications is an important aspect of disease management. Poor adherence to correct medication therapy may result in complications that consequently lead to increased healthcare costs (Brown and Bussel 2011). IMS Institute for Healthcare Informatics found that medication non-adherence accounts for the largest avoidable cost of 105 billion US dollars per year in the US healthcare system (Blank 2012). Main reasons for poor medication adherence are: complex medication regimens, lack of understanding of medical condition, poor skills to follow medicine label directions, ineffective patient-physician communication and simply forgetting to take the medicines (Brown and Bussel 2011).

The need to use the medicines to treat multiple diseases at the same time in the same patient is growing and that consequently increases the likelihood of drug-drug interactions\(^1\) (DDIs), unwanted side-effects and administration errors (Patient Safety… 2009).

An important characteristic of DDI is that they are frequently avoidable if identified beforehand (Böttiger et al. 2008). But what makes the identification of potential DDI difficult today is the fact that patients are often cared for by several doctors simultaneously and there is no concrete coordination or management of the patient’s medication (Patient Safety… 2009). If we add here one more factor that is the over-the-counter (OTC) medicines, the picture gets even more complicated.

\(^1\) Drug-drug interactions occur when one drug changes the pharmacological effect of the other drug by increasing or decreasing the therapeutic effect and/or causing unwanted side-effects (Dailey … 2003)
Like between prescription (RX) medicines, clinically significant and dangerous interactions might occur also among OTC and RX medicines (Gavronski and Volmer 2014). Gavronski and Volmer (2014) conducted a survey in Estonia to discover for what conditions and how often OTC and RX medicines are concurrently used. 50.4% of 712 people who participated in the survey reported using of RX and OTC medicines simultaneously. The survey confirmed frequent simultaneous use of RX and OTC medicines, especially among chronic and elderly patients. They conclude in their study that both healthcare professionals (HP) and patients should always consider when using RX and OTC medicines concurrently, the possible DDIs that might occur between them (Gavronski and Volmer 2014).

Medicines, when used wisely and properly, can significantly improve people’s health by treating illnesses and preventing diseases (Patient Safety… 2009). However, several studies have shown that patients do not realize the risks associated with self-treatment and consider OTC medicines generally as safe. They tend to ignore patient information leaflets and do not check whether possible DDIs might occur between their medicines (Gavronski and Volmer 2014).

To make the right choices and avoid harm, patients need simple solutions that provide knowledge about the benefits as well as the risks of medicines. For patients to get accurate help in their own language in Estonia today, the only possibility is to use the help of a doctor, nurse or pharmacist. But due to the shortness of visit time and lack of appropriate supporting tools, it is often not properly done. So there is a need for an additional compelling solution that provides a comprehensive list of patient’s RX and OTC medicines with instructions and precautions, which is accessible for doctors, pharmacists as well as for patients and empowers patients to stick to their medication, follow administration instructions and avoid possible DDIs.
1.2 Examples of some solutions developed earlier

A correct and up-to-date patient medication overview helps to decrease medication errors. Studies have shown that when access to medical records is given to all relevant HPs and patients, (re)admissions related to medication errors to hospitals are reduced (Storms et al. 2014). By knowing precisely which medicines and how patients use enables doctors to more effectively plan the treatment of patients, avoid DDIs and identify side effects (Staroselskya et al. 2008).

Studies have shown that patients using medication lists printed on paper have shown improved knowledge of their medical condition, improved care process and increased responsibility (Chae et al. 2009). Patients also use many OTC medicines and food supplements that their healthcare providers are not aware of. Studies indicate that in order to create a reliable medication management system in outpatient setting it requires as much input from patients as from all caregivers throughout the care process (Chae et al. 2009, Stock et al. 2008).

Since patients are the actual users of medicines, only they can provide accurate information about which medicines and how they actually take. Therefore, by providing mechanisms that allow patients to review and complement their medication overview could really enhance the patient-physician communication and improve the accuracy of the Electronic Health Record (EHR)\(^2\) medication documentation (Staroselskya et al. 2008).

The possibility to share information digitally is seen as a means to improve communication between HPs, institutions and patients (Chae et al. 2009; Dullabh et al. 2014; Stock et al. 2008; Storms et al. 2014). They state, however, that implementing a digitally shared medication overview is challenging. Especially important is to develop structured lists for medication related information as information presented in free-text or in any other non-standard format would end up

\(^2\) **Electronic Health Record** – is a system that enables health care providers to collect, store and share detailed patient data during patient’s hospitalization, over time, and between different care settings (Silow-Carroll 2012).
being unreadable and could result in loss of various possible benefits of the system (Staroselskya et al. 2008).

Several attempts to develop such an electronic solution have been described in literature. For example, in Belgium a secured electronic platform was designed for medication information exchange and a pilot study “Vitalink” of its implementation was conducted. During the project, a uniform template of the medication overview was developed. They pointed out in discussion that when applying a new technology, it is always crucial to consider the needs of HPs making the tool easily accessible, usable and fit to the current practice workflow (Storms et al. 2014).

The US non-profit organization Peace Health also studied feasibility of developing an e-tool to share accurate and up-to-date medication data with everyone involved in the care process. The goal was to collect data from as many sources as possible, including patients, and to create one-page document to better identify which medicines each patient exactly was taking. The system also enabled patients to print out their medication list with information to carry with them. They applied user-centred design methodology in the design process involving patients at each stage of the process. Participation of patients was an unusual experience for everyone and in the beginning HPs were concerned about sharing internal problems with patients. This project well demonstrated the benefits of employing user-centred design methodology in the design process, as in the end of the study they concluded that involving patients led to more efficient, effective, and sustainable clinical work practices and the electronic medication list was found being beneficial and desirable by patients. As a result of this project, this level of patient’s involvement is integrated into all Peace Health quality improvement projects (Stock et al. 2008).

Also patients’ attitude toward and willingness in participating in their care process has been studied. The independent research organization NORC at the University of Chicago conducted a study to evaluate the role of patients in improving the accuracy of their medical records. The study was performed at the Geisinger Health System. At the time of the study over 200,000 patients had accounts in their
Patient Portal\textsuperscript{3} with access to their health information, prescription ordering, appointment scheduling and lab results. The objective of the study was to determine if patients were interested in becoming involved in making their medical records more accurate, to identify the best methods to obtain and process patient feedback and assess what impact this might have on EHR. Findings of this study suggest that patients are very willing to provide feedback and the information they provide does result in more accurate information. They concluded in their study that engaging patients via the EHR is beneficial and highlighted that communication processes must be easy to use, easy to access and also development of programs to encourage patients to use the system are necessary (Dullabh \textit{et al.} 2014).

The above-described cases prove well that patients are ready to take greater responsibility, become more engaged in their care process and are even willing to contribute to the development of services. As a result, services that meet the needs of both patients and healthcare providers are designed, which in the end leads to a better outcome for all stakeholders involved in the means of improved quality and saved cost.

1.3 \textbf{E-medication list as a possible solution in Estonia}

In Estonia a well-established and secure infrastructure has been implemented enabling development and offering eHealth services. To date there is a nation-wide health information system (IS) implemented and the most successful eHealth project so far has been the change from paper prescriptions to electronic prescribing system (Kalvet \textit{et al.} 2013).

In order to provide the electronic prescription (ePrescription) service, a special database, i.e. Digital Prescription Centre (DPC) was created. All data from different registries and users are gathered into this database by using the national data

\textsuperscript{3} Patient Portal – online access for patients to get an overview of their health data. Might include the possibility to view test results, schedule appointments, ask questions from their FD and order prescription refills (Silow-Carroll 2012).
exchange layer X-Road (Kalvet et al. 2013). The X-Road platform enables to securely exchange between different state ISs and access data stored in them (Data Exchange …, 2013).

Today, over 95% of all prescriptions in Estonia are issued electronically and the system has been well accepted by doctors, pharmacists and patients. The main aim of implementing an ePrescription system was to improve the quality of health care, including having complete overview of patients’ medicines to prevent medication errors (Kalvet et al. 2013). Currently all patient’s prescriptions are provided for doctors as a list of documents, therefore it is quite time consuming to get a complete overview of medicines the patient is presently using and even more difficult how these medicines are interacting with each other.

Diana Ingerainen, Head of the Estonian Society of Family Doctors, has been advocating the need for the central electronic medication list containing an overview of patients’ active medicines (Diana Ingerainen …, 2014). Additionally, in 2014, a survey was conducted among Estonian Family Doctors (FDs) to study their expectations about the future eHealth services for improving the quality of the MMP. Results of this survey confirmed the statements of Ingerainen. FDs expressed their need for a tool to support the MMP providing a complete overview of patients’ medicines and additionally offering supporting functionalities to detect DDIs and warn about allergies (Parv et al. 2014).

