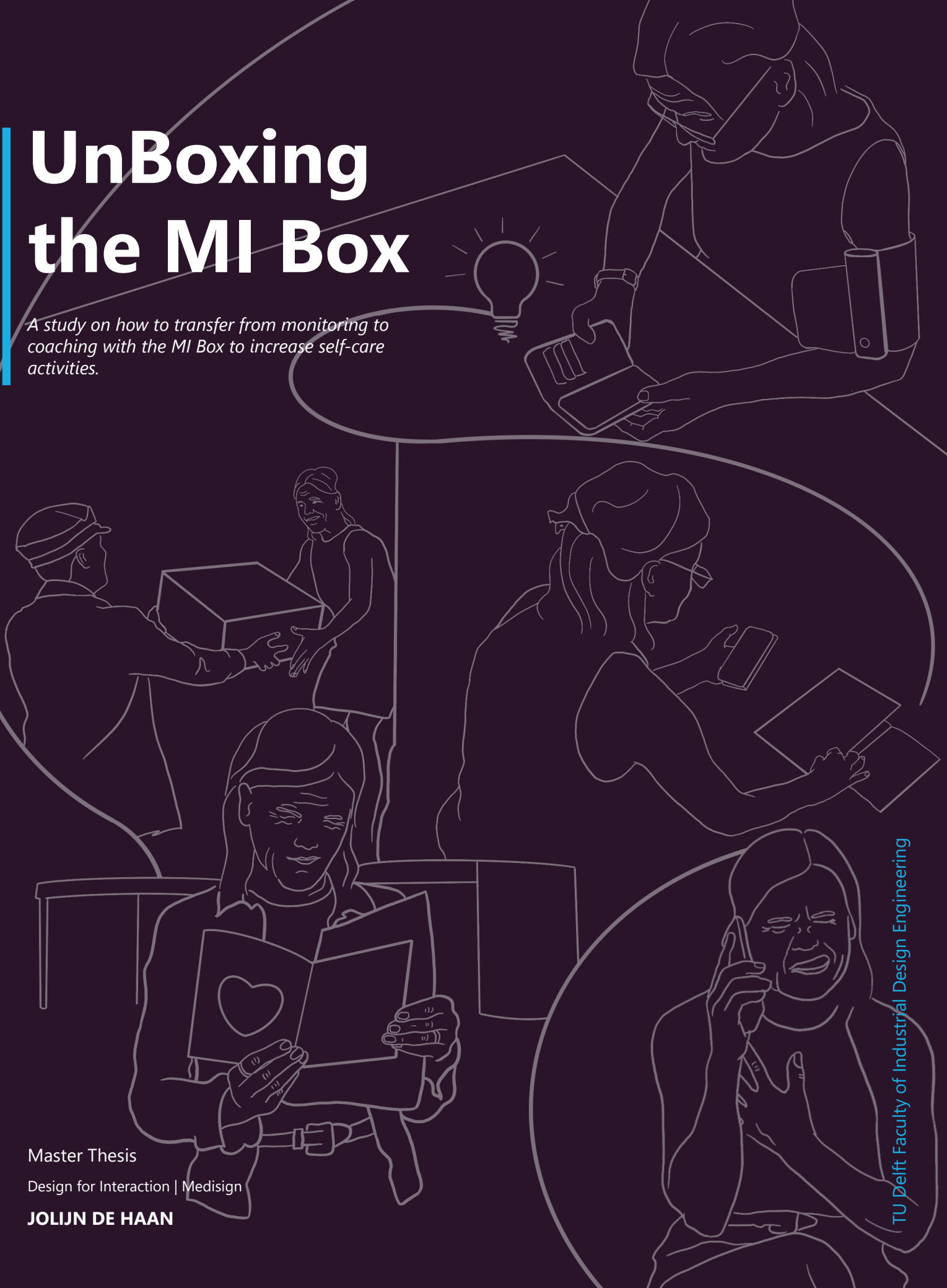


# UnBoxing the MI Box

*A study on how to transfer from monitoring to coaching with the MI Box to increase self-care activities.*



Master Thesis

Design for Interaction | Medisign

**JOLIJN DE HAAN**

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*A study on how to transfer from monitoring to coaching with the MI Box to increase self-care activities.*

JOLIYN DE HAAN



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## Problem Background

Cardiovascular disease (CVD) is the most common cause of death in the world (Johnston et al., 2016). One of the main causes for cardiovascular mortality is a myocardial infarction (MI) (Jneid et al., 2013; Mishra & Ramavataram, 2021; Verburg et al., 2019). A myocardial infarction is an event in which the heart muscle is damaged because of a complete or partial absence of oxygen supply (Mishra & Ramavataram, 2021).

The healthcare system is pressured by the enormous number of CVD cases (Kaushik et al., 2020). Digital care has gained recognition in the past decade because of its potential to release some pressure from the healthcare system. With the potential of digital care in mind, Leiden University Medical Center (LUMC) has developed a concept called “The MI Box” which provides patients who have had an MI with self-monitoring devices (The Box, 2021).

During the hospitalisation phase of the MI care trajectory, there is little time to involve patients in their care because healthcare

professionals (HCPs) need to work as quickly as possible to avoid as much heart damage as possible. This is causing patients to have a bad discharge experience. The MI Box shows potential to involve patients more after the discharge as the concept shows the monitored values to patients. However, it can be difficult for patients to understand these values and how to use them for self-care activities, especially because of the little involvement during hospitalisation. If LUMC wants to satisfy its aim to change from monitoring to coaching, it is crucial to provide patients with enough support to work with their monitored values and perform self-care activities.

Increasing patient involvement is an essential first step before shared decision making (SDM) can be realised. SDM is a suitable approach for the change towards coaching as it invites patients to make their own care choices. In the MI care trajectory, the implementation of SDM is currently lacking. Therefore, further analysis of SDM is needed. A tool that is valuable for the analysis and

increasement of SDM, and which is used in this thesis, is the Metro Mapping tool (Metro Mapping, n.d.).

Besides, because the MI Box causes care to be transferred to a patient’s home environment, it is necessary to consider the home context of a patient as care activities do not happen in

a controlled hospital environment. Currently, little is known about the context in which the MI Box is used. Therefore, more knowledge about the context is necessary to consider what support means would be suitable to offer to patients to make them more empowered to perform self-care activities.

## Main Research Question

How to shift from monitoring to coaching with the MI Box?

## Research Activities

During the research phase, the following activities were performed:

- Literature research;
- Interviews: HCPs (n=5), MI patients (n=4), MI Box users (n=2);
- Context mapping;
- Metro Mapping.

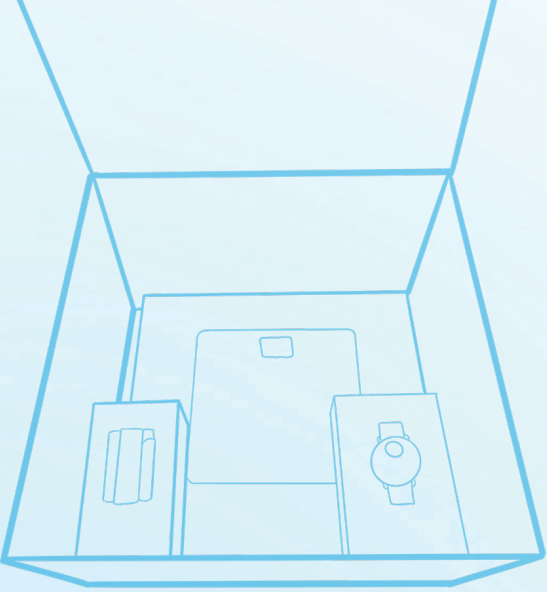
## Design Goal

The following design goal resulted from the research analysis:

The goal is to increase patients’ confidence to perform self-care activities by increasing patients’ involvement and guidance with the use of the MI Box.

# Concept Proposal

The result of this thesis is the concept proposal called “**UnBoxing the MI Box**”. This concept is visualised on these pages.



## 4. Connecting the devices

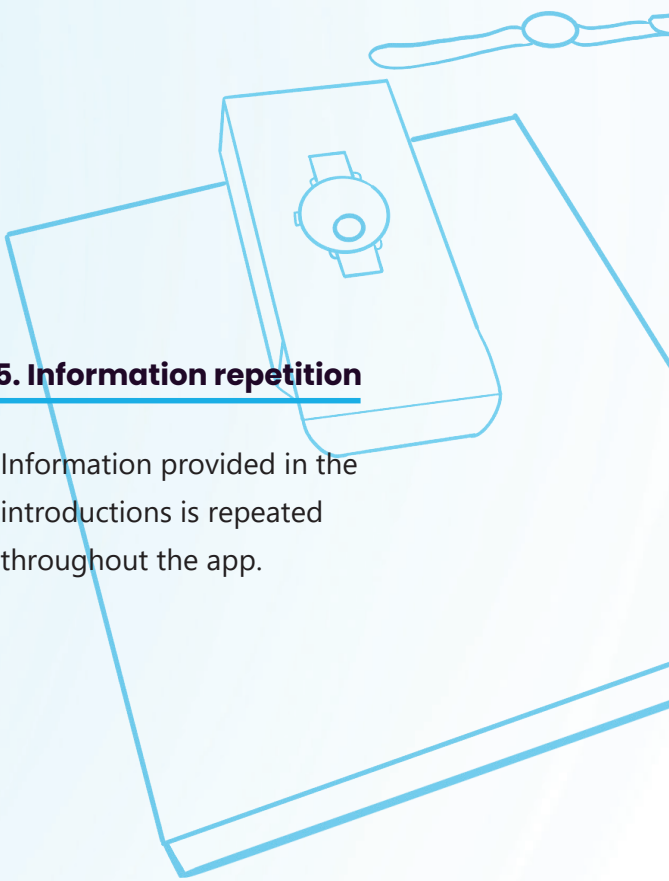
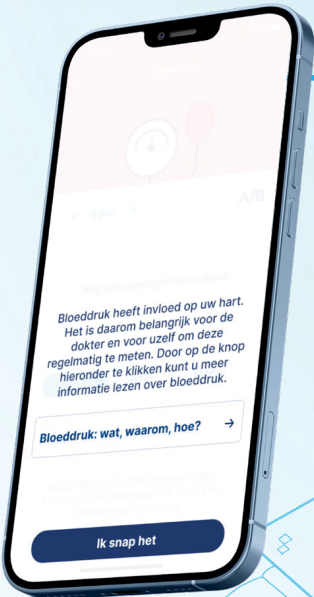


Different introductions in the app **involve** and **guide** the patient to increase **self-care activities**. Information provided in the introduction is repeated throughout the app.

## 1. Card



## 3. Use of the LUMC Care app



## 5. Information repetition



Information provided in the introductions is repeated throughout the app.

## 2. Purpose of the (MI) Box





## GLOSSARY

- B** • **Basalt**: The rehabilitation centre in the MI Box care trajectory
- **BPM**: Beats Per Minute
- C** • **Clogging**: Cholesterol that is pilling up in the inner wall of an artery
- **CR**: Cardiac rehabilitation
- **CVD**: Cardiovascular Diseases
- D** • **Digital health**: A broad umbrella term encompassing eHealth, as well as emerging areas (i.e. artificial intelligence; Singhal et al., 2020)
- **DG**: Design Goal
- E** • **ECG**: Electrocardiogram, heart movie
- **EPD**: Electronic Patient Dossier
- **eHealth**: The use of information and communications technology in support of health and health-related fields (Singhal et al., 2020)
- H** • **HCPs**: Healthcare Professionals
- L** • **LUMC**: Leiden University Medical Center
- M** • **Metro Mapping**: Metro mapping is a tool that can be used to map out how shared decision making is influenced by the care path, information streams, the environment, the patient, and their care community (Metro Mapping, n.d.)
- **MI**: Myocardial Infarction
- S** • **SDM**: Shared Decision Making
- R** • **Risk factor management**: Decreasing the amount of modifiable risk factors for a (recurring) MI
- T** • **The MI Box**: The Myocardial Infarction Box
- I** • **Ischemie**: A restricted blood flow to parts of the body which may cause tissue damage due to lack of oxygen and nutrients (NCI Dictionary of Cancer Terms, n.d.)