Also pharmacists have expressed their wish to have more information about active medicines that the patient is actually using. In their opinion, a central electronic medication list would enable them to better consult patients on their medicine use and detect possible DDIs to avoid unwanted side-effects (Apteekrid soovivad …, 2014).

Thus, Ingerainen proposes to create in DPC an adjunct service providing a comprehensive overview of patient’s medicines that is accessible for doctors, pharmacists and patients. A suitable name for this service is currently under discussion, some suggestions are eMedication
list, eMedication scheme, eMedication instruction (Diana Ingerainen …, 2014). A commonly understandable name should be agreed during the future SD process between all stakeholders. In this paper the name eMedication list will be used.

In the opinion of Ingerainen, the eMedication list should have specially designed interfaces for each stakeholder and display only the relevant information to that party. From the patient perspective, the benefits seen by her lie in the possibility to check and remind the intake instructions at home after a visit to doctor where the patient could be nervous and not remember everything perfectly (Diana Ingerainen …, 2014).

Therefore, the ePrescription service needs to be improved and the existing platform to create an eMedication list as an additional service in DPC is promising.

Still, the information about OTC medicines bought by the patient is missing from the system. At the moment it fully depends on whether the patient shares that information with the doctor or not, and when buying an OTC medicine from pharmacy informs pharmacist about all the other medicines he or she is currently taking. According to the survey published in Eesti Arst, one-quarter of the Estonian adult population uses OTC medicines every day or at least once a week. And only 1/3 of them consult their doctor or pharmacist prior to making the decision (Gavronski and Volmer 2014). Gavronski and Volmer stress that access to patients’ medication history containing both OTC and Rx medicines can improve the quality of the services related to MMP and is especially important in case of elderly and chronically ill patients.

Doctors and pharmacists have communicated their need for an eMedication list in order to improve their role in the MMP. The patients’ opinion in this matter has not yet been heard. In fact, there is little knowledge on how patients feel about the current situation, what are their needs and experiences, how they could contribute towards making the service more valuable for all parties.
1.4 Defining the research problem

The research problem identified in previous chapter is that at the moment medication related information displayed through DPC in Estonia is not sufficient, does not contain OTC medications and is not efficiently exchanged between HPs and patients. The current situation does not satisfy the needs of different counterparts in providing the services related to MMP and the decision has been made to develop the eMedication list as an adjunct function to DPC in Estonia. The initiative to start is based on the limitations of the current system identified by the pharmacists and doctors, but little is known about the patients’ opinion and expectations on this service.

The aim of this research is to answer three main questions:

**RQ1:** To understand how do patients currently manage their medication related information?

**RQ2:** To find out what is the patient’s opinion regarding the eMedication list as a possible supportive service of MMP?

**RQ3:** To identify what would be the best way from patient’s perspective to collect data about OTC medicines?

**The objective of this research** is to understand how the situation today is seen and experienced through the eyes of patients, identify the problems, unmet needs as well as opportunities for innovation.

**The expected result of this thesis** is a solution describing how the services related to MMP should look like from patients’ perspective.

During analysis of international experience in this thesis, it became evident to the author that involving of real patients into the development process would contribute to overall success of the service and all counterparts would benefit. Based on that finding, SD is considered by the author of this paper as the most suitable approach to developing and improving healthcare services. An overview of the SD process and methodologies is given in the next chapter.
2 THEORETICAL FOUNDATIONS

2.1 Introduction to Service Design

In the new era of services growing more and more sophisticated, new ways of developing services should be found to be successful. In fact, services today can be highly complex networks of interactions, involving people, systems, products and organizations (Polaine et al. 2013). In addition, advancing technology also continuously adds a wide range of new possibilities to innovate and create services to offer value in novel ways. The relationship between customers and service providers has been changed drastically due to the technological revolution, but as much as technology offers new possibilities it also poses many challenges (Moritz 2005). The quality of services and acceptance by people highly depends on how well the whole service system has been linked together. It is not enough that each individual part of the service is designed carefully when the service has not been considered and designed holistically (Polaine et al. 2013).

Thus, the growing complexity of services demands a design approach that looks at the service as a whole and considers its all aspects during the development process. SD has been seen as an approach to overcome this situation. SD was first introduced as a disciplinary field of design in 1991 at Cologne International School of Design (KISD) and the first SD consultancy office, live\work, opened 10 years later, in 2001, in London (Kuosa and Westerlund 2012).

SD helps to acquire holistic understanding of the whole service system and different actors are involved in the process. By combining various methods and tools from other related fields, like marketing, research, management etc., the SD approach helps to create beneficial, usable and desired services from the perspective
of user, and at the same time efficient, effective and unique services from the provider’s point of view (Mager and Sung 2011).

No matter what type of service, people are always part of it (Polaine et al. 2013); therefore, SD places people to the centre of the design process. The central goal of SD is to establish a good understanding of the aim, motivations and underlying needs of service users (Moritz 2005) and not forgetting that employees who are in contact with customers are correspondingly the users and providers of services (Polaine et al. 2013).

SD researchers conclude that the human-centred design approach is the main driver and fundamental to the discipline (Holmlid and Evenson 2008, Meroni and Sangiorgi 2011, Polaine et al. 2013).

The main characteristic of the human-centred SD is that services are not designed just for people but with them and as much for the person who delivers service as for the customer (Polaine and Evenson 2013). It means that the customers and all other relevant stakeholders should be involved as early as possible in the service development process (Schneider and Stickdorn 2010).

2.2 Service Design process

In the literature and practice, various frameworks of SD processes consisting of three or more steps can be found. Still, basically they all share the same idea of going through phases that involve different activities and can be broadly divided into the stages of analysing, defining, developing and implementing (Kuosa and Westerlund 2013, Meroni and Sangiorgi 2011, Moritz 2005, Schneider and Stickdorn 2010). Every phase of the process has its own purpose and gives input for the next stage. Each stage is briefly described below:

- The analysing stage is about exploring and discovering the needs and experiences of clients, identifying problems and opportunities of the service as well as the limitations of the solution. This stage will eventually form the
basis for the rest of the project and will be an inspiration source to the design team (Schneider and Stickdorn 2010).

- The defining stage is about analysing the insights gathered and assembling those into ideas and service concepts (Meroni and Sangiorgi 2011, Schneider and Stickdorn 2010).

- The developing stage involves testing these ideas and concepts or exploring if individual parts of service are feasible in the context of the entirety of the service and whether individual touchpoints\(^4\) (TPs) link together to form a complete service experience (Meroni and Sangiorgi 2011, Miettinen and Koivisto 2009, Schneider and Stickdorn 2010).

- The implementation stage allows experimenting with new service models and ideas during workshops or in real settings to minimise risk of failures or generate more ideas for improvement (Meroni and Sangiorgi 2011).

SD is about going through these phases, but not necessarily in that order from start to end. The nature of the SD process is iterative and non-linear. It is always possible and even recommended to move between different stages (Schneider and Stickdorn 2010). In the opinion of the author of this paper, the best model to describe the nature of the SD process has been created by Meroni and Sangiorgi (see Figure 1).

\(^4\) Touchpoint – term in SD. Individual contact points where interaction with service takes place and forming together a complete service experience (Miettinen and Koivisto 2009).
This diagram represents quite well the possible movements between different stages depending on the need. Each stage provides new insights or findings that may require returning even to the very beginning. So, during the whole design process it is possible to have several full cycles or you can iterate multiple cycles within one stage. This results in that the new possible service solutions can be frequently evaluated and tested with customers and other stakeholders to reach the goal of excellent and perfectly working service (Holmlid and Evenson 2008). All these stages are about understanding customers, users, organisation and market, generating ideas, explaining complicated structures and processes, using tools that make ideas tangible so that people can explore possible new service experiences (Meroni and Sangiorgi 2011, Moritz 2005).

To summarise there is no general one-size-fits-all process model to choose from in SD, as services and environments where they exist are very different. Therefore, Schneider and Stickdorn (2010) suggest not sticking to any pre-defined process model and rather build the process according to each individual project. Hence, following a concrete process model is not that important in SD, rather than that all stages are passed as many times as needed aiming to reach to the point where no new issues or questions arise.
2.3 Service Design tools

The techniques used in SD are mostly applied in other research disciplines, but there are some specific tools also (Segelström 2013). These tools enable to visualise the insights into easily understandable representations and illustrations of service situations. The ability of designer to make the service processes and future visions visible and tangible is considered one of the core features of the SD discipline (Meroni and Sangiorgi 2011, Segelström 2013).

Some of the most commonly used tools according to Segelström (2013) are listed and shortly described below:

- **Customer Journey** maps the customers’ steps all through the service from the perspective of customer, focuses on customer experience and identifies main TPs. It does not offer the actual structure of how the service works rather than how customer sees it (Segelström 2013). It can be used either in the analysing stage or throughout the whole project as a tool to identify problems in a current service and gradually generate suggestions for improvements where different stakeholders become involved (Meroni and Sangiorgi 2011).