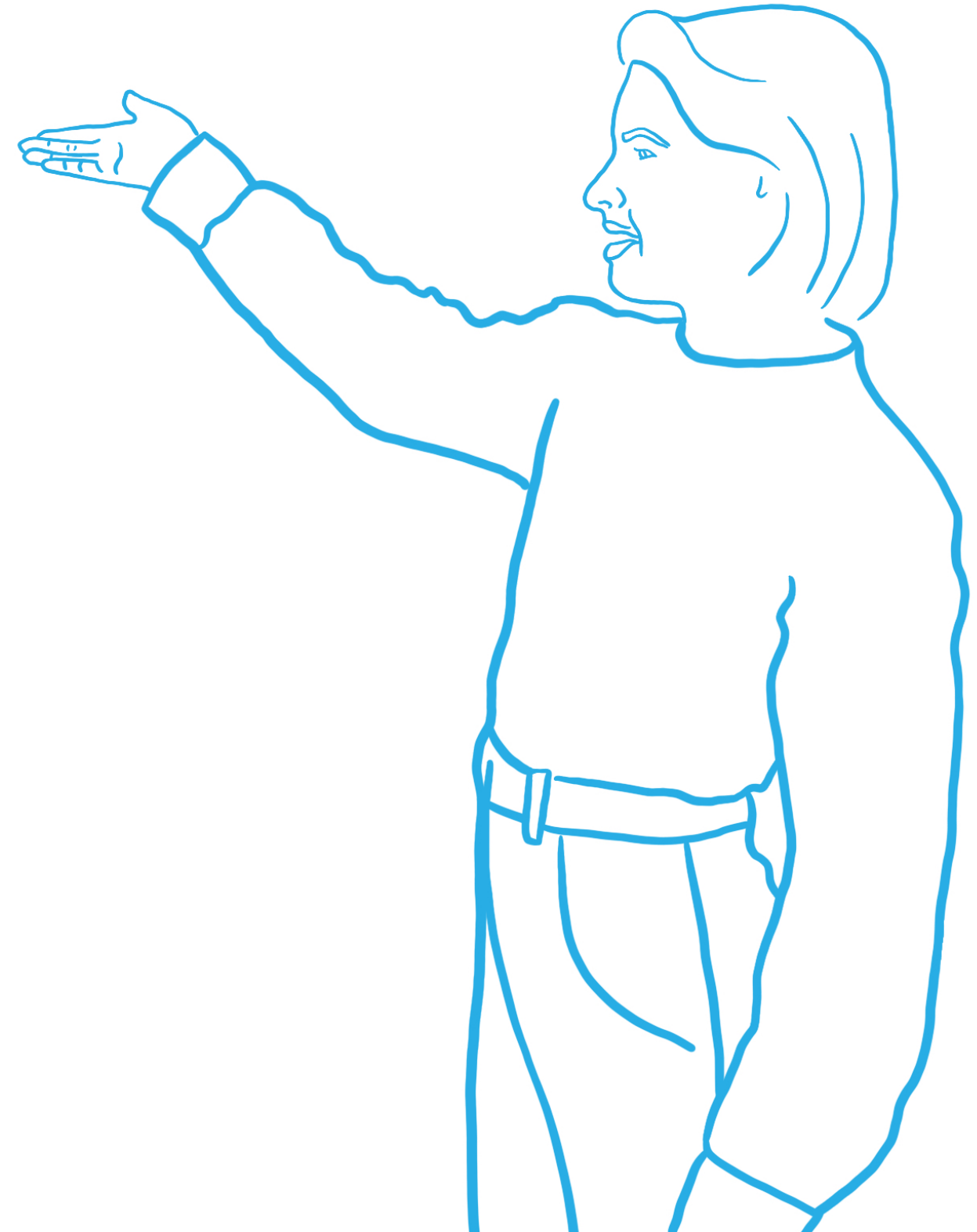
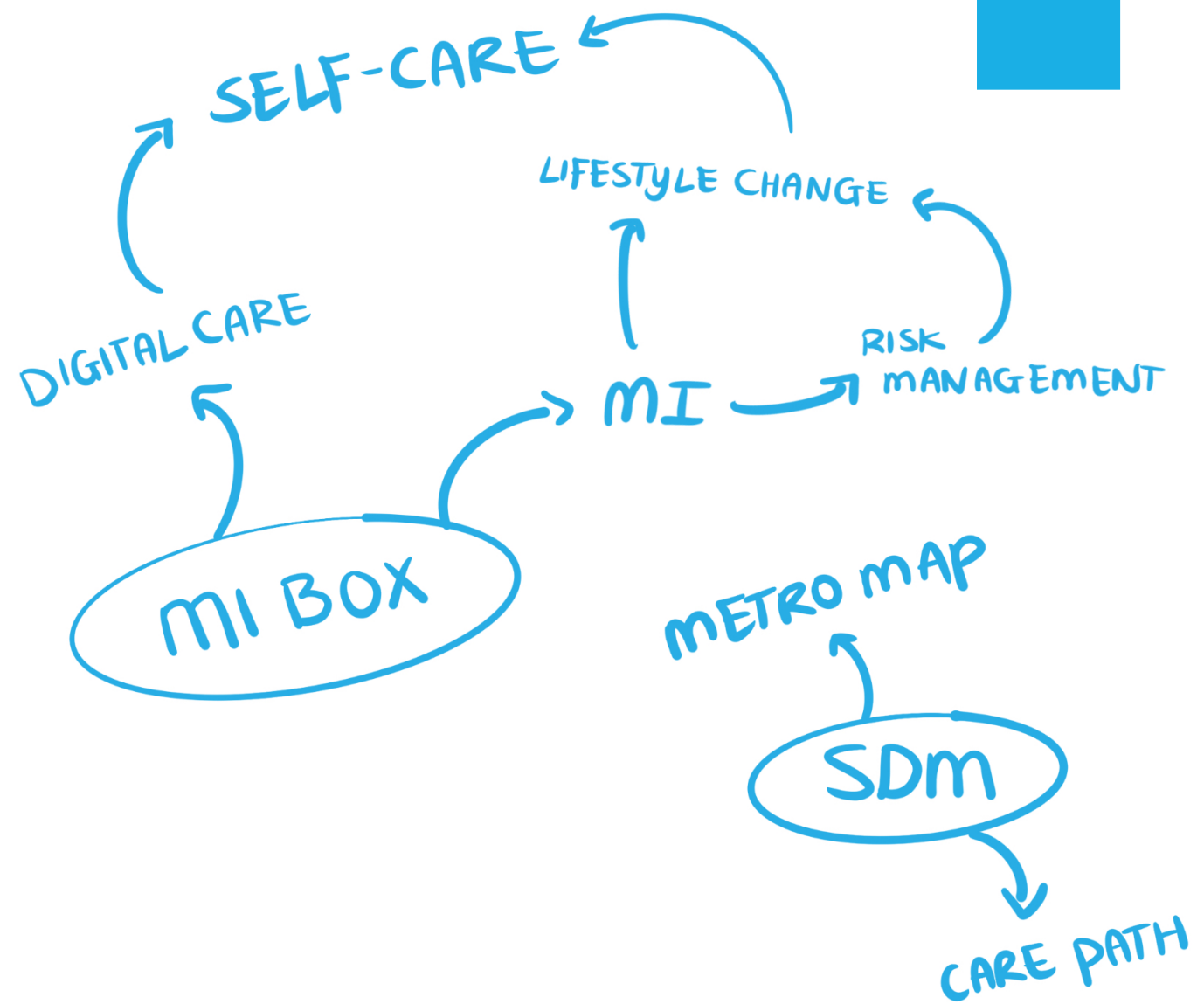


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## INTRODUCTION

# 1



## 1.1. Project Scope

The client of this thesis is Prof. Dr. D.E. Atsma. Dr. Atsma is working at the heart-lung centre of Leiden University Medical Center (LUMC). LUMC provides patients who experienced a myocardial infarction (MI) with a concept called “The MI Box” (The Box, 2021). This is a box with devices provided to MI patients to monitor patients from home. The concept of the MI Box has great potential to involve patients more in their care trajectory as it shows the monitored values to patients (see Figure 1). However, for sufficient involvement, patients need to understand the monitored values and how to use them for self-care activities. Therefore, the aim of the LUMC is to shift from monitoring to coaching patients with the MI Box. In this thesis it is researched how to do this.

Self-care is important for risk reduction of a recurring MI (Riegel et al., 2017). During the care trajectory of MI Box users, patients interact with various stakeholders (LUMC, rehabilitation, family, etc.) and make decisions about their care. These interactions and decisions aim to empower patients to perform independent self-care activities. To perform self-care, patients need to learn how to independently embed the changes needed for a healthier life in their home context to decrease the risk of a recurring MI. This is why the role of the patient’s context during the MI Box care trajectory is analysed in this thesis by means of the Metro Mapping tool and context mapping activities. These tools and activities will be explained in Chapter 2. The analysis with the use of different

tools aims to find opportunities for design interventions for the MI Box. The LUMC Care app is part of the MI Box and functions as the interface of the MI Box. Therefore, this app is an interesting focus to look into how to shift from monitoring to coaching. The design

opportunities resulting from the analysis will be further researched through co-creation activities which will be presented in Chapter 12. These co-creation activities aim for a final concept design that is effective, desirable, viable, and feasible.

## 1.2. Main Research Question

How to shift from monitoring to coaching with the MI Box?

## 1.3. Background Thesis Topics

In this section the main topics that are touched upon in this thesis will be briefly introduced.

### 1.3.1. Target Group: MI Patients

Cardiovascular disease (CVD) is the most common cause of death in the world (Johnston et al., 2016). One of the main causes for cardiovascular mortality is an MI (Jneid et al., 2013; Mishra & Ramavataram, 2021; Verburg et al., 2019). The expression “heart attack” is commonly used for the medical term MI. An MI is an event in which the heart muscle is damaged because of a complete or partial absence of oxygen supply (Mishra & Ramavataram, 2021).

This can cause part of the heart muscle to die. The most common reason for the oxygen shortage is a sudden decrease or stoppage of coronary blood flow caused by clogging. Clogging is the word that is used for cholesterol that is piling up in the inner wall of an artery. Chest pain is the most characteristic symptom of an acute myocardial infarction (Mishra & Ramavataram, 2021). Patients who experienced an MI are at increased risk of rehospitalization because of another recurring MI, heart failure, and ventricular arrhythmias (Verburg et al., 2019). 80% of heart diseases related to mortality occur in people that are 65 or older (Mishra & Ramavataram, 2021).



Figure 1: The MI Box potential

*The CVD mortality is often preventable as more than 70% of the cardiovascular morbidity is due to modifiable risk factors that can be influenced by lifestyle changes.*

*Digital care has gained recognition in the past decade because of its potential to save time, and therefore, release some pressure from the health care system.*

*Shared decision making (SDM) is the process in which a doctor and a patient jointly make a health decision.*

*Encouragement of patient engagement with healthcare beyond clinical settings can help patients to develop an understanding of the relationship between lifestyle choices, medications, and the disease.*

CVD mortality is often preventable as more than 70% of cardiovascular morbidity is due to modifiable risk factors that can be influenced by lifestyle changes (Yusuf et al., 2020). Therefore, the European Society of Cardiology guidelines recommend that these risk factors are addressed in the follow-up of post-MI patients by means of lifestyle advice (Verburg et al., 2019). More information about the risk factors and further details of the diagnosis and treatment of an MI will be provided in Chapter 3.

### 1.3.2. Digital Care: The MI Box

The in-person follow-up in care practices is becoming increasingly difficult to accomplish due to shortages of health employees and increasing numbers of elderly people with chronic diseases (Aamodt et al., 2020). Digital care has gained recognition in the past decade because of its potential to save time, and therefore, release some pressure from the healthcare system (Butcher & Hussain, 2022). Digital care can be described as the use of digital information and communication technologies to collect and share information to improve patient health and healthcare delivery (Kaushik et al., 2020). With the potential of digital care in mind, Leiden University Medical Center (LUMC) has

developed a concept called “The MI Box” which provides patients who have had an MI with self-monitoring devices (The Box, 2021). These devices are able to track step count, weight, blood pressure and pulse. The main purpose of the MI Box is for doctors to remotely be able to track the patients’ vital parameters to see if parameters are reaching a certain threshold. Currently, there is a potential of using this concept for more than only remote monitoring of patients as self-monitoring can increase self-regulation and patient empowerment (Suls et al., 2019). Moreover, digital tools can play a major role in risk management and lifestyle choices (Kaushik et al., 2020). In other words, next to the monitoring purposes, the MI Box has the potential to be used as a coaching means to increase self-care activities. More about self-care will be explained in Chapter 3.5.

### 1.3.3. Shared Decision Making

The phrase “sharing of decision making” was used for the first time in 1972 (Stiggelbout et al., 2015). Shared decision making (SDM) is the process in which a doctor and a patient jointly make a health decision. Nine elements that are important for SDM are definition/ explanation of the problems, presenting options, discussion of benefits and risks,

considering patient values/preferences, discussing a patient’s ability and belief in self-efficacy, knowledge and recommendations of a doctor, clarifying the understanding, make (or postpone) a decision, and arrange a follow-up (Siyam et al., 2019). SDM has been recommended as a key feature of good clinical care by the World Health Organization as it enhances patient autonomy (Butterworth & Campbell, 2014). Maintaining autonomy is a major patient goal (Bente et al., 2021). However, patients’ preferences and willingness to engage in SDM change over time and are context dependent (Eliacin et al., 2015). Encouragement of patient engagement with healthcare beyond clinical settings can help patients to develop an understanding of the relationship between lifestyle choices, medications, and the disease (Kambhampati et al., 2016). This understanding is valuable for the performance of self-care activities (Riegel et al., 2017). Besides, patient’s values, preferences and abilities need to be discussed as the changes that are suggested by clinicians must be implemented by the patients. Therefore, to make sure the implementation of care suggestions will go successfully, it is needed that the care is minimally disrupting the patient’s life and their interactions with their family and social

context (Kunneman et al., 2021). In other words, context is important to acknowledge in SDM. The context becomes especially important if, due to a digital care trajectory, care transfers to the home context of a patient.

### 1.3.4. Metro Mapping

Metro Mapping is a tool that can be used to map out how SDM is influenced by the care path, information streams, the environment, the patient, and their care community (Metro Mapping, n.d.). This tool will be a starting point to improve the care path of a patient. It is a tool that is developed, as an initiative of Ingeborg Griffioen, to support SDM in oncology (Metro Mapping, n.d.). Because it has shown great potential, there is interest in elaborating on the use of this tool in other care paths, like the care paths of the MI Box. In this thesis, Metro Mapping will be used and suggestions for further developments of the tool will be made based on experience of working with the tool in a digital care trajectory. These suggestions will have a big focus on the context layer as this layer will become even more important in a digital care trajectory. The use of the Metro Mapping tool will be explained more elaborately in Chapter 2.



1.4. Project Approach

1.4.1. Assignment

The original assignment of this thesis aimed to increase SDM. This changed throughout the process as the first step to enable SDM is to involve patients more in the care trajectory. During the research phase of this thesis, it became clear there is little to no involvement of the patient in the current MI Box care trajectory which causes a lack of understanding. Because of that, it would have been too big of a goal to increase SDM. This thesis, therefore, aims to increase patient involvement in their care trajectory to

increase a patient’s understanding of the MI Box care trajectory (see Figure 2). In other words, this thesis researches how to perform the first steps to shift from monitoring by the doctor to coaching patients with the MI Box. A focus on SDM throughout this thesis is still relevant as it helps to define the moments in the care trajectory in which involvement is essential. Moreover, it already shows the moments in which, after this thesis, SDM could be increased.

1.4.2. Process

During this graduation project different activities are performed with converging and diverging purposes. The process resulting from these activities is presented in Figure 3 and is inspired by the Double Diamond Design process (Framework for Innovation: Design Council’s Evolved Double Diamond, 2022). The activities can divide the project into four phases: discover, define, develop and evaluate. As a design process is iterative and rarely linear, different steps within the two diamonds are iterated upon.