- **Persona** is a profile of a person that is a representation of a group of people with similar interests. Personas are developed based on thorough research of the service users. Many customers should be interviewed or shadowed to collect data, which are then analysed and gathered according to common behaviours to reflect the needs and goals of the actual users, to check if developed ideas fulfil these needs and if there is no conflict with the proposed service and their behaviour (Segelström 2013).

- **Storyboard** describes how service interactions occur over time (Meroni and Sangiorgi 2011). The storyboard is made of images or drawings setting focus on the important aspects of service interactions (Segelström 2013). The method can be used from the early stages of concept development through to the design process (Meroni and Sangiorgi 2011). It is more general than the
Customer Journey (Segelström 2013), it helps to imagine future interactions and stimulate discussion. In the end, storyboard will serve as the basis for creating a service blueprint (Meroni and Sangiorgi 2011).

- **System map** represents the working model of the system from the provider’s point of view by visualizing its components and connections between them (Segelström 2013). It helps to understand the structure and organization of a service system. System map is mainly used in the beginning of SD process in order to evaluate the feasibility of the idea. It is also a useful tool for stakeholders to understand their relationship and how they affect each other in the service system (Meroni and Sangiorgi 2011).

- **Blueprint** is a holistic representation of how the process of service is intended to work (Segelström 2013). It includes the service process from the user perspective as well as actions and processes needed to support it from the provider’s point of view. Blueprints are suitable to evaluate an already existing service and to design a completely new one. They provide insight to what processes, resources, actions and tools are needed to improve or implement the services (Meroni and Sangiorgi 2011).

To conclude, there is a wide range of tools and methods in addition to those described above to choose from and designers have actually free hands in selecting and combing these across the project stages (Meroni and Sangiorgi 2011, Moritz 2005, Schneider and Stickdorn 2010). Depending on the specific service characteristic and area of design intervention, various methods from other design disciplines (e.g. experience design, interaction design, system design, participatory design and strategic design) can be also combined in the SD process (Holmlid and Evenson 2008, Meroni and Sangiorgi 2011).

Designers’ main task is to find a workable combination that can lead to gradual improvement through the iterative process of SD (Schneider and Stickdorn 2010).
2.4 Service Design in healthcare

Earlier in this paper it was pointed out that services can be very complicated systems of interactions. Healthcare sector undoubtedly is one of the most multifaceted and regulated environments where services are present. Not only that healthcare is a highly complex sociotechnical system between people, organizations, technology and shared information (Jones 2013), it directly affects human lives and any error in that system can actually become a matter of life or death. As Peter Jones in his book “Design for Care” states:

“Nobody dies from a bad website, but patients can and do die from information display errors and counterintuitive device interfaces. Thoughtless design is magnified greatly when it shows up in a healthcare process or medical device”.

Therefore, any attempt to design and re-design services in the healthcare sector needs to be carefully and holistically planned and implemented. Partial process improvements or changes within present services without considering the whole process, current professional-patient relationship model and people’s behaviour are destined to failure (Freire and Sangiorgi 2010, Jones 2013).

Being widely accepted as a beneficial approach in other sectors, SD has also found its way to healthcare. Pioneers in adapting this approach have been mostly located in the USA and UK, where many SD agencies have already specialized in innovating health care services, developed specific tools and are working in partnership with healthcare organizations. IDEO with Kaiser Permanente in the USA, Design Council and think public with the Department of Health, National Health Service (NHS) in the UK, to name just a few (Freire and Sangiorgi 2010; Szebeko and Tan 2010). Several studies have denoted that bringing patients, professionals and community together to the development process of healthcare services highly contributes to the success of the service (Boyd 2014, Stock et al. 2008; Storms et al. 2014).

To co-create services in such complex environments as healthcare, Peter Jones (2013) has proposed an integrated SD framework for healthcare with a
selection of methods for service innovation in a specific stage of design process (see Table 1).

Table 1. Integrated Service Design framework for healthcare.

<table>
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<th>Design phases</th>
<th>Methods</th>
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<tbody>
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<td>Analysing</td>
<td>Participatory workshops&lt;br&gt;Dialogic design&lt;br&gt;Simplexity&lt;br&gt;<strong>Stakeholder analysis/Personas</strong>&lt;br&gt;<strong>Customer journey mapping</strong>&lt;br&gt;Ethnographic field research&lt;br&gt;Sense-making interviews&lt;br&gt;Cognitive task analysis&lt;br&gt;Value sensitive design (VSD)&lt;br&gt;Empathic design research</td>
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<tr>
<td>Generating</td>
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<tr>
<td>Developing</td>
<td>Body-storming (simulating use cases)&lt;br&gt;<strong>Service blueprint</strong>&lt;br&gt;Visual sense-making&lt;br&gt;Scenario storyboarding</td>
</tr>
<tr>
<td>Prototyping</td>
<td><strong>Service blueprint</strong>&lt;br&gt;Workflow analysis&lt;br&gt;Developmental evaluation&lt;br&gt;<strong>Service design plan</strong>&lt;br&gt;Dialogic design&lt;br&gt;Developmental evaluation</td>
</tr>
</tbody>
</table>

Note: Service Design specific methods are highlighted in bold, the rest of the methods are borrowed from other design disciplines.

Source: Jones (2013) modified by the author

The main challenge for any SD project in healthcare is to find a suitable design approach to overcome the complex nature of a healthcare system and the problematic situations that occur today. The current practice in healthcare SD is to
operate mainly within human-centred design approaches where Customer Journey mapping, creating Personas and Service Blueprint have been the most widely used methods (Boyd et al. 2012, Freire and Sangiorgi 2010, Jones 2013). SD with its methods has been proven to be a useful approach to facilitate change of a healthcare system from fragmented care to collaborative team-based care for patients (Jones 2013; Stock et al. 2008; Storms et al. 2014).
3 RESEARCH METHODOLOGY

Based on the research problem and the opportunity seen in SD in providing answers and solutions to this, the following phases of the design process will be covered and the methods presented in Table 2 were chosen for this research:

Table 2. Design methods chosen for the research

<table>
<thead>
<tr>
<th>Design phases</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysing</td>
<td>In-depth interviews</td>
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<td></td>
<td>Creating patient profiles, Personas</td>
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<tr>
<td>Generating</td>
<td>Patient Journey mapping</td>
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<tr>
<td>Developing</td>
<td>Service Blueprint from patient perspective</td>
</tr>
</tbody>
</table>

Source: Service Design process. Meroni and Sangiorgi (2011) modified by the author

3.1 Data collection

During the analysis phase, the first task is to better understand the current service process from the customer perspective, to get deeper understanding of their experience, attitudes, problems and needs.

Qualitative research was seen as an appropriate approach to acquire this type of information. More specifically, in-depth interviews were chosen as a data collection method. In-depth interviews are used to generate knew knowledge and can be well used to get ideas and suggestions on a particular topic.

In-depth interviews provide a flexible and unstructured way to guide the interviewee through the pre-defined theme using a rough topic guide. Each topic can
be explored deeper with follow-up questions and probes as the topic emerges and new relevant issues arise. The initial question of the interview should be formulated in such a way that the interviewee starts telling the story and the next question usually arises from the answer given by him/her (Ritchie and Lewis 2003).

3.2 Research sample

The criterion based sampling method was selected to identify proper interviewees for the survey. As the aim of the research was to explore how patients manage their medication related information today, what are the existing problems and gaps in the system from their perspective, the main inclusion criterion requested a history of using multiple medicines for a longer period of time.

More specifically, it was decided to conduct interviews with patients who had regularly taken at least two RX medicines for half a year and complemented them with one or more OTC medicines over the period of time. According to studies, multiple medicine use is more prevalent among elderly patients (Gavronski and Volmer 2014). Based on these studies, the age of participants found and recruited for this research remained between 50 and 90 years. The average age of participants in the survey was 70 years, the number of concurrently used RX medicines was 4.4, occasionally complemented with OTC medicines, and the history of taking medicines 12.5 years. The survey sample included 8 females and 4 males. Details of the research sample are presented in Appendix 1.

Search for potential participants and recruitment was done through family and friends of friends’ networks. When an initial agreement to participate was attained, the author of this paper contacted the potential participant over the phone, gave a short overview of the topic and fixed the time and place for face-to-face meeting.

At the beginning of the research, the goal was set to perform 15 in-depth interviews. After 10 interviews it became clear to the interviewer that the stories and experiences started to repeat and no new knowledge was acquired. It was then
decided to stop searching for new participants and conduct only the remaining interviews that were already appointed.

In qualitative research, appropriate sample size is achieved when the point of data saturation is reached (Ritchie and Lewis 2003). In total, twelve face-to-face interviews were done between 05 February and 17 February 2015, an average length of one interview was 45 minutes.

3.3 Structure of interviews

The interviews consisted of two parts. The first part was to understand the current MMP and its limitations from the patient’s point of view and the second part was about the attitudes towards becoming a co-creator of the service, not just a user. With each interview the confidence and knowledge of interviewer increased, leading the interviews to become more and more informative.

At the beginning of each interview, a short introduction to the topic was given to the participant and relevant background questions regarding age and medication related information were asked. The interview continued with the request to describe the patient’s personal experience of getting information about their medicines starting from the first contact with the doctor at the beginning of their treatment. The interviewer helped to lead the story by asking what happened next or where did you go after that. It was then discussed what happens in each TP, what are the problems they have experienced, what are they satisfied with and what kind of tools or systems they use or have developed to manage with their medicines today. During the interview, patient’s knowledge about the current eHealth services and the attitude towards using technological systems in general and future eHealth services, particularly eMedication list, were also tested.

To introduce the second part of the interview, questions related to OTC medicines were asked regarding their usage, general perception about their safety and level of knowledge about possible DDIs. TP cards were used to make future
solutions more tangible and clear. Usually the card sorting method is used during workshop sessions, but recent practice has shown that the method can also be beneficial during user interviews. This technique helps better to identify user preferences about solutions they are not familiar with (Clatworthy 2010).

TP cards were used in the interviews to identify the way participants were most likely to provide information to the eMedication list. Eight cards with different scenarios generated by the author were explained and presented in random order to the participants with the request to sort them according to their preference. When sorting the cards, interviewees actually started to comment on the solutions and provide reasoning why they choose the cards in that order. This really provided valuable background information for understanding their attitudes and expectations. Eight scenario choices to provide OTC medication related information presented in the cards were the following:

- I prefer to use the help of a pharmacist while submitting data to the eHealth IS during the process of buying them;
- I prefer to submit my data via SMS to the eHealth IS;
- I prefer to tell this information to my doctor who submits my data to the eHealth system;
- I prefer to use a special mobile application that is connected to my health records, uses barcode reader to scan the medicines and sends the data automatically to the eHealth system;
- I prefer to use the help of my family member in entering the data to the eHealth system;
- I prefer to use a self-service machine in a pharmacy that requires ID-card identification to connect with my health records, uses barcode reader to scan the medicines and sends the data automatically to the eHealth system;
- I prefer to call to the special call-centre and provide my data to be sent to the eHealth system;
- I prefer to use Internet and enter my data myself to the eHealth system;
The actual cards used are presented in Appendix 2.

All interviews were recorded with the permission of the interviewees. Due to the sensitive topic, all participants wished to remain anonymous, only age and sex were documented from personal data. The recorded material was transcribed and then analysed by the author.
4 RESEARCH RESULTS

In this chapter the data gathered during interviews are analysed in order to develop the foundation to create Persona and map its journey through MMP. A common method used in analysing qualitative data is identification of the emerging patterns and key themes from interviews (Ritchie and Lewis 2003). During the analysis performed for this paper, data were sorted according to different TP patients encounter during their journey and the related topics of interest posed in the research questions. To illustrate findings from interviews, patient quotations are anonymously inserted in the text in italic.

4.1 Creating Persona

The next step in the SD process analysis phase is to create Personas, who are imaginary characters generated based on actual users’ insights. For this research the aim is to build a Persona profile representing the primary user of the services related to MMP. The Persona profile describes the users’ characteristics, needs, attitudes and expectation in the context of the specific service.

A special focus in creating Persona was on searching patterns in patients’ overall behaviour and goals while managing their medication, similarities in their general knowledge about medicines and attitude towards using technology.

In all interviews, quite similar stories and experiences started to appear already from the very beginning, surprisingly there were no significant differences between men and women. Some differences were discovered between different age groups. People older than 80 years were supported in managing their medication by their relatives and they were not so optimistic about using technology themselves.
It came out from the interviews that all participants realised the importance of taking their medicines correctly in order to control their condition, something that needs to be done properly. The main goal that really emerged from each interview was that patients want the process of taking medicines to be as easy as possible and not disturbing their everyday life. The bigger the number of medicines, the more problems appeared in the process. Many of the patients had developed their own system to cope with the complexity, for example, bill boxes were widely used, 8 persons out of 12 mentioned using them. They were found most useful to check if the medicines had been taken or not.

„In the beginning there was a big mess, I did not have my medicines in system. But my sister brought me this special box”;  

“If I am about to take my medicine and somebody calls during that time, I might not remember if I took them already or just thought about taking them”.

The longer the history of taking the medicines, the less additional aids were needed to support the process. One of the respondents said with a smile:

“I am a professional patient already, I know exactly what and when to take... it is part of my daily routine”.

Though respondents claimed taking their medicines as prescribed, it appeared in discussion that occasionally they do forget and some even claimed making their own changes to the regimen.

“I take usually in the morning ... I cannot actually remember exactly how she said. I did not write it down”.

One respondent said that due to the side-effect experienced, she herself decided to skip one medicine and increased the amount of the other. She did not report it to her FD and was surprised that nobody noticed that she stopped ordering prescription for one medicine and begun more often to refill the receipt for the other.

“My FD could check if I buy out medicines or ask what I take or do not take, but nobody seems to care.”

A general perception was that doctors and pharmacists have complete overview of the patients’ medicines and information flows smoothly between
different doctors and pharmacies. All participants praised the digital prescription system and highlighted that this has made their life much more convenient. The main argument in favour of this system was convenience.

“I don’t have to go doctor’s office each time I have to prolong my prescription”;

“I just have to call to nurse and after a couple of hours my prescriptions are in pharmacy”;

“I just give my ID card to pharmacist and she knows already what prescriptions I have left. I don’t have to carry a paper with me and store it for six months, it is all in the computer”.

From negative side it was pointed out that it is more difficult to keep track of how many prescriptions are left. Only three respondents were aware of the possibility to check it from Internet. But the benefits of the ePrescription system clearly outweighed this minor complication and everybody was really satisfied with this system.

The attitude towards using the support of technology and eServices was in general positive; it came out that two thirds of the interviewees had used the eServices in Internet and 7 of them claimed feeling confident in doing so.

“I have my computer open all day. Most often I read news and use banking services”;

“I had to learn using computer due to my work. I have no problems with it”;

“I check my digital prescriptions from eesti.ee. It is very convenient, I can sort them there and check if I have active prescriptions left”.

Two persons who did feel a little insecure, mentioned though that if somebody shows how to do something, they will manage fine with it. Only 3 respondents out of 12 said that they do not use Internet and computers at all and do not know even how to do it, but they would use the help of their family member in case it was necessary.

Knowledge concerning OTC medicines matched with the earlier studies that people consider them generally safe. Some respondents said in the beginning of the
interview that they use OTC medicines only when their doctor recommends it. Later in the discussion it appeared that the usage was more prevalent than they admitted to themselves. For example, painkillers, common cough and cold medicines and various ointments, not to mention vitamins and minerals, were actually widely used. It can be assumed that people consider some OTC medicines more serious than others and based on that categorization pay less or more attention to possible reactions related to using them. The attitude also varied according to previous experience, whether they had come across with a side-effect and DDI previously or not. Half of those with no experience, although confirmed knowing about possible side-effects and DDIs, really did not pay much attention to it.

“Of course I know about possible DDIs, they are listed in those information leaflets ... but I don’t read them”.

“Well I do read those instructions how to use, but according to them nothing can be used, so why bother”.

It was also mentioned that it is quite difficult to understand everything in the information leaflets because of the Latin names of medicines and diseases.

“When you have 7 to 10 different medicines, it is rather difficult to compare and understand. It is like a science project”.

It also appeared from interviews that possible DDIs are rarely discussed in FD office or in pharmacy.

“When I am buying OTC medicines, nobody asks what other medicines I use”;

“There are separate cashiers for OTC and RX medicines, so they have no information what other medicines I use”.

A couple of respondents though had had experience where pharmacist discovered a possible side-effect and DDI; those 2 cases happened when the patients were buying OTC medicines at the same time with RX medicines.

“I suddenly started coughing and it stayed, it was disturbing. Then once I was in pharmacy buying my RX medicines, I asked for a recommendation of pharmacist for cough remedy. Explained my situation and then coincidently the pharmacist said...
that this might be the side-effect of one of my medicines. I stopped taking it, and the coughing finished. I couldn’t have discovered this correlation myself. And my FD did not discover it either”;

“I was buying a painkiller and my pharmacist said that this is not recommended to take together with my other medicines”.