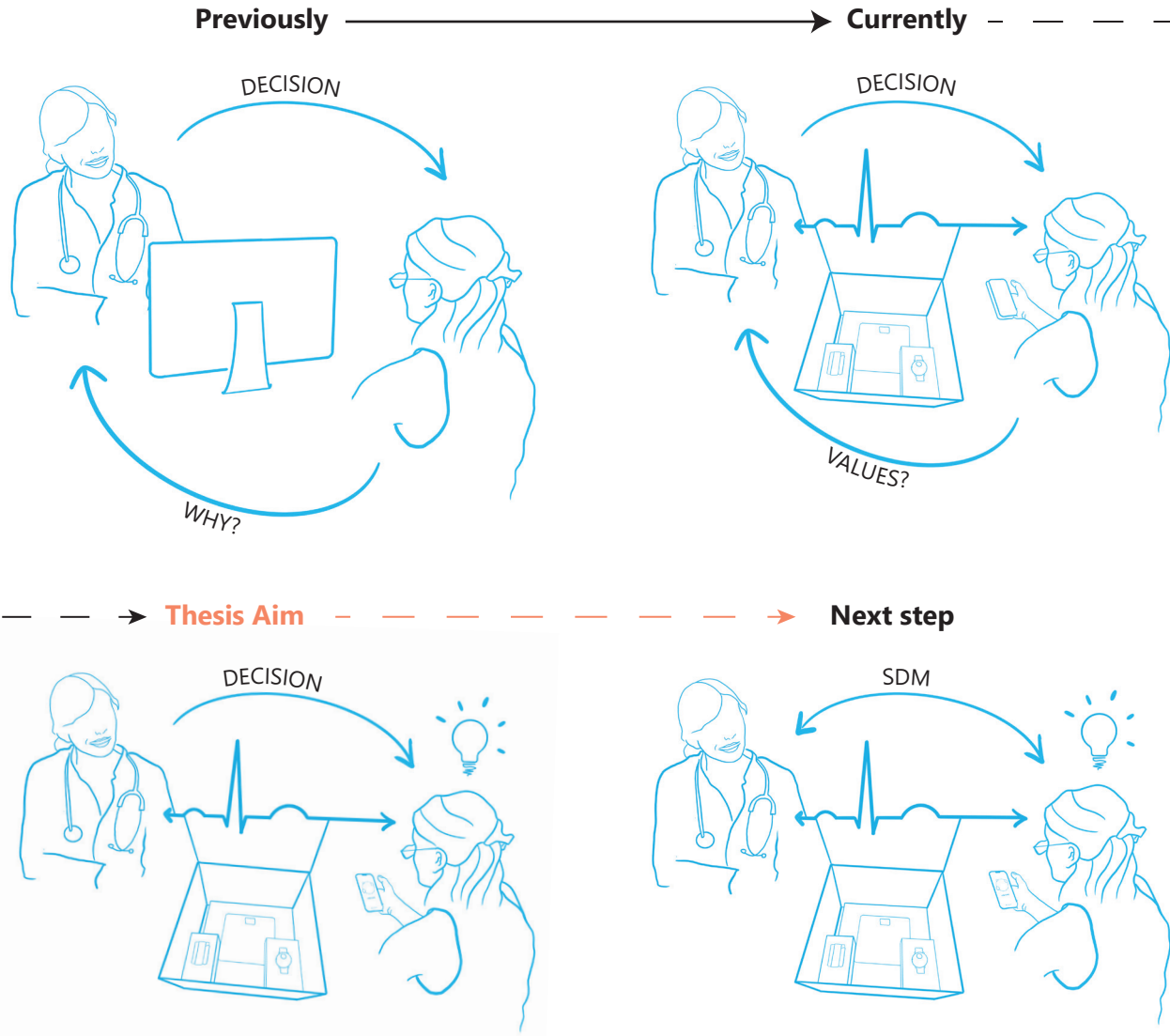


Figure 2: Thesis aim

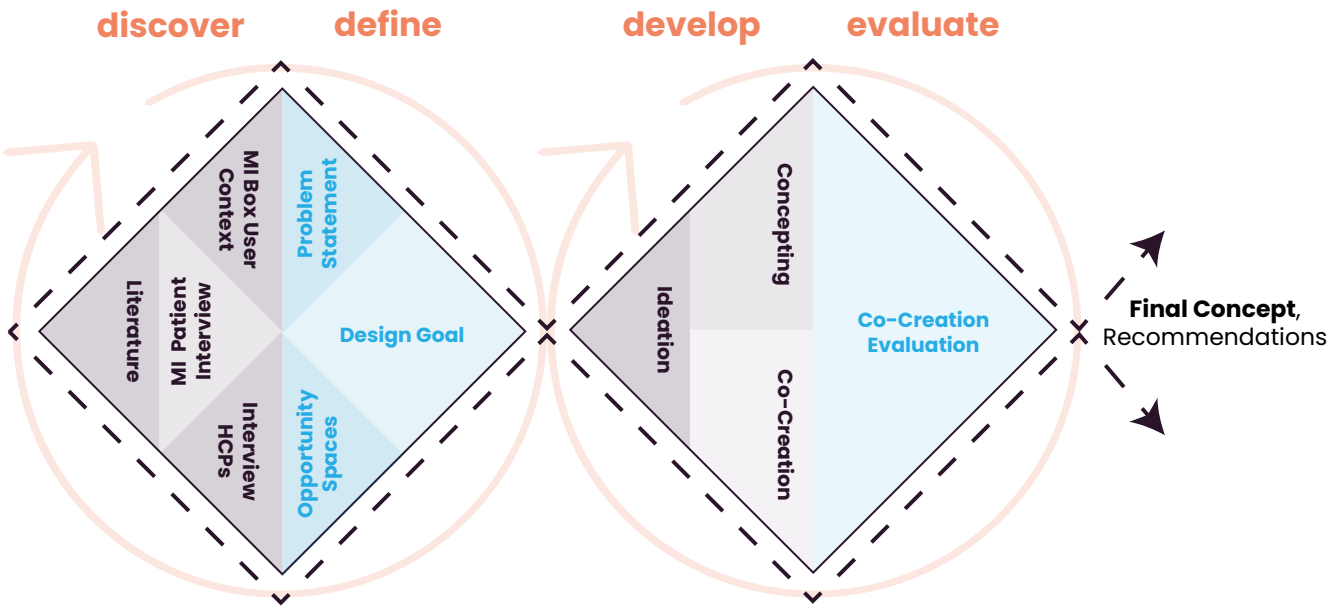


Figure 3: Project process

### Discover

During the discovery phase different activities are performed to get more familiar with the topics MI, digital care, the MI Box, the MI Box care trajectory, the hospital context, the patient context, and the interactions between healthcare professionals (HCPs) and patients. These activities aim to discover how to change from monitoring to coaching. First, literature research is performed to find out more about an MI (symptoms, diagnosis, treatment, etc.), the MI Box components, lifestyle change behaviour, self-care elements, and the SDM model. Secondly, interviews with HCPs are performed to get more familiar with the care trajectory of the MI Box patients and the interactions that take place. Furthermore, these interviews are used to determine the care steps within the Metro Map of the MI Box trajectory. Thirdly, interviews with MI patients are performed to find out more about the wishes and needs of the target group of the MI Box. Due to the difficulty to reach out to MI Box users because of strict protocols around contacting patients at the LUMC, the majority of interviews are performed with MI patients that do not use the MI Box. These interviews provide an idea about the impact of an MI on a patient and their home context. The insights

of these interviews are compared to the insights gained from interviews with MI Box users. Lastly, interviews with MI Box users are performed with the use of context mapping tools. The context mapping tools help to get a better understanding of how the MI Box is used in the patient's context.

### Define

The insights of the research activities are analysed by means of the Metro Mapping tool in combination with context mapping activities. The reason behind these tools and activities will be explained in Chapter 2. Furthermore, various frameworks that are derived from the literature research will be used to look into lifestyle change behaviour and self-care activities of patients. After this, a problem statement is defined and opportunity spaces appear. Finally, a design goal (DG) that aims to solve the problem statement is determined.

### Develop

During the development phase the goal is to look into how the design goal can be satisfied in the most desirable, feasible, and viable manner. This is achieved by performing multiple co-creation activities. Before these

co-creation activities, other ideation and concepting activities have been performed. During the co-creation different concept elements are evaluated with Innovatic, HCPs, MI patients, and MI Box users. Innovatic is the company that developed the current LUMC Care app (Waardevol Werk Waar We Trots Op Zijn | Innovatic, n.d.). Involving the developers in the development process helps to define what solutions can be implemented easily and thus are feasible. Furthermore, during the co-creation, input for the different concepts is created to ensure the desirability and viability of the final concept.

### Evaluate

Various concept directions are evaluated during co-creation sessions. The criteria that

the different concept directions are evaluated on, advocate the increasement of patient involvement, guidance, and confidence to perform self-care activities. This enables evaluation of the design goal stated in the define phase. The evaluation format used will be explained in Chapters 9 and 13. Moreover, suggestions for the evaluation of the final concept will be provided. A final concept is composed with the insights from the co-creation sessions. The most desirable, yet easily implementable, concept elements have been selected for the composition of the final concept.

### 1.4.3. Stakeholders

Different stakeholders are involved during this graduation process (see Figure 4).

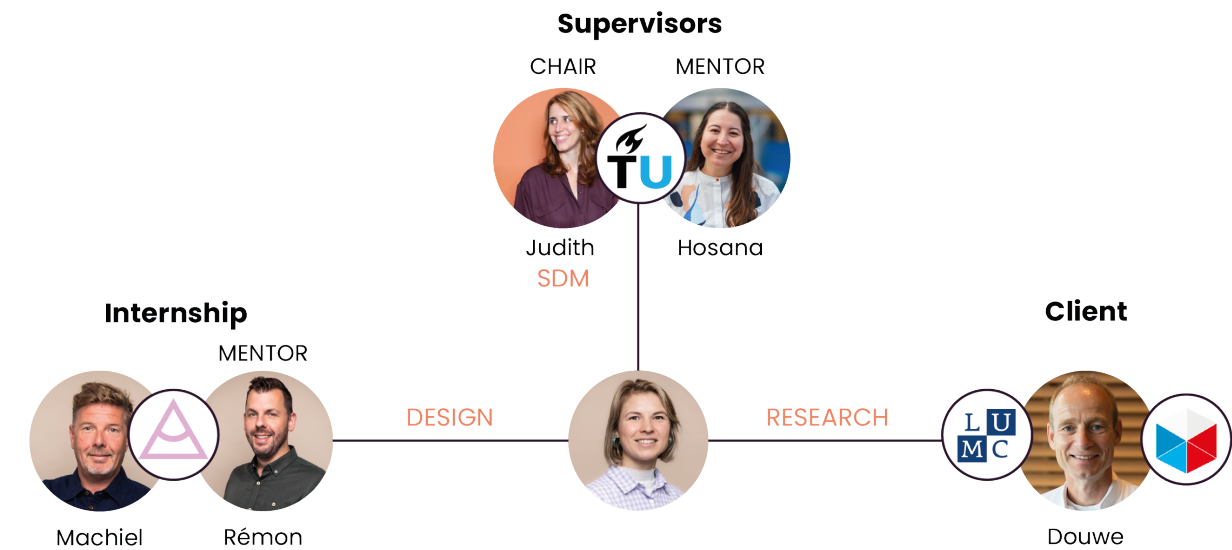


Figure 4: Stakeholders

A short explanation of the different stakeholders is provided below:

- LUMC: LUMC is the client of this project and supports the research activities performed during the graduation process.
- Online Department: As experts in the field of digital design, Online Department is involved in the design process.
- TU Delft: Supervisors of the TU Delft provide guidance during the graduation process by means of their expertises in SDM, design, and academic research.

#### 1.4.4. Ethics

The interview studies are performed under the approval of the Human Research Ethical Committee (HREC) from TU Delft and the Data Steward of the IDE faculty. Both research with HCPs and research with MI patients are approved by the HREC. Besides, for performing research with MI Box users who are patients from LUMC a niet-METC (Medisch Ethische Toetsings Commissie, in English: Medical Ethics Review Committee) approval is required. Therefore, an amendment to ongoing research has been submitted and approved by the Medical Ethical Review Committee.

As part of this HREC and niet-METC submission, it has been determined that all data will be anonymised to protect the privacy and safety of the participants.



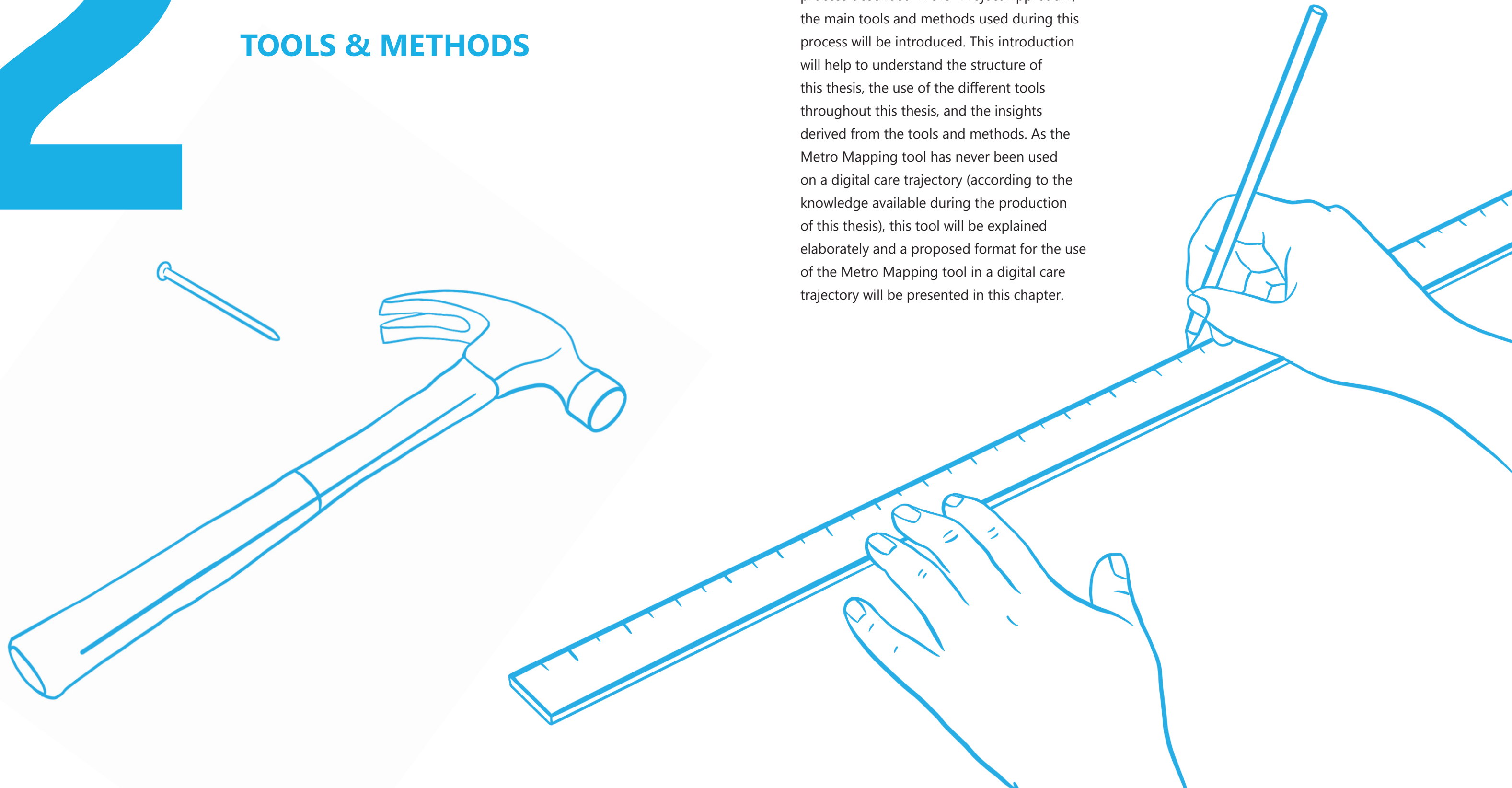
#### KEY TAKEAWAYS | Chapter 1

1. The aim of the LUMC is to shift from monitoring to coaching patients with the MI Box.
2. CVD mortality is often preventable as more than 70% of cardiovascular morbidity is due to modifiable risk factors that can be influenced by lifestyle changes (Yusuf et al., 2020).
3. Digital care has gained recognition in the past decade because of its potential to save time, and therefore, release some pressure from the healthcare system (Butcher & Hussain, 2022).
4. Shared decision making (SDM) is the process in which a doctor and a patient jointly make a health decision.
5. Encouragement of patient engagement with healthcare beyond clinical settings can help patients to develop an understanding of the relationship between lifestyle choices, medications and the disease (Kambhampati et al., 2016).

# 2

## TOOLS & METHODS

Before this thesis will walk through the process described in the "Project Approach", the main tools and methods used during this process will be introduced. This introduction will help to understand the structure of this thesis, the use of the different tools throughout this thesis, and the insights derived from the tools and methods. As the Metro Mapping tool has never been used on a digital care trajectory (according to the knowledge available during the production of this thesis), this tool will be explained elaborately and a proposed format for the use of the Metro Mapping tool in a digital care trajectory will be presented in this chapter.





2.1. Deriving Frameworks From Literature

During the literature research various frameworks and models are found. These models and frameworks help to understand the different topics introduced in Chapter 1. Furthermore, the models are used for analysing and structuring the insights from the different research activities throughout this thesis. The models and frameworks used are the FITT framework (Kujala et al., 2020), the Social Cognitive Theory (SCT) model (Glanz et al., 2015), the SDM model described as 4 steps (Stiggelbout et al., 2015), and a visualisation made out of the core elements of self-care (Riegel et al., 2017). The reason and function of these models will be explained more elaborately in Chapter 3.

2.2. Interviews

Interviews are used as a method to receive qualitative data of the different perspectives in the care trajectory. Interviews are employed with HCPs (n=5), MI patients (n=4), and MI Box users (n=2). In this thesis, a semi-structured interview approach is employed. Open-ended questions are asked in a flexible order that is led by the conversation. This enables space for new and surprising input. Moreover, as answers can be answered more freely, it becomes clear what themes are important for the participant. During the interviews, generative session techniques are used which will be explained in section 2.3.2.