Both of them really valued their experience and said that this kind of checking should be a standard procedure. Also, those people who had discovered possible side-effects or DDIs themselves mentioned that some procedure to discover these beforehand should be in place and should not be as difficult and random as it is today. All participants who had been in the situation were a side-effect or DDI was discovered were also more careful in reading patient information leaflets and asking for advice. At the same time, they were not willing to bring that topic up themselves, as the general perception is that FD-s and pharmacists are too busy with other things.

“No, no I cannot disturb my FD with this”;

“There are always other people standing in line at the pharmacy. It is not possible to start debating about my medicines”.

So, as much as people do not want taking medicines to disturb their life, they do not want to cause any inconvenience to others related to the process. They realise it is important to stick to their medication in order to have normal life and maintain their health. Any solution making this process easier for them is highly welcome and accepted.

Based on the above findings and general observations during the interviews, a Persona profile representing the primary user of the services related to MMP, was created (see Appendix 3).
4.2 Creating Patient Journey

The Patient Journey\(^5\) map provides a compendious overview of all TP that the patient comes in contact within the whole services pathway. It describes shortly what the patient is trying to do at each contact point, what are her goals, needs and even latent needs at each service TP. It also helps to understand where and what kind of problems occur and what are the real expectations and experiences of the patient. It is used as guidance through the generating and developing phases of the SD process in order to make improvements that truly satisfy the needs of the patient. Insight for the journey mapping comes from qualitative interviews.

Every interview started with a request to describe the Patient’s Journey starting from the moment they were first time prescribed their medicines. For most of the patients the first contact point was a FD or a predecessor of FD, who then sent the patient to the relevant specialist who prescribed the first medicines. For three persons the journey started in hospital where they ended up after sudden appearance of disease symptoms and their first medicines we prescribed after release. 7 out of 12 respondents had received also a written medication list on paper, including the name of active substance and instructions how to take them. These medication lists were mostly provided by the hospital or specialist at the beginning of treatment and are not usually updated when the care process is changed later. However, some FDs also give these lists to their patients, 2 persons in this research received it from their FD, so it highly depends on how the FD is used to operate. Those who did not receive such a list at all, had to take less than 3 medicines, except for one person who had over five and did not get the list from the doctor. Later it appeared that she had made her own list of daily routine.

“I made myself ... you know such a list what and when to take, marked out from information leaflet when I should take it ... before, after or during meal. Well, I have many medicines you know.”

\(^5\) Considering the healthcare context, the term Patient Journey will be used instead of Customer Journey.
Those who had the list really valued it as a supporting tool in managing their medication at home, especially at the beginning of the treatment.

“I still have the medication list I received from hospital. Without it would have been difficult to remember what and when to take. See, this tablet, I only have to take a half. Yes, without this list I could not remember this”;

“The doctor gave me information on paper, I used it a lot in the beginning. Now I do not have to look it anymore. But sometimes of course they change the scheme, then I need it again”.

“I have a very-very good FD. She always gives me instruction on paper. So I have good overview of my medication. But I have heard from my friends that this is not common practice”.

After being in contact with a specialist, the next step is again FD who takes over the process of managing patient’s medication. If necessary, FD makes corrections and controls the process further on. Of course, when there is a need, the specialist will be involved again, but in general FD reviews and leads the course of treatment.

The next contact point for the patient is pharmacy, where medicines are bought. Usually pharmacist repeats the instructions or at least asks if this is needed. In case patient wishes so, the normal procedure is to write the instructions of usage on the package. More than the usage of medicines, the discussion in pharmacy is about choosing between original and different generic products. One of the issues pointed out was that patients would like to receive always the same brand. But unfortunately this information is not stored anywhere and cannot be seen from DPC. Patients claimed it difficult to remember exactly which product they bought last time.

“Pharmacist cannot see the name of the exact medicine that I bought last time. So it is like a guessing game in pharmacy, did the name start with C or R, was it blue or red box”;

“My memory is not the same anymore. If I do not write down the name beforehand, I might not remember it in the pharmacy. It is embarrassing”.
Most of the interviewees went to the same pharmacy and stated that they had developed a very good relationship with their pharmacist. Pharmacy is also the place where people check how many active prescriptions they have left, some pharmacies even provide printout for patients. As mentioned earlier, the awareness of the possibility to check that information at eesti.ee or Patient Portal was very low.

When active prescriptions are used and patient needs a new one, the next step is usually a phone-call to family nurse. All respondents were really satisfied with that possibility. In most cases, the nurse just prolongs the prescriptions and asks no additional questions.

“I just tell her what I need and everything is done”.

Only one respondent said that nurse once asked him how exactly he takes his medicines. Merely positive comments were mostly provided for this part of the process. Just once one person experienced a situation when the nurse forgot to prolong the prescription and she had to reorder it the next day.

The last common point in outpatient medication management journey for the patient is home. Some of the routines in managing medication were already mentioned and described in the previous chapter, including the medication list provided by doctor and pill boxes. Some people use their own alternatives, like bottles or bowls, but the idea is similar – to prepare daily or weekly medicines beforehand in order not to forget.

Family members’ support was also very widely mentioned. Two thirds of the interview participants claimed to have somebody in their family who has more knowledge in medicine with whom they time to time consult or who just occasionally supports and checks the situation.

“I occasionally check with my daughter. She is a nurse”;

“My sister sometimes calls and asks if I am taking my medicines correctly. She is a doctor in Finland. She also brought me this pill box”;

“Me and my husband, we both take medicines. So we keep an eye on each other.”
At home, when question arises regarding the medicine not in the medication list, the first place to search additional information is from product package and information leaflet. As regards the OTC medicines, all respondents claimed to rely on FD recommendations.

“Usually I buy OTC medicines only when doctor suggests. But I do not buy them much, you know, I have to take a lot of medicines anyway”.

Later it still appeared that a lot of information is also acquired from commercial magazines and advertisements.

“From magazines we look what is new and good to take to improve my condition. My wife is super in this matter, very diligently looking for those things”; “I choose based on advertisement what to buy. If fish oil is claimed to be in good capsules and does not smell fishy, I choose them”.

Female respondents over 70 also discuss and compare medicines with their friends. Some of their decisions to buy OTC medicines are based on friends’ recommendations.

The major TP for each patient in their medication management journey today is doctor, FD and/or specialist, pharmacist and at home information leaflet and product package. The order of contact is not always the same and each TP can be contacted several times during one journey cycle.

Considering the findings provided in the previous chapter, a Patient Journey was created for the Persona created in the analysis stage of the SD process, i.e. patient called Helle (see Appendix 4).

4.3 Creating Service Blueprint

In the following chapter, to cover the developing phase, the process of creating the Service Blueprint for the services related to MMP (see Appendix 5) will be described.
Service Blueprint enables to get an overall picture of the related direct onstage and backstage events (Bitner et al. 2008). According to Bitner et al. (2008), a typical Service Blueprint consists of five key components:

- Customer Actions (in our case Patient’s Actions)
- Onstage/Visible Contact Employee Actions (in our case HPs Actions)
- Backstage/Invisible Contact Employee Actions (in our case HPs Actions)
- Support Processes, and
- Physical Evidence

All these components are separated from each other with specific lines that will be described further on in this chapter. Patient actions are the central part of Service Blueprint and all of the phases that patients encounter during the service provision process are listed chronologically at the top of a flowchart. The line of interaction separates the patient activities from the visible HP actions (Bitner et al. 2008). With invasion of technological solutions in the service sector, onstage and backstage contacts can also occur between person and technology (Miettinen and Koivisto 2009). Onstage is therefore where either a face-to-face contact between patient and HP occurs or patient’s direct contact with technology takes place. After that, the line of visibility splits onstage and backstage activities of HPs and technology (Miettinen and Koivisto 2009). All actions that appear below the line of visibility are not seen by the patient, while everything above is visible. The final line is internal line of interaction that separates internal HP and technology actions from contributing processes. These are the support processes that need to take place in order to deliver the service. Vertical arrows show the connections between different parts and how the different service parts work together. As a final point, at the very top of the flowchart for each customer activity tangible evidence is presented (Bitner et al. 2008).

To conclude, Service Blueprint is presented as a flowchart that similarly to Customer Journey shows the service path, but in addition to that it also shows the
essential parts of the service that are not visible to customers, but are important for the service to run smoothly. Blueprint shows how different parts of a service, actions and processes are connected to each other and support the whole course of service.

Based on the information heard from qualitative interviews, Persona and Patient Journey, the author of this paper creates a Service Blueprint in a manner described above for the services related to MMP featuring the eMedication list.

As it appeared from the previous chapter, patients really valued the medication list on paper provided by their doctor. During the interview it was also questioned what would be their opinion if this list was available over the Internet. Those who had a well developed system in place and their list was regularly updated by their doctor, saw no benefits to them personally in seeing this information in the Internet. But those people who did not have such a smooth procedure in place, those who did not receive such a list or had a list from the beginning of their treatment and had to update it themselves, 9 respondents, expressed their positive attitude and willingness to use it.