2.3. Context Mapping

To map out the context of the MI patients and MI Box users, methods are used that are described in the Convivial Toolbox book (Sanders & Stappers, 2012). Certain generative research elements from the Convivial Toolbox are employed during all the interviews. The following tools are used from the Convivial Toolbox:

2.3.1. Sensitize Booklet

A sensitize booklet is employed to sensitize MI Box users to think about the use of the MI

Box in their context before the interview (see Appendix A). This booklet is communicated to the patients as a “workbook”. The booklet is sent to the patient before the interview. The insights of the booklet are utilised as preparation for the interviews. Besides, by already making people think about their current and past use of the MI Box, the path of expression is followed (see Figure 5). Following the path of expression helps to find out the latent needs of patients.

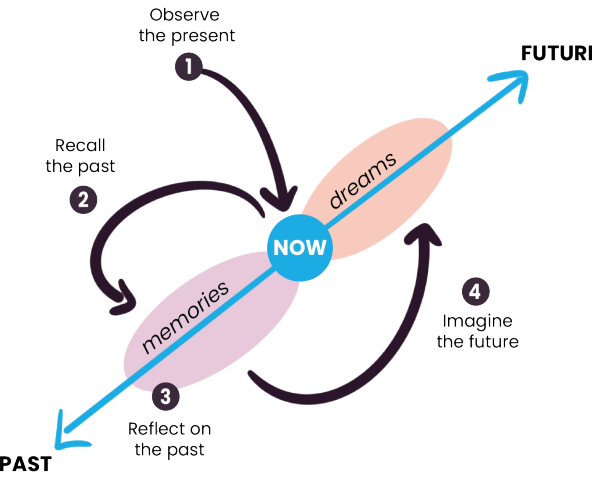


Figure 5: Path of expression

2.3.2. Generative Session

For all the interviews, visual materials are made to support the interview. These are used as generative means and as toolkits for expression. Various materials are employed in the different interviews:

1. Empty timeline, Appendix B.
 

*Used for: HCPs*

2. Stakeholder map, Appendix C.
 

*Used for: HCPs, MI patients, and in sensitize booklet*
3. Adjustment difficulty scale, Appendix D.
 

*Used for: MI patients, and MI Box users*

2.3.3. Statement Cards

Statement cards contain quotes, a paraphrase, and raw data from the interviews (see Figure 6). A paraphrase is an interpretation of the quote, in other words; a statement. For each of the interviews a different colour is used to enable quick recognition of the interview the statement card is referring to. Working with statement cards already helps to make the first step for data analysis. The statement cards are used in different ways in this thesis. They are evaluated by means of clustering the cards of the same interview in certain topics. Furthermore, the cards are placed within theoretical frameworks and models derived from the literature research. Lastly, all the different statement cards of all interviews are compared to each other and clustered into the main topics mentioned.

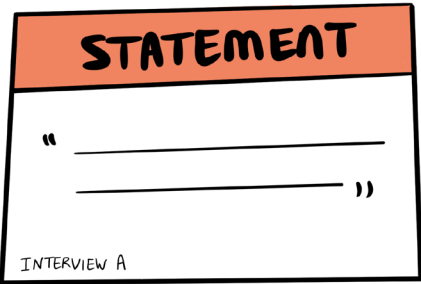


Figure 6: Statement card example

2.4. Metro Mapping

The Metro Mapping tool is used throughout this thesis to analyse SDM, understand patient involvement, define the problem, and explore opportunity spaces. Currently, the Metro Mapping tool is still in development. The aim of the tool is to further develop the context layer in the Metro Map. Furthermore, the tool is currently used during oncological care trajectories and has not been used (according to the available knowledge

during this thesis) in digital care trajectories. However, digital tools transfer care to a more complex (home) context that can not be controlled by the hospital. Therefore, the tool will also be adjusted to ensure it can be applied on a digital care trajectory like the MI Box. Suggestions for improvements based on the experience of working with the Metro Mapping tool for the MI Box trajectory are made and explained in section 2.4.2.

2.4.1. Current Metro Mapping Tool

First familiarisation with the tool is necessary before the tool could be used and improved. Therefore, in this section, the current tool will be explained. The Metro Map exists out of five layers as can be seen in Figure 7 (Metro Mapping, n.d.). The five layers will be explained in this section.

Layer Metro

This layer visualises the steps in the care trajectory that are relevant for the patient. The different types of care steps (treatment steps, conversations, planned SDM, etc.) are distinguished by means of different symbols. The different symbols and their meaning can be found in the legend of the Metro Map of attachment MI\_Box\_MetroMap.pdf which can be downloaded via the QR code of Figure 8. A planned SDM moment is marked with a star (see Figure 9). Furthermore, this layer



Figure 8: QR code to download MI\_Box\_MetroMap.pdf



Figure 9: Planned SDM moment

visualizes the moments of care transfers and the care steps performed before an SDM moment. Certain colours are used to communicate what kind of treatment is performed across a certain part of the Metro Map. Colours can be adjusted according to what is favoured.

Layer Information

Patients need the information to understand the care trajectory and the decisions that can be made. Therefore, the information that the patient receives and the tools to provide this information are integrated under the information layer.

Layer Companions

In this layer the people involved in a certain moment (a.k.a. a station) in the Metro Map are described. These people can be HCPs but also people with a secretary background. In other words, the layer describes the people that a patient interacts with during a particular moment in the trajectory and thus could influence the patient experience.

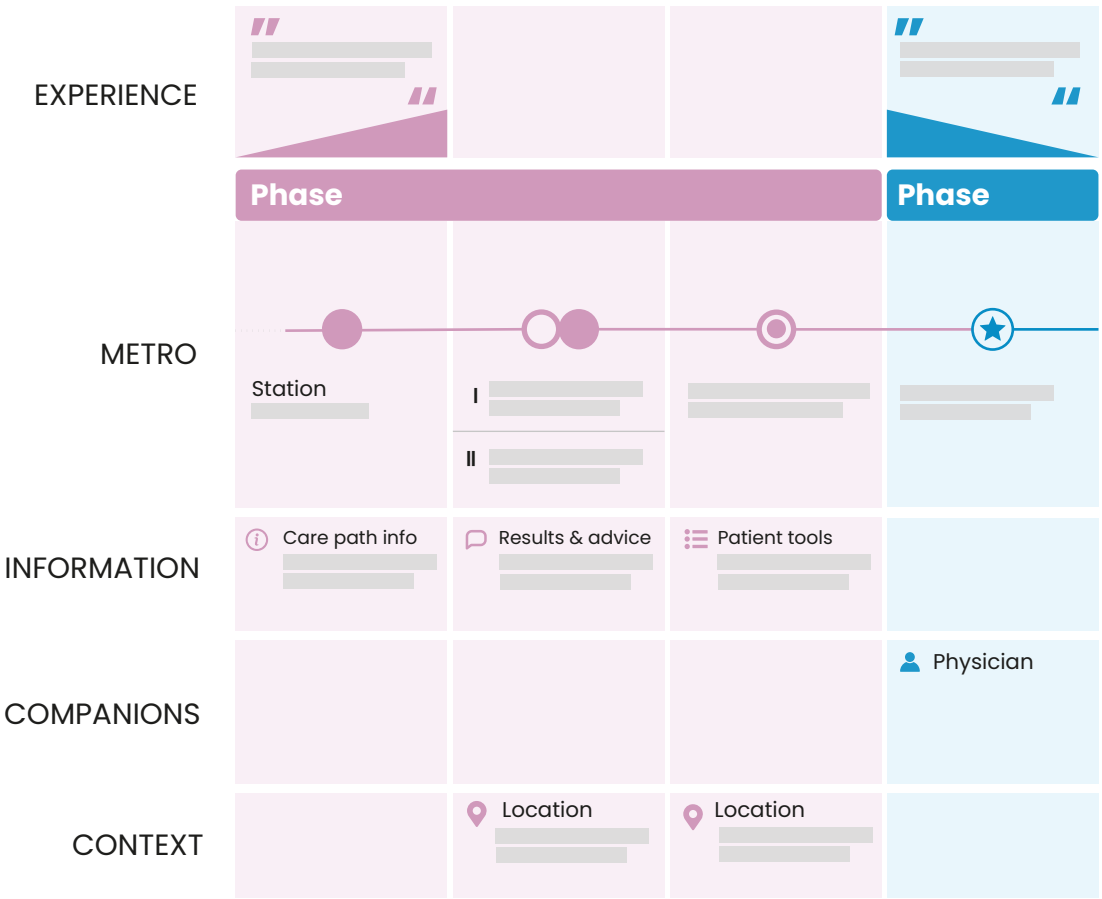


Figure 7: Current Metro Map format

Layer Context

The context layer describes the location at which a certain care step in the Metro Map takes place. Besides, it can also outline the tools and medicine present at a certain moment in the care trajectory. It shows in more detail what path the patient is taking and what is influencing their experience.

Layer Experience

The experience layer shows the experiences of patients and their loved ones during the journey of the Metro Map. This is currently done by means of quotes from the research and by means of a slope within the layer which shows if a station within the metro line is costing energy (decreasing slope) or providing energy (increasing slope).

2.4.2. Metro Map Proposal

The Metro Map format is iterated on while the tool has been used for the digital care trajectory of the MI Box. This iteration explored a new format of the Metro Map tool which would make the use of the tool more meaningful for the MI Box care trajectory. Finally, a new format is composed and proposed. This proposed format will be explained in this section (see Figure 10).

Layer Metro

The Metro Mapping tool is currently using different colours for different treatments. In the proposed format, different colour schemes are used for distinguishing care steps in a hospital environment (blue shades), a home environment (orange shades, and a rehabilitation environment (pink shades) (see Figure 11). Namely, while using the Metro Map tool, difficulties were experienced with communicating when care is delivered in the hospital or in the home environment. As this distinction is important for understanding the digital care trajectory, it has to be more explicit in the metro line.

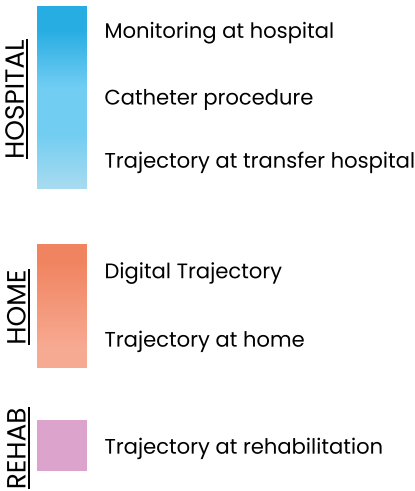


Figure 11: Used colour schemes

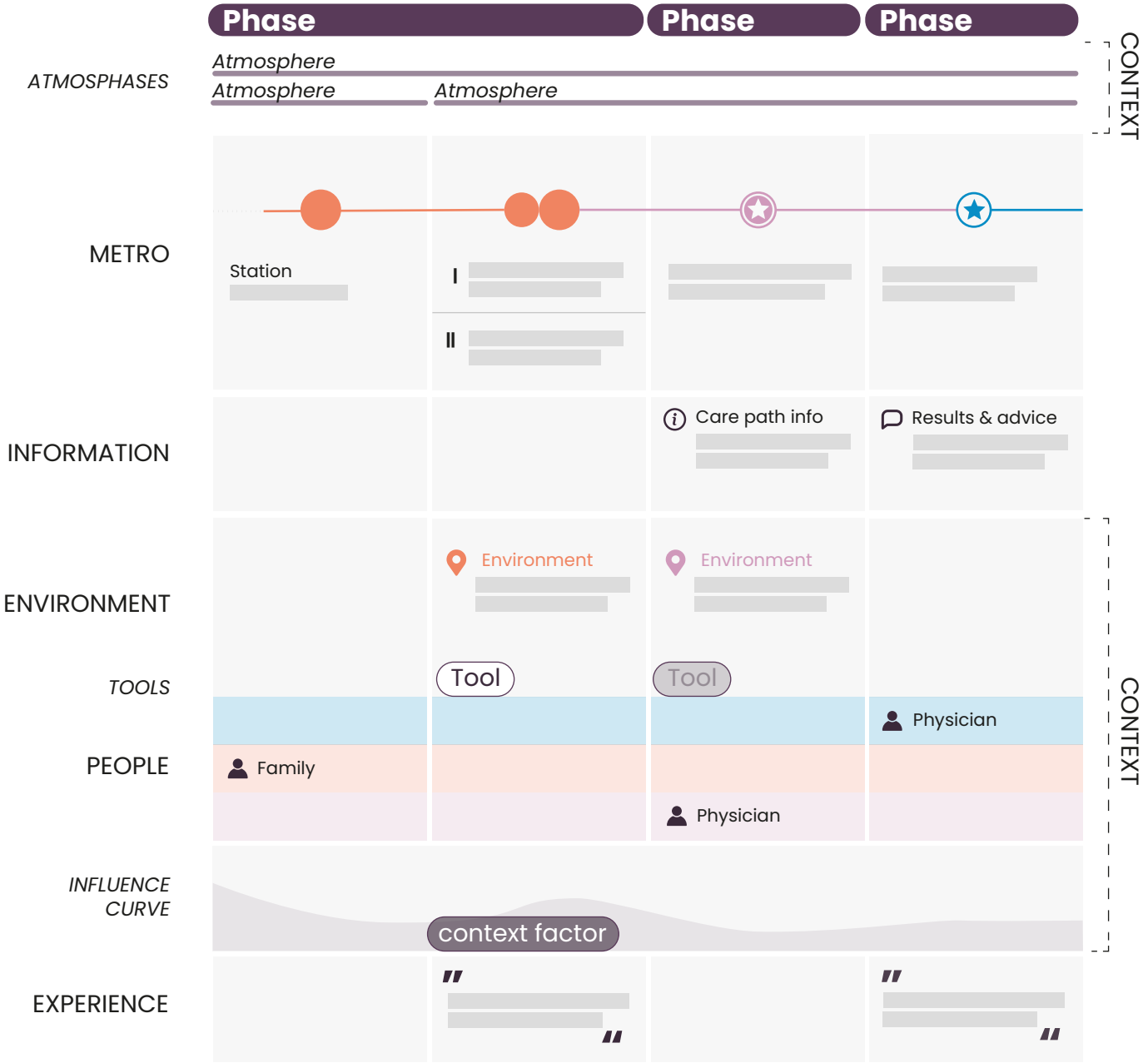


Figure 10: Proposed Metro Map format

The chosen colour scheme does not have a certain rationale except for the fact it compliments the layout of this thesis. Using the different colour schemes provides a good overview of the type of environments where care is provided and what processes happen simultaneously at different locations. In digital care, these locations and means of care become more important as the care transfers to the home context of a patient which is out of the controlled environment of the hospital. Apart from the colour schemes, an extra care step classification is added to the legend. Namely, while using the Metro Map a need arose to visualise moments in which one would expect SDM, but in which there are no planned SDM moments (see Figure 12). These moments show opportunity spaces to increase SDM within the care trajectory.



Figure 12: Potential SDM moment

*Information*

In the information layer it is explained what kind of knowledge is transferred. The difference in this layer, compared to the original format, is the separation of

“tools” from this layer. Namely, in a digital care trajectory the provided and available tools have a huge impact on how the care trajectory is experienced and what kind of interactions take place in the care trajectory. Therefore, these are visualised more dominantly on the Metro Map. Besides, the layer is reorganised in a different order to enable the proximity of the context elements. Furthermore, it was considered valuable to place the information layer more closely to the care steps as it helps to explain what a certain care step entails.