“Medication list electronically, I should see it from the computer, right? I would take a look, beginners definitely. I would check my prescription, how many is left.... They used to be on paper, keeping track was then easier”;

“eMedication list would help, yes. If I would lose my paper list, I would be in trouble”;

“I still use it sometimes when I divide my medicines to the pill box. I have had it since 2011”;

“I would like the possibility to go to the Internet with my ID card and check my medication scheme”.

Even those people who were not Internet users pointed out how they could benefit from the system.

“If it would be possible to print out, that would really help. I do not go to Internet myself, but I would ask my daughter to print it for me”;

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“So I could see myself what medicines and how to take? Well, I do not feel very homey in Internet, but if somebody instructs me for the first time, then I could manage. It would be also good if I could ask this print out from pharmacy”;

“eMedication list is very welcomed. I would also print out this list for my mother, she doesn’t use Internet. I can check her medicines better as well”.

Regarding the medication list, some comments were made what data it should contain in addition to what the paper list does. Common suggestions were the actual name of the medicine in addition to active substance and information regarding how many active prescriptions are left.

Other benefits of the new service were also recognised by patients besides in helping them at home to manage their procedure. The importance of information sharing between different TPs was commonly acknowledged by all participants. Half of the respondents were convinced that information is already well shared across the healthcare system, which is partly true – doctors and pharmacists can see the prescriptions, but it is complicated to get a quick overview and some important information is missing in the current system.

“For example, I have ended up a couple of times in the emergency department and they have asked do you have your medicines with you, what you are taking. So far, I have been able to provide this information, but I can be in the condition where I am not able to do that. This medication list should be available for all doctors who take care of you”;

“When some other doctor is examining me, I must be able to tell her right away exactly when I had my surgeries and whatever. Good that I can remember now. My health information should be always available. The situation could be that I am not capable of giving this information”;

“It should be mandatory for a doctor to store information electronically. I am treated by several doctors in different places. My medical history is very thick ... nobody is going to flip through it when in hurry. But the other doctor must have an overview”. 
So, patients do not expect doctors to have only an overview of medication related information, but other important health related data as well. Like a snapshot of their medical history.

In summary, benefits of the eMedication list from the patient perspective in managing their medication are:

- It can be used at home as a reminder how to use the medicines
- It is a reliable source of useful information for the caregiver when receiving help from a family member
- It provides quick overview to other relevant HPs in case there is need for it
- It helps to avoid medication errors.

As discussed earlier, also information about OTC medicines taken by the patient needs to be integrated into the medication overview. Regarding preferences in providing such data to the eHealth IS, it became obvious during analysis that one option clearly stood out from the rest. The results are shown in Figure 2.
Figure 2. Preferences of patients in submitting data about OTC medicines to the eHealth information system. Source: Author.

The most popular option was using the help of a pharmacist at the same moment when buying OTC medicines. This possibility was mentioned among top 3 choices by all the participants and 8 of them ranked it as their number one choice. The reasons given were very similar among all respondents. This option seemed to be the easiest, the most convenient and logical way of doing this. To outline this, some of the quotations of interviewees are:

“Well, when I am in pharmacy I am dealing with my medicines and it would be most convenient to have it done there. I am not going to enter anything later. The less trouble the better”;

“When I am buying them, I can get it done at spot... exactly, I do not have to worry later. Most important is that it can be done easily”;

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“To call and enter something later ... no, it takes time and it is too late. I have bought it already. It is too late when I discover at home that this medicine is not good for me. Waste of money. And I could forget later;

„When the medicine is not proper for me, I will have that information already in pharmacy. Then I will not buy it. Otherwise, I buy it and then discover this is not proper for me“.

Family members help ranked in the second place, though it was only once mentioned as the first choice by the respondent whose medicines were anyway managed by the family member. It was three times picked as the second choice and likewise as the third choice. Those who picked their family member did not generally feel very confident in using technology and considered this choice easier than using other options. Still, the first choice for those people was also the pharmacist. FD was twice mentioned as the first choice to provide OTC medication related information. Those two people also claimed to have an excellent relationship with their FD and stated that prior to any decision concerning their medication they always consult with their FD.

Self-service machine in a pharmacy was also quite popular choice, 4 times mentioned as the second option and once as the third, mostly for the same reasons as given for the pharmacist’s help, that the procedure can be done conveniently in the right environment and before purchase. The average age of those who mentioned self-service machine as an easy option was 64 and they all had had previous experience of using self-service cashiers in supermarkets.

To conclude, respondents did express their willingness to provide OTC medication related information as long as this process does not complicate their life. Though, a couple of them remained sceptical and expressed their disbelief in that their FD or pharmacist does not care much of collecting and analysing this data. Still, all of them understood why this information is required from them and considered it as something that could be valuable for them.

According to previously analysed data, Helle is looking forward to the eMedication list to be available, she considers it valuable and helpful. She is willing
to look up the information from Patient Portal, but occasionally wishes to print out the list also. Since she does not have a printer at home, she would appreciate the possibility to ask a print-out from pharmacy also. The best solution for Helle is to check and complete the final information regarding her medicines during the process of buying them in pharmacy. Pharmacist is considered by her as the main source for re-checking the medication related information and a facilitator in choosing the right OTC products. So, for Helle the OTC medicines should be added to the eMedication list and the possible DDIs should be checked in a pharmacy and with the help of the pharmacist. This helps her to avoid redundant purchases and save money. She can also control whether the information stored by FD is correct and updated when changes are made. Having an updated and accurate overview of her medicines electronically available she can be sure that whenever this information is necessary it will be easily accessible to her and her doctors.

4.4 Service Blueprint for the services related to medication management process

The improved MMP is built around two core services: ePrescription and eMedication list. When ePrescription is already implemented and well-functioning, the eMedication list, as a sub-service of the ePrescription system, still needs to be developed. Though the functionalities of the eMedication list supporting patients’ expectations, will be described, the design of the actual application will not be covered in this thesis. It should to be done in the future development process of the service, when input from all stakeholders has been acquired.

The first steps in designing the eMedication list service have been already taken by EHIF and the first mock-up for the medication management user interface from the perspective of FDs has been designed (Parv et al. forthcoming).

Future services related to MMP in Estonia are provided in four main TPs: doctor, pharmacist, webpage and nurse. At each contact point, ePrescription and
eMedication list have an important role in supporting the process to meet the patients’ expectations for the service. Convenience, accuracy and speed of service, which are highly appreciated by patients in MMP, are strongly supported by both, ePrescription and eMedication list, in all TPs.

This chapter explains what happens in each TP in more detail across Service Blueprint components.

4.4.1 Touchpoint: Doctor

**Doctor** is the first point of contact for patients in MMP. It can be either FD or specialist or hospital, depending on the condition of the patient. When patient turns to the doctor or ends up in hospital and medicines are prescribed, the MMP for the patient begins.

- **Customer Actions** – patient receives information about her condition, treatment plan, confirmation that the prescription is issued and instructions how to take her medicines. In recurrent visits, gives also feedback about treatment results.

- **Onstage Actions** – doctor checks the patient’s condition, her previous medication history and current medicines the patient is using. Decides the treatment plan, gives information and instructions. Prescribes medicines. When requested by patient, prints out the list of medicines with administration instructions.

- **Backstage Actions – doctor uses IS, where**
  - ePrescription interface enables electronic prescribing.
  - eMedication list interface supports treatment decisions, giving advice and instructions. Enables to check if patient’s medicines go well with each other. Warns about possible DDIs, therapeutic duplications and risks for allergies. Enables to print out the medication list with administration instructions. Possibility to check if medicines are bought and administered properly.
• **Support Processes**
  
  o **Certification centre** – enables to authenticate patients using ID-code.
  
  o **DPC** – receives, stores and sends information about prescribed medicines. All information exchanged by doctors and pharmacist through DPC is updated in the eMedication list.
  
  o **Other databases** – store and send information to the eMedication list required to detect DDIs, therapeutic duplications, risks for allergies, etc.
  
• **Physical Evidence** – doctor’s office, prescription and instructions.

In this TP, patients expect to receive information about their condition and detailed instructions about the treatment plan. According to interviews, patients trust their doctors and are confident that all doctors have a complete overview of their medicines and check always possible DDIs. The eMedication list displays all active prescriptions registered in DPC, so every doctor the patient turns to have a complete overview of all her current medicines. The tool provides a quick overview and also information about possible DDIs and therapeutic duplications. With that, the patients’ expectations regarding doctors being informed and choosing the best possible treatment for them are met in that TP.

4.4.2 **Touchpoint: Pharmacy**

**Pharmacy** is the next service point for the patient in MMP. With information about the prescription generated by the doctor the patient goes to a pharmacy to buy the medicines.