*Layer Context*

In the proposed format the context layer is seen as the environment that enables interactions with people and the tools available within the environment. The environment is visualised with visuals in the Metro Map of attachment MI\_Box\_MetroMap.pdf (see Figure 8). If visualisation skills are lacking during the use of the Metro Mapping tool, it can be helpful to use pictures instead. These pictures also help to define the tools available in the different care steps. During a care trajectory, the interactions and experiences are influenced by certain context factors (e.g. educational background, previous hospital

experiences, a partner, etc.). Especially when care transfers to the home environment, the care context can be different per individual. To show what can cause differences in care experience and interactions, these context factors are important to map out. Moreover, it can help to explain why, at certain moments in the Metro Map, there can be a mismatch between the provided care and patient needs. To visualise the amount of influence the context has in the care trajectory, an influence curve is added to the context layer. This curve shows moments in which it is crucial to provide a sufficient and clear structure of care as there is a big amount of influence coming from outside the hospital. Because the different elements in the context cannot be seen as separate layers, as they are more building blocks that explain the whole context, they are placed in close proximity to each other. An exception to this is the so-called “atmospheres” as they show the context in relation to the care phases. Namely, atmospheres are the atmosphere phases within the care trajectory that can influence the interactions between HCPs and patient. For example, if time is limited due to the fact that a medical intervention needs to happen as fast as possible, there will be little time for informing the patient.

*Experience*

The context can influence the experience. Therefore, the experience layer is placed below the context layer. The original slopes are left out in this layer as the influence curve already shows influences on the experience.

**2.4.3. Metro Map Use**

The Metro Map is used to map out the insights gained during this thesis and analyse the problems and opportunities in the care trajectory. Therefore, throughout this thesis, it will be explained how the insights are mapped within the Metro Map. A summary of how the proposed Metro Map format can be used for research into other digital care trajectories is given below:

1. The atmospheres provide early clustering of the care trajectory;
2. The colour schemes give a clear overview of where and when care is provided;
3. The caresteps that are marked as potential SDM moments show opportunity spaces;
4. The amount of tools and the misused tools provide an overview about the use of (correct) means within the care trajectory;
5. The influence curve gives an overview of the moments in the care trajectory in

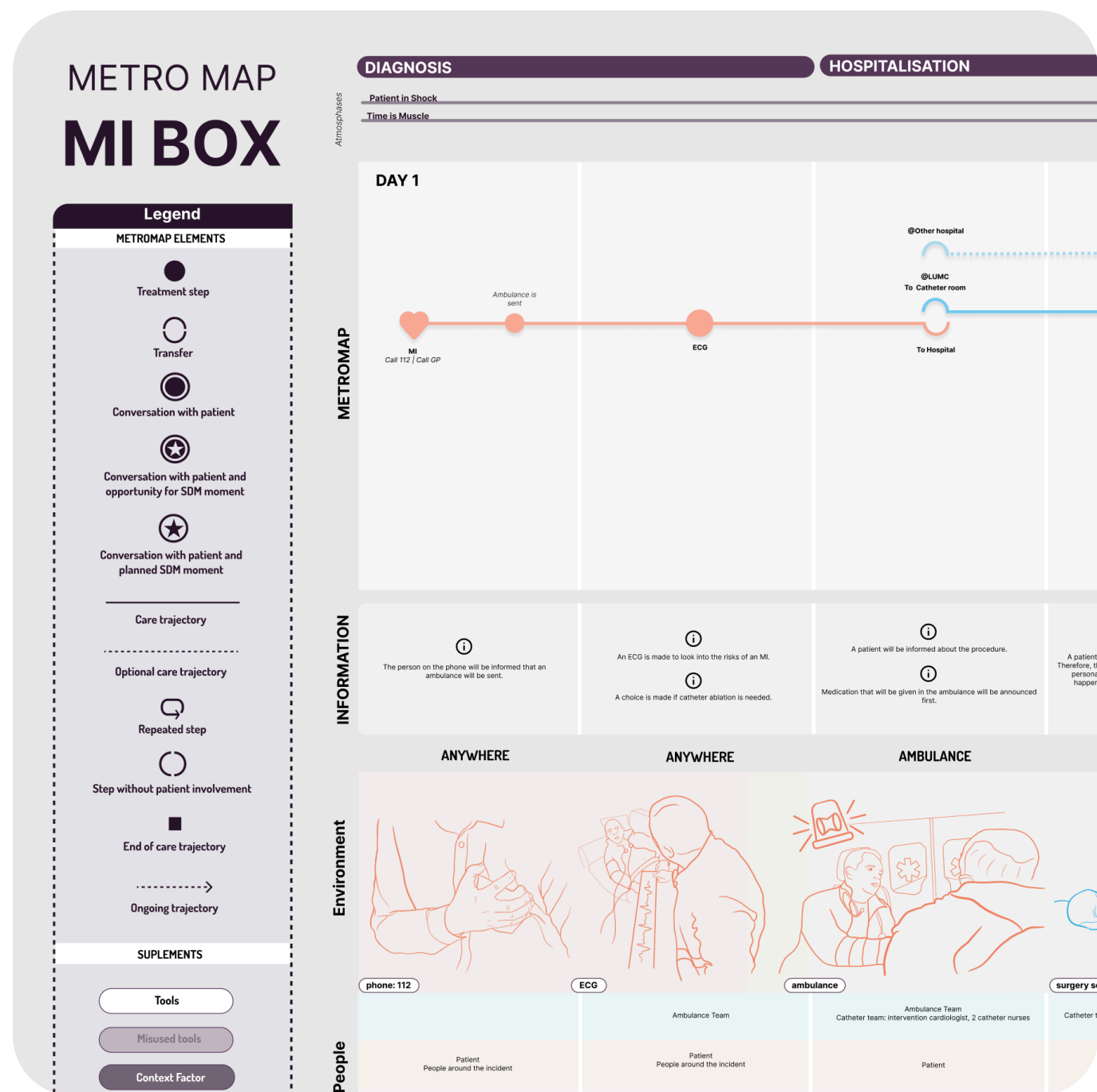


Figure 13: Snippet Metro Map

which the context plays an important role  
and context factors should be considered;

6. The combination of the amount of (misused) tools with the influence curve shows the risks of an awkward interaction.

## 2.5. Ideation Tools

Various ideation tools are used which are introduced in this section.

### 2.5.1. How-To's

How-To's are problem statements that are written in the form of a question (Van Boeijen et al., 2014). It is a method that helps to generate ideas as the answers to the How-To questions are possible solutions. How-To's are used in this thesis as a starting point for idea generation.

### 2.5.2. Dot Voting

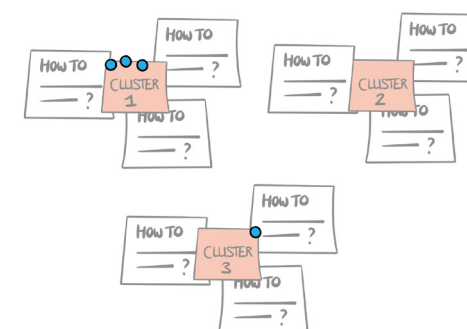


Figure 14: Dot voting

The full MI Box Metro Map can be found in the attachment MI\_Box\_MetroMap.pdf (see Figure 8). A snippet of the Metro Map can be found in Figure 13.

With a dot sticker, participants of an ideation or co-creation session can vote on an idea or idea element (see Figure 14). This shows what ideas are rated as most promising. Dot voting is used in this thesis as it provides a quick overview of the preferences of different stakeholders involved in the design process.

### 2.5.3. Harris Profiles

A Harris Profile is a visual presentation of the strengths and weaknesses of a design by means of a rating of the design requirements (Van Boeijen et al., 2014) (see Figure 15).

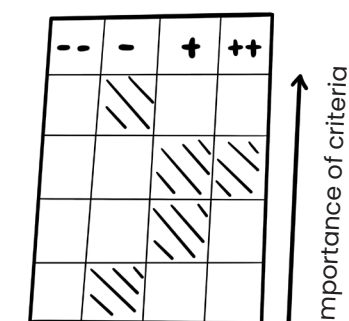


Figure 15: Harris Profiles



The design requirements in the Harris Profiles need to be placed in order from least important (lowest) to most important (highest). This method is used as it enables a quick and easy selection of concept ideas that are most in line with the design goal.

#### 2.5.4. Co-Creation

Co-creation is a broad term that can be interpreted in different manners. In this thesis, the term is used to refer to any act of creativity shared by two or more people, which is in line with the definition in the paper of E. A. Sanders and Stappers (2008). This thesis uses co-creation sessions to look into how the value of the LUMC Care app, which is part of the MI Box, can be

increased by involving different stakeholders in the creation of a final concept. During the co-creation sessions various concept elements will be presented, discussed, rated, and evaluated based on the design criteria stated further in this thesis (see Chapter 9). Furthermore, input for the different concepts is asked from the various stakeholders to ensure the effectiveness of the concepts. The co-creation sessions with MI Box users are rated as most important as they are the actual user of the product. Input from HCPs and Innovattic (developers of the LUMC Care app) are also used to ensure a viable and feasible design intervention. More about how the co-creation sessions are performed will be explained in Chapter 12.



#### KEY TAKEAWAYS | Chapter 2

Main tools used in this thesis:

1. Frameworks derived from literature;
2. Sensitize booklet;
3. Visual materials that support the interviews;
4. A new proposed format for the Metro Map;
5. Ideation methods: How-To's, vote dots, Harris Profiles, co-creation.

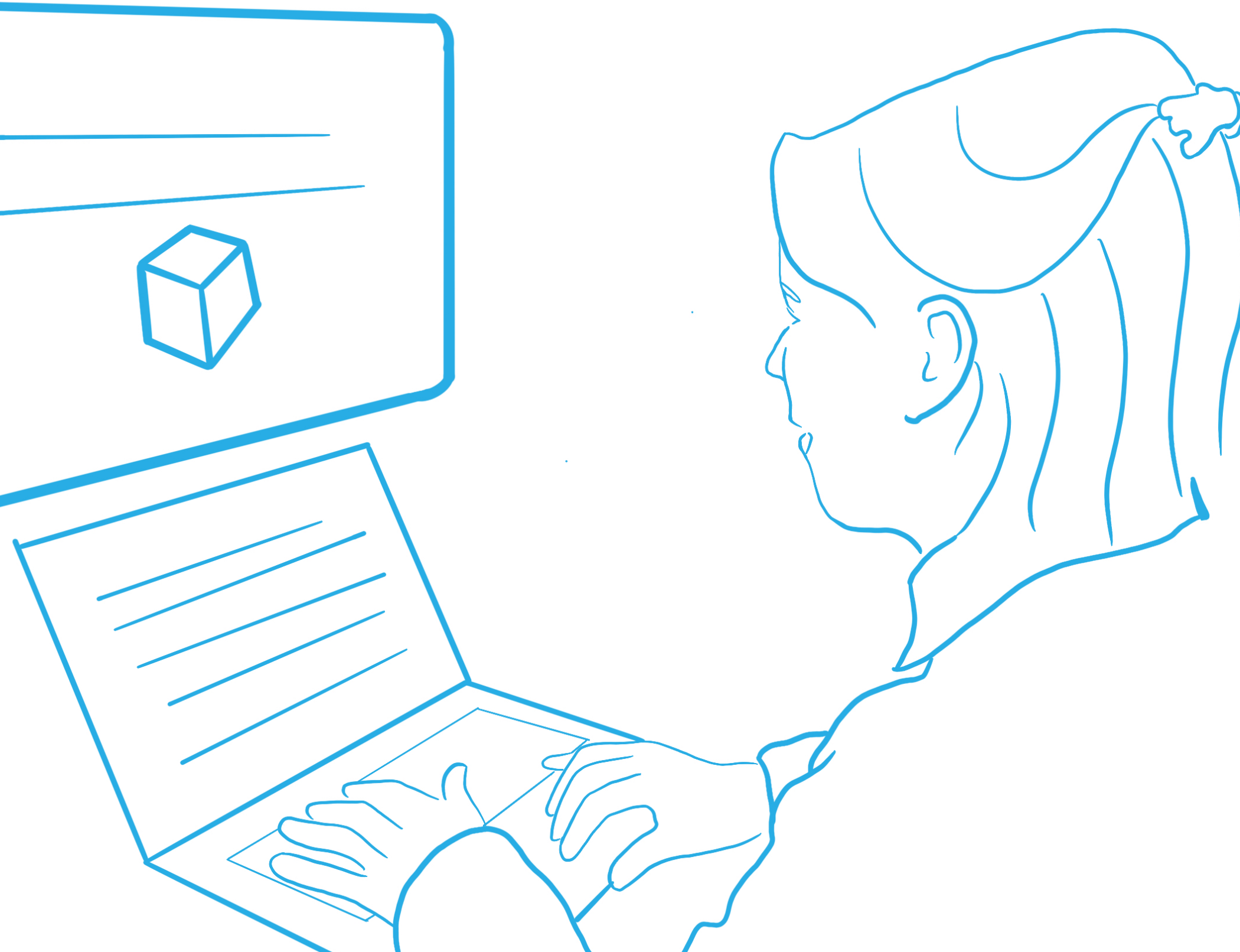
# DISCOVER

MI Box User  
Context

Literature

MI Patient  
Interview

Interview  
HCPs



## LITERATURE DISCOVERY

# 3

In this chapter the results of the literature discovery will be presented to provide more background information about the main topics in this thesis: MI, the MI Box, lifestyle change, SDM and self-care. Firstly, information about an MI will be given to get familiar with what an MI entails. Furthermore, this background information is used to better empathise with the care trajectory of an MI. Secondly, the MI Box elements and the most important care steps within the MI Box care trajectory will be shown. Besides, as the MI Box is an example of digital care, the opportunities and barriers

to digital care implementation will be explained. Thirdly, part of the literature is devoted to lifestyle change behaviour as this is an important part of an MI treatment and the self-care activities expected of MI patients. To understand how lifestyle adherence and self-care activities can be improved, more knowledge will be presented on how behavioural change is influenced. Fourthly, details about what self-care activities entail and how self-care could be increased and evaluated will be shared. Lastly, an elaborate explanation of SDM and its relation to this thesis is provided.

### 3.1. Myocardial Infarction

This section aims to give a better understanding of what an MI entails (symptoms, diagnosis, risk factors), what the common care steps are, and what kind of impact it has on a patient.

#### 3.1.1. Symptoms

Possible symptoms of an MI are (Antman et al., 2000):

- Chest pain that can radiate to arm, wrist, jaw, and upper abdominal pain;
- Nausea or vomiting;
- Dizziness or light-headedness;
- Shortness of breath.

#### 3.1.2. Diagnosis

An MI can be diagnosed by means of different signs. A diagnosis of an MI is determined when 2 of the following signs are observed (Mechanic, 2022):

1. Symptoms of ischemia.  
Ischemia means restricted blood flow to parts of the body which may cause tissue damage due to a lack of oxygen and nutrition (NCI Dictionary of Cancer Terms, n.d.). Symptoms that are related to ischemia are chest pain that can radiate to the arm, wrist, jaw, and upper abdominal pain (Antman et al., 2000).
2. New ST-segment changes.

With an electrocardiogram (ECG) a movie of the electrical signals within the heart is made. Figure 16 shows an example of an ECG. Changes in the ST segment can be warnings for an MI.

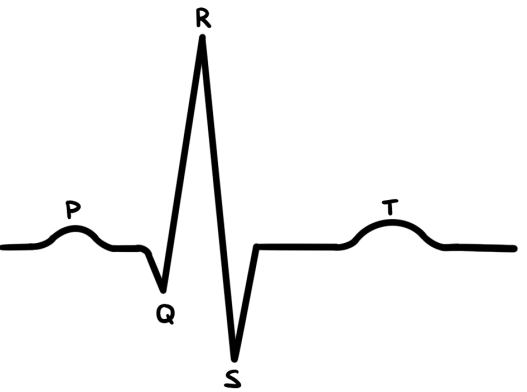


Figure 16: ECG

3. Presence of pathological Q waves on the ECG.  
A Q wave in the ECG can signal an old MI. This signal is called a “pathological Q wave”.
4. An echo shows the abnormal motion of parts of the heart muscle.
5. Autopsy or angiography shows intracoronary thrombus.  
Intracoronary thrombus is when a blood clot is hindering blood flow in vessels of the heart (Whittington et al., 2022). An autopsy is an examination of the body after death.

Several studies have demonstrated that reduction of risk factors is effective in decreasing recurrent coronary events in patients who have already experienced an MI.

Early treatment aims to reduce the extent of myocardial damage due to the length of which blood (and therefore oxygen and nutrition) flow is hindered.

An angiography is a type of X-ray used to examine blood vessels (Angiography, 2023).

Besides, the elevation of specific biomarkers (e.g. troponin) reflects myocardial damage. The number of biomarkers can help to classify the size of the MI although a generally accepted classification of the sizes of an MI does not exist yet (Antman et al., 2000).

An ECG should be used for all patients with chest pain. An ECG is highly specific for an MI (95% to 97%). However, sometimes an ECG will not show an MI. More about this will be explained in section 3.1.4. If an ECG does not show an MI, a blood test can be performed to check for biomarkers if a physician is suspicious due to the clinical history of the patient (Mechanic, 2022).

#### 3.1.3. Risk Factors

As explained in the introduction of this thesis, more than 70% of cardiovascular mortality is due to modifiable risk factors (Verburg et al., 2019). Several studies have demonstrated that the reduction of risk factors is effective in decreasing recurrent coronary events in patients who have already experienced an MI (Cobb et al., 2006). To give an overview

of the modifiable and non-modifiable risk factors a summary of the review of Mishra and Ramavataram (2021) and the paper of Rippe (2019) will be given in Table 1 and 2 (on the next page). Education about risk factor management is needed to decrease the risks of a recurring event (Johnston et al., 2016). For patients with a heart disease, risk factor management takes the form of diet, weight management, exercise and a lot of self-monitoring (Moore et al., 2015).

#### 3.1.4. Treatment

##### Immediate Treatment

An MI can be divided into two types: a non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI) (Mechanic, 2022). In other words, STEMI can be detected by means of an ECG and NSTEMI cannot be detected with an ECG. A STEMI is caused by hindering the blood flow to the heart, which needs to be recovered immediately. Early treatment aims to reduce the extent of myocardial damage due to the length of which blood (and therefore oxygen and nutrition) flow is hindered (Aylward, 1996). This can be done by an emergent percutaneous coronary intervention (PCI) named catheter ablation (in Dutch: Dotteren)

| Risk Factor                                         | Explanation                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sedentary lifestyle</b>                          | Having a sedentary lifestyle increases the chance to develop an MI. Therefore, physical activity is needed to avoid this sedentary lifestyle. Regular walking, climbing steps, and cycling are known movements that provide protection against (a recurring) MI.                                                                     |
| <b>Smoking</b>                                      | The presence of nicotine and carbon monoxide in cigarette smoke cause arteries to lose their distensibility leading to clogging development. Besides, cigarette smoke causes decreased oxygen supply to muscles of the heart as it increases the production of carboxyhemoglobin which hinders the release of oxygen by haemoglobin. |
| <b>Alcohol use</b>                                  | Big alcohol consumers have a higher risk of an MI.                                                                                                                                                                                                                                                                                   |
| <b>Hypertension</b>                                 | Hypertension means having a high blood pressure. Hypertension is a big risk factor for MI.                                                                                                                                                                                                                                           |
| <b>Cholesterol</b>                                  | Accumulation of LDL-cholesterol increases clotting risks. Cholesterol can be influenced by dietary intake.                                                                                                                                                                                                                           |
| <b>Diet</b>                                         | A diet that contains more fruits and vegetables, fish, whole grains and fibre, and maintaining a caloric balance, lowers the risk of CVD.                                                                                                                                                                                            |
| <b>Obesity</b>                                      | Obesity is associated with an increased risk for an MI.                                                                                                                                                                                                                                                                              |
| <b>Diabetes mellitus</b>                            | Especially type 2 mellitus is a potential risk factor for an MI.                                                                                                                                                                                                                                                                     |
| <b>Chronic stress, social isolation and anxiety</b> | Many studies show a relationship between an increased risk of a heart attack and constant chronic stress, social isolation and anxiety.                                                                                                                                                                                              |

Table 1: Modifiable risk factors.  
The explanation has been retrieved from (Mishra and Ramavataram, 2021) and (Rippe, 2019).

| Risk Factor                  | Explanation                                                                                                                                                                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Age</b>                   | Advancing age is linked to an increased mortality rate in acute myocardial infarction.                                                                                                                                                                                |
| <b>Heredity</b>              | One of the most important non-modifiable risk factors is family history.                                                                                                                                                                                              |
| <b>Gender</b>                | More men suffer from heart attacks than females.                                                                                                                                                                                                                      |
| <b>Socio-economic status</b> | Generally, the higher the social-economic status of a person, the better the health indication. Namely, persons with a higher status have more power and access to resources. This power and resources influence the ability of persons to adapt to lifestyle change. |

Table 2: Non-modifiable risk factors.  
The explanation has been retrieved from (Mishra and Ramavataram, 2021) and (Rippe, 2019).

(Mechanic, 2022). This procedure is also needed for NSTEMI if ischemia is detected. However, an asymptomatic NSTEMI patient does not have to have a PCI but can be treated with medicine only (Mechanic, 2022). In this thesis, the care path of patients that require an emergent catheter ablation is analysed.

*Medicine*  
Besides the PCI procedure, all acute MI patients receive certain medicine. These medicines often consist of the following:

- Anticoagulants (Aylward, 1996; Lin et al., 2010): These types of medications are also known as blood thinners.
- ACE inhibitors / renin-angiotensin-aldosterone (Aylward, 1996; Lin et al., 2010): These types of medications aim to lower blood pressure.
- Beta-blockers (Aylward, 1996; Lin et al., 2010): These types of medications aim to lower blood pressure.
- Statins (Lin et al., 2010): These types of medications aim to lower cholesterol.

Other drugs that might be given can help patients with their pain relief (Aylward, 1996).

Rehabilitation

The European Society of Cardiology guidelines recommend that post-MI patients are referred to cardiac rehabilitation (CR) (Verburg et al., 2019). Rehabilitation addresses the management of lifestyle interventions (Fållun et al., 2016) and teaches and encourages self-care (Riegel et al., 2017). In other words, lifestyle change is part of the treatment after an MI. Adherence to medication and cardiac rehabilitation is essential for decreasing the risk of a recurrent MI (Treskes et al., 2020). The effectiveness of the CR programs are depending on the amount of patient involvement and care resources to support the implementation of lifestyle changes (Johnston et al., 2016). During rehabilitation patients like to meet other patients as it is reassuring to find out one is not alone (Hildingh et al., 2006). Moreover, exchanging experiences with others increases a patient’s confidence and self-knowledge (Qin et al., 2022).

3.1.5. Impact of an MI

Fear and Anxiety

A common theme that appeared in the

literature about an MI is fear and anxiety (Fållun et al., 2016; Hildingh et al., 2006; Qin et al., 2022). This has several reasons:

- The MI made patients experience how fragile life can be (Fållun et al., 2016).
- Anxiety for a recurring MI (Fållun et al., 2016; Qin et al., 2022).
- Fear of having a chronic disease. Especially older patients are afraid that they need to go to a nursing home (Fållun et al., 2016).
- Fear of losing one’s identity and social role (e.g. career and family obligations) due to changes needed after the MI (Qin et al., 2022).
- Fear of how it could affect close family members (Fållun et al., 2016).
- Concern about how to recognise symptoms (Fållun et al., 2016).

This fear is mostly present shortly after discharge and is increased by the long waiting time for rehabilitation (Qin et al., 2022). Patients show a need to get support in coping with this fear (Bente et al., 2021).

Poor Discharge

In the research from Fållun et al. (2016) patients’ reflections of hospital discharge are discussed. In this paper, it becomes clear

that it is crucial that patients get enough information and guidance before discharge as post-hospital complications and readmissions are associated with poor discharge. Especially with elderly, poor quality of discharge shows an increase in re-hospitalisation. However, the short time between MI treatment and home transfer leaves little room for information and guidance to be offered. Therefore, a lot of patients experience the discharge process as challenging. Individual guidance is needed for MI patients that will help them cope with everyday challenges experienced after discharge. Although the hospitalisation period may serve as an ideal time to provide the needed information and guidance to the patient and their family, a patient might still experience a shock of the incident which influences their ability to receive information.

Lack of Understanding

An MI usually comes unexpectedly and suddenly changes the lives of patients and their relatives (Qin et al., 2022). Patients gradually gain an understanding of what it all means during the care trajectory. Lack of understanding can be caused by lack of involvement of patients during their treatment process which decreases the opportunity to grasp the MI (Qin et

al., 2022). In different facets of an MI lack of understanding appears: the MI itself, symptoms, drug mechanisms and risk factor management (Johnston et al., 2016; Qin et al., 2022; Verburg et al., 2019). Lack of understanding is one of the main reasons for patient nonadherence to their medication and reluctance to lifestyle changes for risk management (Johnston et al., 2016; Verburg et al., 2019). Moreover, patients need to better understand the disease at an individual level to be able to shape their future (Qin et al., 2022). Patients like to have information they can rely on and which they repeatedly can look into (Bente et al., 2021). This information needs to be simple and concrete and informs about how they can improve their lifestyle or cope with their disease.





## KEY TAKEAWAYS | Chapter 3.1. MI

1. Early treatment aims to reduce the extent of myocardial damage due to the length of which blood (and therefore oxygen and nutrition) flow is hindered (Aylward, 1996). This can be done by an emergent percutaneous coronary intervention (PCI) named catheter ablation (Mechanic, 2022).
2. Adherence to medication and cardiac rehabilitation is essential for decreasing the risk of a recurrent MI (Treskes et al., 2020).
3. Lifestyle change is part of the treatment after an MI.
4. A common theme that appeared in the literature about an MI is fear and anxiety. This fear is mostly present shortly after discharge and is increased by the long waiting time for rehabilitation (Qin et al., 2022).
5. It is crucial that patients get enough information and guidance before discharge as post-hospital complications and readmissions are associated with poor discharge (Fålund et al., 2016)
6. Lack of understanding can be caused by a lack of involvement of patients during their treatment process which decreases the opportunity to grasp the MI (Qin et al., 2022).
7. Lack of understanding is one of the main reasons for patient nonadherence to their medication and reluctance to lifestyle changes for risk management (Johnston et al., 2016; Verburg et al., 2019).

## 3.2. The MI Box

To give a better idea about what the MI Box entails, a summary of the components of the MI Box will be provided. Also, a simplified version of the care journey of MI Box users will be explained in this section.

### 3.2.1. MI Box Components

The MI Box is a box with self-monitoring devices provided to patients who have had an MI (The Box, 2021). The main purpose of the MI Box is for doctors to remotely be able to track the patients' vital parameters to see if parameters are reaching a certain threshold. The MI Box consists of a smartwatch, a smart scale, a blood pressure monitor, and two apps (see Figure 17). The devices provided in the MI Box are made by Withings. That is why the Withings Health Mate app needs to be downloaded to gather data from the devices.

*Both apps are used with a specific LUMC patient account that ensures data will be shared with the Electronic Patient Dossier (EPD).*

The Withings Health Mate app is linked to the LUMC Care app to enable data visualisation in the LUMC Care app. Both apps are used with a specific LUMC patient account that ensures data will be shared with the Electronic Patient Dossier (EPD).

#### Watch

With the watch the following things are enabled:

- An ECG can be made;
- Steps are counted;
- Biking activities are recorded;
- Heart Beats Per Minute (BPM) are monitored and can be seen directly on the watch;
- Motivational messages can be sent by the watch.



Figure 17: MI Box devices

*The five phases ... can be simplified into three transition moments: discharge (1), end of rehabilitation(2), and the end of the first year of the MI Box care trajectory (3).*

*Scale*

Weight is measured by means of a smart scale.

*Blood Pressure*

A Withings blood pressure monitor measures blood pressure and communicates the monitored values to the Withings Health Mate app.

*Withings Health Mate App*

The Withings Health Mate app collects the

monitored data. The looks of this app can be seen in Figure 18. The Withings Health Mate app is used during the first phase of this graduation project. Screenshots of this experience are provided in Appendix E.

*LUMC Care App*

The LUMC Care app shows the collected data of the Withings Health Mate app in a different manner. Furthermore, it enables the collection of other data (e.g. patient’s stress) that can be communicated to the HCPs. The home screen

of the LUMC Care app can be seen in Figure 19. More screens from the app can be found in Appendix F.

**3.2.2. Additional Patient Materials**

During the care trajectory certain information is communicated to patients. The information that is provided to patients is analysed. This information is provided using the following resources:

- Mission Booklet: A booklet with information about the MI and its treatment;
- Manual of the MI Box;
- Patient issue form: Shows the frequency of measurements and the threshold values which are different per patient.

More details about these information resources can be found in Appendix G

**3.2.3. Carepath**

Information about the cardiothoracic care trajectory, which is another care trajectory than the MI Box care trajectory, and interviews with HCPs resulted in an overview of the care steps. These can be found in the Metro Map that is attached to this thesis as MI\_Box\_MetroMap.pdf (see Figure 8). The most important care steps will be explained in this section to give a summary of what the MI Box care path looks like. The five phases that can be found on top of the Metro Map can be simplified into three transition moments: discharge (1), end of rehabilitation (2), and the end of the first year of the MI Box care trajectory (3). These three transitions also encapsulate three main phases (see Figure 20). These transition moments and phases will be explained on the next pages alongside with the most relevant care steps (Figure 21, 22, 23).



Figure 18: Withings Health Mate app



Figure 19: LUMC Care app



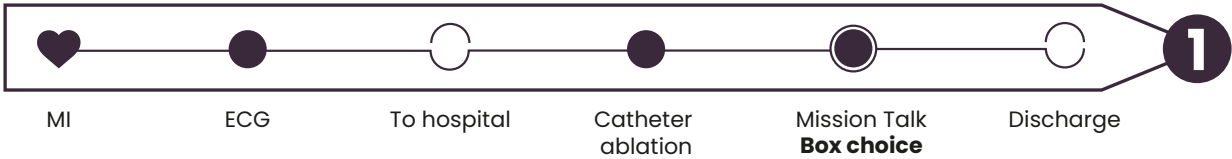
Figure 20: Three main phases

After some monitoring and last checkups, a so-called “Mission Talk” is performed. This is a discharge talk in which everything in the aforementioned Mission Booklet is explained.

Rehabilitation is offered as standard care during the care trajectory of the MI Box.

The patient is expected to perform self-care activities and implement lifestyle changes in their daily routine.