• **Customer Actions** – patient identifies herself by providing the ID-card, chooses what to purchase and buys products. In case of OTC products, asks pharmacist to submit information to the system (e.g. DPC where in addition to RX medicines also the information about OTC medicines can be stored)
providing the data for the eMedication list and check possible DDIs with other medicines the patient is using.

- **Onstage Actions** – pharmacist identifies the patient, checks prescriptions, sells medicines. Provides information and consultation. In case question arises about the correctness of the RX medicine, the pharmacist contacts the doctor. When the patient wants to purchase OTC medicines, proposes to check in the eMedication list possible DDIs with other patient’s medicines. Gives advice and when asked, provides a print-out of the eMedication list with instructions.

- **Backstage Actions – contacts to pharmacy’s IS, where**
  o **ePrescription interface** enables to retrieve prescriptions and dispense medicines.
  o **eMedication list interface** enables to check what medicines are actually bought, name of the brand, not only active ingredient. Enables to submit OTC medicines to the DPC providing the data to the eMedication list. Enables to check possible DDIs and therapeutic duplications between all active medicines and food supplements. Supports giving advice and recommending suitable OTC products. Enables to print out the medication list with administration instructions.

- **Support Processes**
  o **Certification centre** – enables to authenticate patients using the ID-card or ID-code.
  o **DPC** – receives, stores and sends information of prescribed and sold medicines, including OTC medicines. All information exchanged by doctors and pharmacists through DPC is updated in the eMedication list.
  o **Other databases** – store and send information to the eMedication list to detect DDIs, therapeutic duplications, risks of allergies, etc.
• **Physical Evidence** – pharmacy, medicines, prescription, medication list on paper and receipt.

In pharmacy patients expect that the pharmacist already has knowledge about all the prescribed medicines and recommends OTC products accordingly. They hope that the pharmacist brings up the topic and shows proactivity in this matter. Pharmacy is considered the most suitable place for submitting additional information to the eMedication list and checking the correctness of all medicines. The core aim of the patient is to leave the pharmacy with correct medicines and detailed instructions. Having access to DPC and the eMedication list with the possibility to print, the pharmacist is able to meet these needs and wishes of patients.

4.4.3 **Touchpoint: eMedication list in the web**

The next important point of contact in MMP is the webpage with access to the **eMedication list for the patient**. With medicines bought, instructions received, the patient goes home and starts taking medicines. Where necessary, there is a possibility to check the medicines and instructions in the eMedication list provided over the webpage, Patient Portal, for example.

• **Customer Actions** – patient goes home, starts taking her medicines. Reads information leaflets. Checks the print-out received from the pharmacy or logs in to e.g. Patient Portal and reviews the eMedication list to remind how to use the medicines.

• **Onstage Actions** – Authentication of patient, displaying the eMedication list patient view. Enables to see what medicines are prescribed for what purpose, how to administer them. What medicines are actually bought, name of the brand, not only active ingredient. Possibility to check how many prescriptions are left and when to order new ones.

• **Support Processes** –
  o **Certification centre** – enables to authenticate patients using ID-card.
- **DPC** – all information exchanged by doctors and pharmacist through DPC is displayed in the eMedication list patient view.
- **Other databases** – store and send information to the eMedication list required to provide the administration instructions.

- **Physical Evidence** – website, e.g. Patient Portal.

At home, patients expect to have already correct medicines that are not in conflict with each other. From the eMedication list, the patient expects to find the instructions how to take the medicines. Information about possible DDIs is not relevant at this point anymore, as they are expected to be eliminated already in previous steps. Having access to the eMedication list through the Patient Portal, the patient has a possibility to check information any time in case she/he forgets or loses the print-out provided by the pharmacist or doctor. This possibility eliminates the uncertainty that might occur between visits to doctor’s office and is in correspondence with patients’ needs identified from interviews.

### 4.4.4 Touchpoint: Nurse

The next service providing TP in MMP is **Nurse**. When patient has taken all her prescription medicines and needs to refill them, the next step is to call the family nurse.

- **Customer Actions** – patient calls the family nurse, provides information about what prescription needs to be refilled. When asked, also provides information regarding how treatment is going.
- **Onstage Actions** – nurse authenticates the patient, checks in the eMedication list what medicines the patient is taking, asks additional feedback about the treatment, takes notes and prepares prescriptions. Informs doctor about feedback and asks to authorise the prescriptions.
- **Backstage Actions** – nurse contacts the IS, where:
  - **ePrescription interface** enables preparing electronic prescriptions.
- **eMedication list interface** enables to check what medicines the patient is taking. To check if medicines are bought.
- Doctor analyses the information received from the nurse. Authorises prescriptions and contacts the patient in case of questions.

- **Support Processes**
  - **Certification centre** – enables to authenticate patients using ID-code.
  - **DPC** – receives, stores and sends information of prescribed medicines. All information exchanged by doctors and pharmacists through DPC is updated in the eMedication list.
  - **Other databases** – store and send information to the eMedication list to detect DDIs, therapeutic duplications, risks of allergies, etc.

- **Physical Evidence** – phone conversation, prescription.

Patients also presume that nurses have a complete overview of all their medicines and expect the refill process to be easy and quick. Having access to the eMedication list, nurses have all necessary information to provide the service meeting these needs of patients.

All these TPs can be contacted during MMP several times and in random order depending on the need of the patient. Only the very first time the process starts with a doctor and is usually followed by a pharmacy.

A complete Service Blueprint for the services related to MMP is visually represented in Appendix 5.

### 4.5 Discussion

According to data gathered from interviews, a written medication list is desired and considered helpful by a majority of patients who take more than two medicines concurrently. To improve the current service, access to a written medication list should be provided for every patient. An electronic medication list,
i.e. eMedication list seems to be an eligible solution for everybody, both for those who want to check their medicines online and for those who want to print out their list. A print-out from the eMedication list can be asked either from pharmacy or can be done at home by the person herself or by the caregiver.

As interviews demonstrated, the younger the respondents the more accustomed to technology they were. Hence, the author of this thesis wants to emphasise that further developers of the service should look into the future and develop the service already in a manner that it would meet the needs of the current main service user profile as well as the next generations’ expectations. For example, they should consider using self-service machines in pharmacies or smartphone applications, as these options were mentioned as preferable possibilities by younger respondents.

Another point to ponder is to develop a reminder system (to remind the patient when it is time to take the next tablet/dose) to be used at the beginning of treatment until a routine develops. As it was discovered from interviews and authors own experience, the hardest part to cope was the very start of a complex treatment. In the opinion of the author, it could be either SMS service or part of a mobile application that is connected to patient portal and contains other features as well. These options are just the author’s thoughts based on her own experience and must be verified by service users and developers whether they are desirable and feasible.

Another thing that was pointed out by a couple of patients is that making the service available is not enough, the information about the importance and availability must also be communicated to the public. The author of this paper shares this opinion and agrees that proper communication in marketing the service to the public is essential to achieve the success and desired results.

To conclude, the current Service Blueprint created in this thesis represents the view of patients, how they see the service meeting their needs and the behavioural patterns. This version needs to be verified with all other stakeholders involved in delivery or development of the service, as introducing the eMedication list requires development and implementation of a new software and for doctors and pharmacists
this new service model results in additional work tasks. Hence, the next steps in developing the service according to the SD process should be convening representatives from all relevant stakeholder groups together and organise workshops to achieve a common understanding how to meet the patients’ expectations in a manner that suites all counterparts. Persona, Patient Journey and Service Blueprint presented in this paper can be used in these workshops to represent the patients’ views and to keep focus on their wishes.
CONCLUSION

The healthcare system is going through a rapid change and one of the key drivers in this has been the fast development of the IT and technological sector, a lot of opportunities to improve the system is seen in creating public eHealth services. The focus of this work was on the opportunity seen in the eMedication list helping patients to better manage with their medicines and coordinate their treatment between different healthcare institutions.

A problem today is that information is not properly exchanged between relevant counterparts, it is not sufficient and satisfies neither healthcare representatives nor patients. In addition, some of the services that are developed today are not properly adopted by the intended users. This thesis shows possible benefits of using the SD process and methods to overcome these problems in developing future eHealth services and demonstrates how to involve patients in the design process.

The objective of the research was to understand how the services related to MMP are currently experienced through the eyes of patients, discover problems, expectations and opportunities for improvement. In summary, it was discovered that patients developed their own systems to manage their medication and are modest to complain or ask for help from HPs when struggling. Management of the medication became complicated when patients had to take more than 3 medicines concurrently. Those patients who received a written medication list from their doctor were more satisfied with the situation than those who did not. Today, providing of a written reminder is not a routine procedure for every FD but it is highly appreciated by patients. All the interviewees praised the ePrescription system by saying that it is very convenient and easy. The author noticed from answers that the success of the
ePrescription system is paving the way to other eHealth services. Patients had been experiencing the benefits that the ePrescription service offers and that made them more open to consider other similar services. The research results showed that the proposed eMedication list is seen as a useful service by patients, especially in the beginning of treatment. They also expect the information to be complete, available online and shared between different HPs.