**HOSPITALISATION** | Figure 21



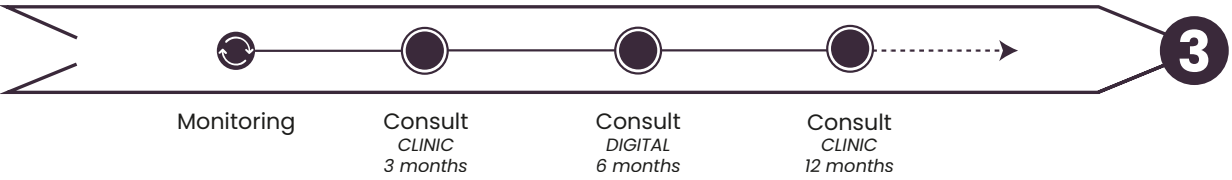
The moment MI symptoms arise the general practitioner or the emergency number will be called. Symptoms will be discussed via phone and an ambulance will be sent to the patient. An ECG will be made to diagnose the MI as explained in Chapter 3.1. If it turns out it is an MI, the patient will go to the hospital in an ambulance, where an emergency catheter ablation will be performed. After some monitoring and last checkups, a so-called “Mission Talk” is performed. This is a discharge talk in which everything in the aforementioned Mission Booklet is explained.

At that same moment, the choice to employ the MI Box is made. After this talk, the patient is ready to go home after experiencing a hospitalisation period of approximately 2-3 days. The aforementioned literature showed the importance of a good discharge to avoid re-hospitalisation (Fålnun et al., 2016). Therefore, this is an important transition moment in the care path. Furthermore, there is some time (around 3-4 weeks) between the discharge and the rehabilitation which is the transition moment that is referred to with the number “1” in Figure 20 and 21.

the patient goes to rehabilitation, one can already start performing home measurements using the MI Box, meaning monitoring starts. After one month of discharge, a digital consult will be held. Around the same period of time, the intake of the rehabilitation takes place in which a biking test is performed to look into the remaining vitality of the patient. The rehabilitation program is based on the results of this

biking test alongside the rehabilitation goals that are composed together with the patient. During the program, the patient is trained, emotionally supported, informed, and motivated to perform self-care activities and change his/her lifestyle. After the end of the rehabilitation, the patients need to independently perform self-care activities, which is referred to as number “2” in Figure 20 and 22.

**INDEPENDENT** | Figure 23



During the independent phase, home measurements and monitoring activities are still performed repeatedly. Apart from the consultations that take place (3 months, 6 months, and 12 months after discharge), the patient is not guided anymore. The patient is expected to perform self-care activities and implement lifestyle changes in their daily routine.

After one year a patient gets yearly check-ups but there is not a clear design of the care trajectory anymore.

Throughout this thesis insights will be aligned with the simplified process visualised in Figure 20.

Transition “3” in Figure 20 and 23 is the transition after the care trajectory of one year.

**REHABILITATION** | Figure 22



Rehabilitation is offered as standard care during the care trajectory of the MI Box.

Rehabilitation is important to avoid re-hospitalisation (Treskes et al., 2020). Before



## KEY TAKEAWAYS | Chapter 3.2. The MI Box

1. Mission Booklet: A booklet with information about an MI and its treatment. In the Mission Talk, which is the talk before discharge, this booklet will be explained.
2. Patient issue form: Shows the frequency of measurements and the threshold values which are different per patient.
3. The Metro Map of the MI Box can be simplified into 3 phases: hospitalisation, rehabilitation, and independence. Throughout this thesis insights will be aligned with this simplified process consisting of 3 phases and 3 transitions.
4. Rehabilitation is offered as standard care during the care trajectory of the MI Box.
5. The patient is expected to perform self-care activities and implement lifestyle changes in their daily routine during the independent phase.

## 3.3. Barriers & Opportunities Digital Care

Previous research shows the potential of using digital technologies for MI patients and lifestyle change (Johnston et al., 2016; Kambhampati et al., 2016; Verburg et al., 2019; Wolf et al., 2016). Namely, digital technologies in care practice show to improve self-management, and adherence to lifestyle changes and medication (Johnston et al., 2016). In other words, it shows an increase in self-care activities. As the MI Box contains digital care devices, the potential benefits and barriers of working with digital health devices are explained in the next sections.

### 3.3.1. Digital Care Opportunities

#### Monitoring

Monitoring of patient's physical activity and blood pressure proved to improve medication adherence and lifestyle adaptations, especially if feedback is provided for these self-monitoring activities (Johnston et al., 2016; Kambhampati et al., 2016). Moreover, self-monitoring can improve dietary intake, weight loss, self-efficacy, and decreases anxiety and stress (Verburg et al., 2019). The MI Box, with its self-monitoring devices, can experience the aforementioned benefits.

*However, in numerous previous studies the patient acts as a passive provider of data, while there might be potential in changing the patient role into an active co-creator of knowledge.*

*... patients find it valuable to get information about symptoms, a list of their medications, and reminders for these medications by means of the app.*

However, in numerous previous studies, the patient acts as a passive provider of data, while there might be potential in changing the patient's role into an active co-creator of knowledge (Wolf et al., 2016). In the current concept of the MI Box, there is little room for the patients to co-create knowledge within the LUMC Care app.

#### Self-Efficacy

Involving patients in their physical health through eHealth has a positive impact on a patient's perceived self-efficacy (Wolf et al., 2016). Self-efficacy is an important construct within SDM and health behaviour (Eliacin et al., 2015; Glanz et al., 2015).

#### Information and Support

Previous research about smartphone-based support tools show that heart patients find it valuable to get information about symptoms, a list of their medications, and reminders for these medications by means of the app (Aamodt et al., 2020). These features are currently not included in the LUMC Care app or the Withings Health Mate app. It would be valuable to consider these features as it can improve patients' drug adherence and cardiovascular lifestyle changes (Johnston et al., 2016).

#### Text Messages

Text messages that contain advice, reminders, and encouragement for lifestyle change can actively engage patients in their care which facilitates empowerment and increases risk reduction (Kambhampati et al., 2016). Currently, the LUMC Care app makes little use of text messages. The Withings Health Mate app does provide motivational messages to move through the watch and the app.

### 3.3.2. Digital Care Barriers

Although eHealth solutions, like the MI Box, show potential, there is resistance towards it. It is therefore valuable that the barriers are considered before design interventions will be suggested.

#### Unfamiliarity Digital Devices

Besides the acknowledgement of the time efficiency of eHealth tools, the digital means that are used in eHealth are not always familiar to patients and they lack experience using it (Aamodt et al., 2020). In a previous internship research from van der Voorde (2020) to the LongBox, patients also noted that it is often expected from them they work more and more digitally but that they do not feel comfortable with these technologies. Moreover, HCPs can also have concerns about



Issues that are remarkably common in the implementation of eHealth interventions are the poor fit of tasks, the technology, and individuals.

how patients are willing or able to use the digital devices which influences the patient’s acceptance to work with the devices (Kujala et al., 2020).

*Impersonal*

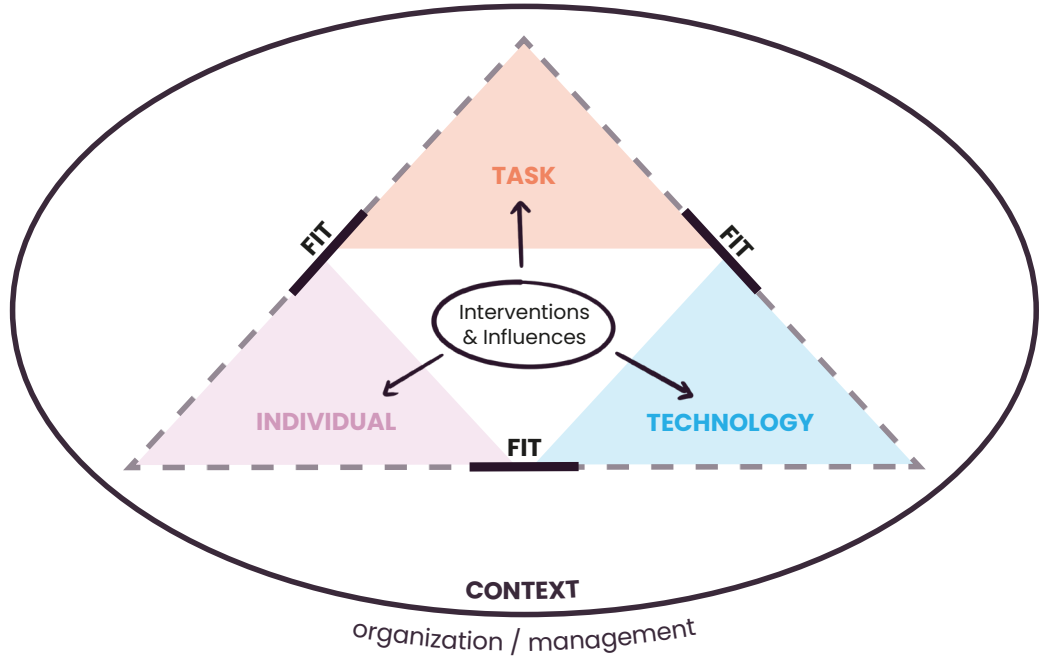
Patients fear that video consultations will be impersonal and disrupt ordinary face-to-face meetings (Aamodt et al., 2020; Wolf et al., 2016).

*Implementation Barriers*

Issues that are remarkably common in the implementation of eHealth interventions are the poor fit of tasks, the technology, and individuals (Kujala et al., 2020). The FITT (Fit between Individuals, Task and Technology) framework evaluates the adoption of Information Technology (IT) in a clinical setting by looking into the fit between the attributes of the individual users, attributes of the technology, and attributes of the clinical tasks and processes (Ammenwerth et al., 2006). In the paper of Kujala et al. (2020), the challenges and opportunities of implementing eHealth services for self-management are analysed by means of the FITT framework. Important barriers that resulted from this analysis were technical problems, acceptance of the technology by HCPs, patient

motivation, and the fact the technology conflicted with the health organisation and management. Elaborating on this, the paper notes most of the struggles of implementing eHealth interventions are related to the broader context. Namely, if a management team does not provide resources for the implementation of the eHealth intervention, individuals are not supported to change their work processes. Therefore, they suggest a new layer to the model that focuses on the broader context (see Figure 24). The FITT framework will be used during the evaluation of the interviews in Chapter 4-6 to look into the FITT of the MI Box in the patient context and hospital context.

Figure 24: FITT framework



**KEY TAKEAWAYS | Chapter 3.3. Barriers & Opportunities Digital Care**

1. Patients find it valuable to get information about symptoms, a list of their medications, and reminders for these medications by means of an app (Aamodt et al., 2020)
2. In a lot of previous studies the patient acts as a passive provider of data, while there might be potential in changing the patient role into an active co-creator of knowledge (Wolf et al., 2016).
3. Text messages that contain advice, reminders and encouragement for lifestyle change can actively engage patients in care which facilitates empowerment and increases risk reduction (Kambhampati et al., 2016).
4. Issues that are remarkably common in the implementation of eHealth interventions are the poor fit of tasks, the technology, and individuals (Kujala et al., 2020). The FITT framework can be used to analyse the implementation of eHealth interventions.



Although the effect of long-term outcomes of lifestyle change is clear, for many patients who had an MI, adherence to lifestyle changes and prescribed medication is challenging.

### 3.4. Lifestyle Change

The European Society of Cardiology guidelines recommend that risk factors are addressed by means of lifestyle advice (Verburg et al., 2019). In the care trajectory of the MI Box, lifestyle change plays an important role in most of the care trajectory. Although the effect of long-term outcomes of lifestyle change is clear, for many patients who had an MI, adherence to lifestyle changes and prescribed medication is challenging (Fållun et al., 2016). To get a better understanding of the challenges that could be present, part of the literature research is dedicated to lifestyle change. To structure

the findings of the literature research the Social Cognitive Theory, developed by Albert Bandura, is used (Glanz et al., 2015). It was chosen to use this model because of the recognition of the environmental influence which suits very well the scope of this project. Namely, analysis of the environmental influence on behaviour helps to define the context layer within the Metro Map. Moreover, the use of SCT has shown a potential to enhance self-care activities (Riegel et al., 2009). The constructs of the model are explained below by summarising the explanation of the SCT model by Glanz

Self-efficacy in patients is dynamic as it is influenced by the context and situation.

This fear can cause patients to be held back to perform a certain behaviour.

et al. (2015). The findings of the literature are provided after the constructs of the model. In Figure 25 an overview of the constructs of the model is visualised. The SCT model will also be used further in this thesis to structure the insights of the interviews.

#### 3.4.1. Cognitive Influences on Behaviour

This part of the model explains the individual's ability to self-regulate behaviour and to reflect and analyse the experience. Cognitive influences consist of three main factors: self-efficacy, outcome expectations and knowledge.

##### Self-Efficacy

Self-efficacy defines a person's confidence in their ability to perform a certain behaviour that leads to an outcome. Patients need to understand they have the self-efficacy to succeed in behavioural change (Bente et al., 2021). Self-efficacy in patients is dynamic as it is influenced by the context and situation (Wolf et al., 2016). Self-efficacy can be influenced by four different sources (Glanz et al., 2015):

1. Previous mastery experience: personal previous experience.  
As an MI comes very unexpectedly, this can have an influence on the belief in

self-efficacy as there are no previous experiences.

2. Vicarious experience: watching the success of others.  
Currently, the LUMC Care app does not provide the opportunity to watch the experiences or successes of others. However, in Chapter 3.1 it became clear that patients like to meet other patients during rehabilitation (Hildingh et al., 2006). This shows opportunities to watch the success of others.
3. Social persuasion: direct encouragement or discouragement from others.  
Patients like to be intrinsically motivated or pushed by for example social pressure (Bente et al., 2021).
4. Emotional arousal: emotional response towards a certain task.  
As mentioned before, fear is a common topic for patients that experienced an MI. This fear can cause patients to be held back to perform a certain behaviour. For example, patients can fear movement or sleep that is needed for recovery and a healthy lifestyle (Hildingh et al., 2006). However, fear can also function as motivation since people can be motivated to change their behaviour to reduce the chance of having a recurring MI.

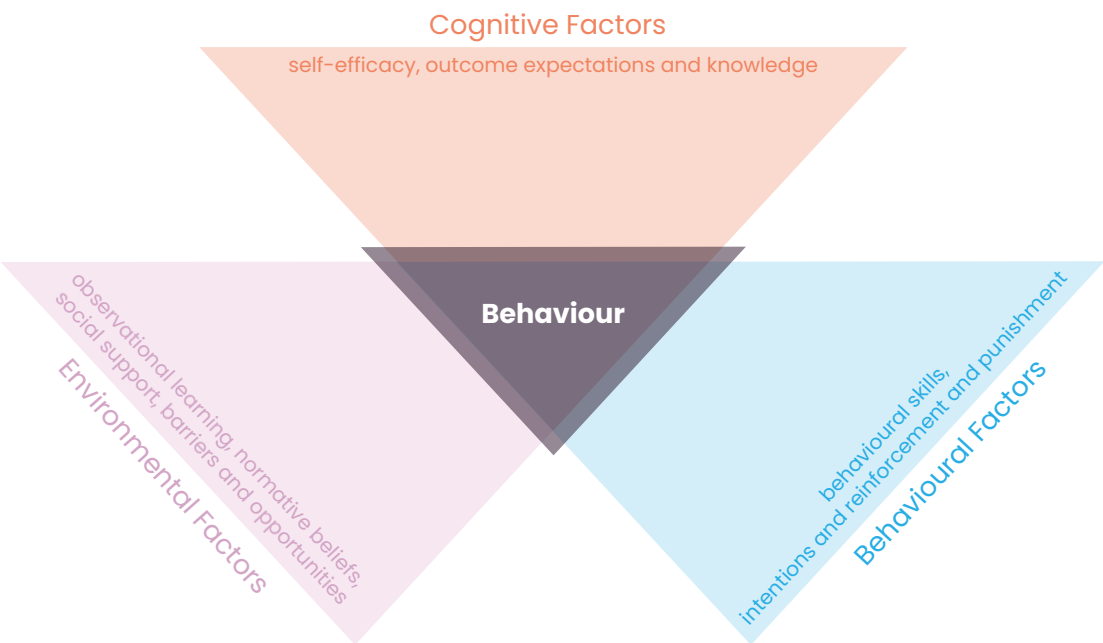


Figure 25: SCT model

*Outcome Expectations*

Outcome expectations are a person's expectation about the consequences (social or physical) of a behaviour. The consequences of lifestyle changes can cause fear for post-MI patients as they do not want to lose their identity (Qin et al., 2022). This is an outcome expectancy that can demotivate patients to change their lifestyles. Furthermore, patients can fear the change could affect their loved ones, which is also an expectation that can negatively influence their health behaviour (Fålnun et al., 2016).