Another important finding was that patients are willing to provide information about the medicines they buy over the counter. But the procedure of doing that should be as simple as possible and part of the current process of buying medicines from pharmacy. The reasoning behind that was that it is convenient and helps to avoid redundant purchases. It came out from interviews that patients were aware of the possible side-effects and DDIs between medicines, but did not pay much attention to them in real life as it tended to be too difficult. So, the tools helping to identify these are welcome and as mentioned earlier, patients are willing to contribute to making the medication lists accurate and complete.

Based on the findings from interviews, during the analysis and generating phase of the design process, a primary patient profile in the form of Persona together with the Patient Journey was created. As the main outcome of this thesis, a future Service Blueprint was presented – how the MMP with the eMedication list should look like from the patient perspective. Service Blueprint developed in this master’s thesis is the first step in the design process of the services related to MMP and serves as a platform and inspiration for further development of these services. During future design process it needs to be detailed and expanded further with input from other relevant counterparts, e.g. pharmacists and doctors, collected during stakeholder workshops and research. Persona, Patient Journey and Service Blueprint created in this thesis should help future developers to take into account the real users’ expectations and needs in the design process of the services related to MMP in general and of the eMedication list in particular.
REFERENCES


RESÜMEE

TEENUSEDISAINI METOODIKATE RAKENDAMINE FARMAKOTERAAPIA PROTSESSI PARENDAMISEL PATSIENDI VAATENURGAST

Käesoleva magistritöö eesmärgiks oli disainida ravimite tarvitamisega seotud protsess seda toetavate teenustega patsiendi vaatenurgast. Töö põhineb teenusedisaini metoodikate rakendamisel teenuse arendamise protsessis.

Töö teine peatükk keskendub teenusedisaini valdkonna tutvustamisele, kirjeldades teenuse disaini eripära, protsesside ning kasutatavaid metoodikaid. Eraldi alapeatükina on väljatoodud teenusedisaini rakendamine tervishoiusektoris ja kohandumine antud valdkonna eripäradega.

Kolmas peatükk juhatab sisse magistritöö empiirilise osa, tutvustades uurimustöö metoodikat ja valitud meetodeid.

Viimane peatükk sisaldab uurimistulemuste analüüsi, mille käigus töö autor loob ravimite tarvitamise protsessi toetavate teenuste põhikasutaja profiili (Persona) ja kaardistab patsiendi tänase ravimite tarvitamisega seotud teekonna (Patient Journey).

Magistritöö lõpptulemiks on täielik farmakoteraapiat toetavate teenuste plaan (Service Blueprint) patsientide vaatenurgast, kus nähtub skemaatiliselt kuidas erinevad teenuste komponendid on omavahel seotud ning teineteist toetavad.

Töö tulemusena valminud põhikasutaja profiil, patsiendi teekond ning teenuste plaan on esimeseks patsientide seisukohti esindavaks sisendiks edasises teenuste arendamise protsessis, võimaldades järgmistes arendusetappides arvestada lisaks arstide ja apteekrite soovidele ka patsientide vajadustega.
APPENDICES

Appendix 1: Details of research sample.

<table>
<thead>
<tr>
<th>No.</th>
<th>Time of interview</th>
<th>Gender</th>
<th>Age</th>
<th>Number of RX medicines</th>
<th>Years of taking medicines</th>
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</thead>
<tbody>
<tr>
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<td>2</td>
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<td>4</td>
</tr>
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<td>20</td>
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<tr>
<td>12</td>
<td>17.02.2015</td>
<td>Male</td>
<td>70</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Author
Appendix 2: Touchpoint cards used in interviews

Source: Author
Appendix 3: Persona profile, describing primary user of the services related to medication management process

<table>
<thead>
<tr>
<th>Helle Kask</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age: 65</td>
</tr>
<tr>
<td>Gender: Female</td>
</tr>
<tr>
<td>Hometown: Tallinn</td>
</tr>
<tr>
<td>Marital status: Married</td>
</tr>
<tr>
<td>Children: 2 children and 3 grandchildren</td>
</tr>
<tr>
<td>Job: Just retired</td>
</tr>
</tbody>
</table>

"I understand that I have to take my medicines in order to control my condition and have a normal life, but I want the process to be as little disturbing as possible."

Helle is 65 years old and just retired. She lives with her husband in Tallinn and is enjoying her life. She likes to travel and spend time with her grandchildren. Occasionally she goes to theatre with her husband and cafeteria with her friends.

Due to her illness she has been taking medicines for some years already. But now she has been diagnosed another disease so the number of medicines she has to take is being increased to four. She says it is more difficult to keep track of medicines and organize them. She also states that her memory is not the same anymore, so she has to write everything down. She is looking for ways to make this process easier for her, as she understands there is no escape from medicines and she has to take them for the rest of her life.

She also occasionally buys OTC medicines and food supplements for herself and her husband. Mostly during cough and cold period, but also when she sees something interesting from magazine. She has not thought of checking if they are good to take with her other medicines. She believes that her FP and pharmacists have very busy schedule, so she tries not to disturb them too much with her questions.

She is very independent and wants to cope with everything herself. Though she does not feel very confident in using computer and Internet, her children have taught her to use e-mail, Skype and banking service. So now she is able to use them without any assistance and feels confident. In case of new things she still needs some help.

<table>
<thead>
<tr>
<th>Goals</th>
<th>Live normal life</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Keep her illness under control</td>
</tr>
<tr>
<td></td>
<td>Make the process of taking her medicines as simple as possible</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motivates</th>
<th>Simple and logical solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clear benefits (saving time, saving money)</td>
</tr>
</tbody>
</table>

| Demotivates | Complicated processes, that require too much effort to perform |

| Technology use | Moderate |

Source: Author
Appendix 4: Patient’s Journey through the medication management process

<table>
<thead>
<tr>
<th>Touchpoint</th>
<th>Specialist, Family Doctor, Hospital</th>
<th>Family Doctor</th>
<th>Pharmacy</th>
<th>Family Nurse</th>
<th>Home</th>
<th>Information leaflet of medicine</th>
<th>Magazines</th>
<th>Supporting person</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current experience</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helles’ actions</td>
<td>Provides test, gets diagnosis and treatment plan</td>
<td>Describes her symptoms, gives feedback about treatment</td>
<td>Buys medicines</td>
<td>Re-orders prescriptions</td>
<td>Takes her medicines</td>
<td>Looks for information about her medicines</td>
<td>Looks for information about new treatment possibilities</td>
<td>Discusses her condition and treatment</td>
</tr>
<tr>
<td>Helles’ questions</td>
<td>What is wrong with me?</td>
<td>Is my condition under control?</td>
<td>Is it the same medicine as last time?</td>
<td>Did she send it to the pharmacy?</td>
<td>How and when should I take them?</td>
<td>What is it exactly for, what else should I know about them?</td>
<td>What new and interesting are available?</td>
<td>What do you think about my treatment plan?</td>
</tr>
<tr>
<td>Helles’ latent needs</td>
<td>Written instructions. Information storing in eHealth system.</td>
<td>Written instructions. Information storing in eHealth system.</td>
<td>Information whether all her medicines work well together.</td>
<td>Checking if all prescription are used properly and remind instructions.</td>
<td>Reminders. Checking if she is taking her medicines properly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaps</td>
<td>Written medication list is not always provided. Information is not well shared.</td>
<td>Written medication list is not always provided. Information is not well shared.</td>
<td>Pharmacist does not always check what other medicines are used.</td>
<td>Nurse does not always check if prescriptions are used and medicines are taken properly.</td>
<td>No concrete source to look for correct and latest information.</td>
<td>Complicated and long to compare if medicines do work well with each other.</td>
<td>May not be fully informed about her condition. Has to rely only on Helles’ words.</td>
<td></td>
</tr>
<tr>
<td><strong>Expected future experience</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible improvements</td>
<td>Always provide written information for patient. Create complete overview in eHealth system.</td>
<td>Always provide written information for patient. Create complete overview in eHealth system.</td>
<td>Always ask what other medicines the patient is using, including OTC medicines.</td>
<td>Always check if there are any abnormalities in prescription usage and discuss with the patient.</td>
<td>Make source of information available, either on paper or electronically.</td>
<td>Create an easier solution to check possible interactions between medicines.</td>
<td>Make a source of information available, either on paper or electronically.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author
Appendix 5: Service Blueprint for the future services related to medication management process from patient perspective