*Knowledge*

Knowledge refers to the person's understanding of the risk and benefits of health practices. As explained in section 3.1.5, knowledge about the MI is often lacking because of the suddenness of the incident. This also implies that it is often difficult for patients to understand what living after an MI would look like (Fålnun et al., 2016). Knowledge about risk management is needed to understand why lifestyle change is needed. Furthermore, risks can be perceived differently. This perception can be influenced by the way symptoms are experienced. For example, hypertension is often a silent killer (Kambhampati et al., 2016). If patients do not

experience a lot of symptoms the risk can be perceived as less harmful, which might lead to patients being less determined to make lifestyle changes (Fålnun et al., 2016; Qin et al., 2022). More risk understanding can be facilitated by personalised communication and patient engagement (Kambhampati et al., 2016).

**3.4.2. Environment Influences on Behaviour**

This part of the model explains the influence of the environment on behaviour. It consists of four main factors: observational learning, normative beliefs, social support, and barriers and opportunities.

*Observable Learning*

Observational learning explains a person's ability to learn from others. Research supports that people are more likely to pay attention to (and learn from) role models that are similar to themselves. Currently, numerous videos are available to explain the use of the MI Box (The Box Instructievideo's, 2022b). However, these videos do not show the use of the MI Box in a home context. Besides, patients like to share experiences and burdens with others as this also gives them more confidence and knowledge (Hildingh et al., 2006; Qin et al.,

2022). Unfortunately, the apps provided with the MI Box do not provide the opportunity to share these experiences. Rehabilitation can provide people with the opportunity to learn from others if they are connected to peers.

*Normative Beliefs*

Normative beliefs refer to the person's cultural norms and beliefs about the social acceptability and perceived effect of the behaviour. Interaction with a social environment influences how patients define their opinion about a certain behaviour (Li & Yu, 2017). In other words, the normative beliefs of patients are influenced by their (social) contexts. The lifestyle adjustments of post-MI patients that are needed for recovery and risk management, arise out of a process of negotiating bodily constraints and social worlds (Moore et al., 2015). Therefore, the social contexts need to be considered to make sure the suggested behavioural change is suitable for a certain individual.

*Social Support*

Social support is defined as a person's perception of encouragement and support from one's social network. Social support (mental and instrumental) is recognised as essential for implementing and adherence

to lifestyle change (Fålnun et al., 2016). Furthermore, there is evidence that social isolation is associated with poor self-care (Riegel et al., 2009). Social support can come from family, friends, a community, internet sites or people that are met during cardiac rehabilitation (Moore et al., 2015). A social network is, next to the information coming from the hospital, a main source of health information after an MI (Fålnun et al., 2016). Furthermore, a strong social network can protect a patient against fear and depression as they can offer mental support (van der Voorde, 2020). All in all, it can be concluded social support is important during the lifestyle changes that are needed.

*Barriers and Opportunities*

Barriers and opportunities summarise the features of the social or physical environment that make behaviours harder or easier to perform. Disengagement with self-management can arise because of the limited availability of personal resources or life choices (Moore et al., 2015). Financial and cultural issues influence behavioural change as they are a barrier for it (Cobb et al., 2006). Research shows that middle-class heart patients are better able to adapt to lifestyle changes and feel more confident

... working digitally is not a familiar way of working for everyone that uses the Box concept.

Patients like to focus on short-term goals after discharge and slowly increase activities.

about their ability to change their lifestyle than lower-class patients (Moore et al., 2015). Namely, middle-class patients experience advantages like higher education, financial security, and social connectedness. These barriers and opportunities in a patient's home context should therefore be considered in the proposed health adaptations during the MI Box trajectory.

3.4.3. Behavioural Influences on Behaviour

This part of the model explains the actions of patients that influence health behaviour. This part of the model consists of four factors: behavioural skills, intentions, and reinforcement and punishment.

Behavioural Skills

Behavioural skills explain a patient's existing repertoire of health behaviour capabilities. For the MI Box, digital skills are needed to work with the provided devices. As mentioned before, working digitally is not a familiar way of working for everyone that uses the Box concept (van der Voorde, 2020). Therefore, it is necessary to consider the digital skills patients have and how this relates to the experience of the MI Box usage in their home context. Moreover, patients need to understand the data that is visualised in the

app to increase their ability to make lifestyle changes based on this data. During the different interviews that are presented later in this thesis, more will be discovered about a patient's ability to interpret the available data. Besides, a lot of patients are concerned about whether they can recognise symptoms (Fålnun et al., 2016). The apps provided with the MI Box currently do not provide means to help people with symptom recognition.

Intentions

The intentions explain the readiness of an individual to perform a behaviour. Intentions are the goals (short-term or long-term) a patient is aiming for. Patients like to focus on short-term goals after discharge and slowly increase activities (Fålnun et al., 2016). This is also in line with what is advised to gain more self-efficacy as it can help to increase the mastering experiences of patients.

Reinforcement and Punishment

Reinforcements and punishments explain how behaviour can be strengthened or weakened by means of tangible (e.g. money) or social (e.g. attention) rewards or punishments. Previous research advises regular moments of encouragement from health care providers (either in person or by telephone) to motivate

lifestyle change (Cobb et al., 2006). Moreover, motivational feedback messages can increase adherence to lifestyle changes (Johnston et al., 2016). The watch of the MI Box is providing some motivational messages. In the interview of Chapter 6, it becomes clear there

is a positive reaction to this motivational message. Furthermore, the interviews in Chapters 4-6 will show more insights into the reinforcement and punishment that can come from the context of a patient.



KEY TAKEAWAYS | Chapter 3.4. Lifestyle Change

1. SCT, developed by Albert Bandura, is used throughout this thesis (Glanz et al., 2015). The use of SCT has shown potential to enhance self-care activities.
2. Self-efficacy in patients is dynamic as it is influenced by the context and situation (Wolf et al., 2016).
3. As an MI occurs unexpectedly, this can have an influence on the belief in self-efficacy as there are no previous experiences.
4. Fear can cause patients to be held back to perform a certain behaviour.
5. Knowledge about risk management is needed to understand why lifestyle change is needed.
6. The lifestyle adjustments of post-MI patients that are needed for recovery and risk management, arise out of a process of negotiating bodily constraints and social worlds (Moore et al., 2015).
7. Social isolation is associated with poor self-care (Riegel et al., 2009).
8. A social network is, next to the information coming from the hospital, a main source of health information after an MI (Fålnun et al., 2016).
9. Disengagement with self-management can arise because of the limited availability of personal resources or life choices (Moore et al., 2015).

- 10. Working digitally is not a familiar way of working for everyone that uses the Box concept (van der Voorde, 2020).
- 11. Patients like to focus on short-term goals after discharge and slowly increase activities (Fålnun et al., 2016).

3.5. Self-Care

The change towards coaching can only happen if patients are enabled to perform self-care activities. But what does self-care actually mean? In this section the definition and elements of self-care will be explained in more detail.

3.5.1. Definition

Self-care is defined as a naturalistic decision-making process addressing both the prevention and management of chronic illness (Riegel et al., 2017).

After an MI people need to adapt to a chronic illness (Condon & McCarthy, 2006). The paper of Riegel et al. (2017) will be used to explain why a focus on self-care is important for the prevention and management of chronic illnesses. The first step in self-care for cardiovascular diseases is knowledge of

one’s health status and awareness of risks. Furthermore, in coronary heart diseases, self-care interventions that focus on lifestyle change improve clinical outcomes. Most patients need assistance to master self-care skills and how to manage unique situations. However, training in self-care is not common in the current healthcare system. Time should be spent informing patients about their health status, risk factors, and providing appropriate sources of further information before other self-care steps can be performed.

3.5.2. Elements

The paper of Riegel et al. (2017) explains that the core elements of self-care are self-care maintenance, self-care monitoring, and self-care management. Self-care maintenance means someone can adhere to the behaviours needed to maintain physical

Most patients need assistance to master self-care skills and how to manage unique situations. However, training in self-care is not common in the current healthcare system.

... the core elements of self-care are self-care maintenance, self-care monitoring, and self-care management.

and emotional stability. Self-care monitoring involves observation of changes in signs and symptoms. As the MI Box offers monitoring devices it already shows potential to be a helpful means for the promotion of self-care. However, besides the patient’s vitals, the symptoms and side effects patients experience are not stimulated to monitor yet. Self-care management means people know how to respond to signs and symptoms when they occur. In a previous paper by Riegel et al. (2009), it becomes clear that even when

symptoms are recognised the interpretation of and reaction to the symptoms can be challenging.

In Figure 26 the three core elements alongside sub-elements that show the self-care requirements are visualised using the insights of the paper of Riegel et al. (2017). This visualisation will be used to analyse the current self-care activities of MI patients and MI Box users.

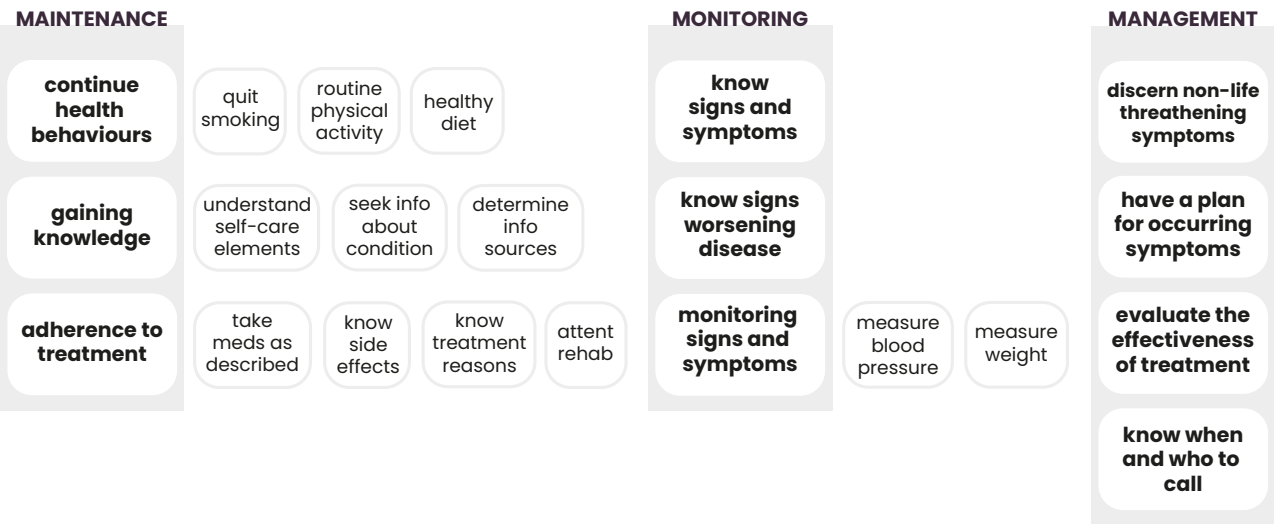


Figure 26: Self-care elements





## KEY TAKEAWAYS | Chapter 3.5. Self-Care

1. Self-care is defined as a naturalistic decision-making process addressing both the prevention and management of chronic illness (Riegel et al., 2017).
2. Most patients need assistance to master self-care skills and how to manage unique situations. However, training in self-care is not common in the current healthcare system.
3. The core elements of self-care are self-care maintenance, self-care monitoring, and self-care management.

## 3.6. Shared Decision Making

As explained before, a focus on SDM throughout this thesis is relevant as it helps to define the moments in the care trajectory in which involvement is important. Moreover, it already shows the moments in which, after this thesis, SDM could be increased. In this section, more will be explained about why SDM is important and how it could be implemented.

### 3.6.1. Why SDM?

#### Benefits

Little proof is available about the effect of SDM on patients' outcomes as research methods to assess SDM appeared quite late (Stiggelbout et al., 2015). However, from what is known, SDM can reduce anxiety over the care process, provide more consistent care,

and reduce healthcare costs (Siyam et al., 2019). Moreover, including SDM may lead to a better fit of care for a certain patient which leads to increased satisfaction, better relationships, fewer consultations and second opinions, and adherence to treatment (Stiggelbout et al., 2015). Most importantly, patients like to be included in SDM (Qin et al., 2022).

#### Project Relevance

From the aforementioned benefits, the reduction of anxiety is especially relevant in this thesis as fear and anxiety are common themes around an MI (Fållun et al., 2016; Hildingh et al., 2006; Qin et al., 2022). Furthermore, this thesis aims to increase self-care activities to enable the change

*SDM can reduce anxiety over the care process, provide more consistent care, and reduce healthcare costs.*

*... it can save time in the long term because better decisions can result in fewer consultations, second opinions, and better treatment adherence and outcomes.*

from monitoring to coaching. Patients need to understand their health status in order to engage in adequate self-care (Riegel et al., 2017). Meaning that before patients can perform self-care activities, they need to be involved in the care process to be able to understand these self-care activities. In other words, involvement is a means to facilitate self-care. As SDM has a focus on patient involvement, an SDM increase can help the MI Box to change to a more coaching attitude. Finally, to avoid recurring MIs it is important that patients adhere to self-care activities. The aforementioned benefits show that SDM has the potential to increase adherence.

### 3.6.2. Implementation

Although the phrase "sharing of decision making" was already used in 1972, the concept of SDM did not appear in research literature till 1997 (Stiggelbout et al., 2015). Furthermore, the paper of Stiggelbout et al. (2015) shows that although HCPs indicate the importance of SDM, SDM is applied only limited in practice. One of the reasons for this limited appliance is the fact that clinicians often fear the time that is needed to perform SDM. Although consultation time indeed shows a small increment if time is invested

in SDM, it can save time in the long term because better decisions can result in fewer consultations, second opinions, and better treatment adherence and outcomes. Also, SDM interventions mostly target physicians and very few target other health professions such as nurses (Siyam et al., 2019). However, Stiggelbout et al. (2015) shows that nurses can play an important role by helping patients form preferences and discussing the pros and cons of treatment.

In the paper of Stiggelbout et al. (2015), ways of implementation of SDM are discussed by presenting 4 steps in which the SDM model can be divided. This deviation makes SDM easier to grasp than the aforementioned nine elements that are attributed to SDM (see 1.3.3. Shared Decision Making). These nine elements are visualised on the next page in Figure 27 (Siyam et al., 2019). The colours of these elements will be used to explain the translation from these nine steps to the four steps defined by Stiggelbout et al. (2015). Figure 28 shows this translation. These steps are used to analyse if and how SDM is implemented in the care trajectory of the MI Box. These moments are first marked with a star that shows an expected and potential SDM moment. After the analysis of these



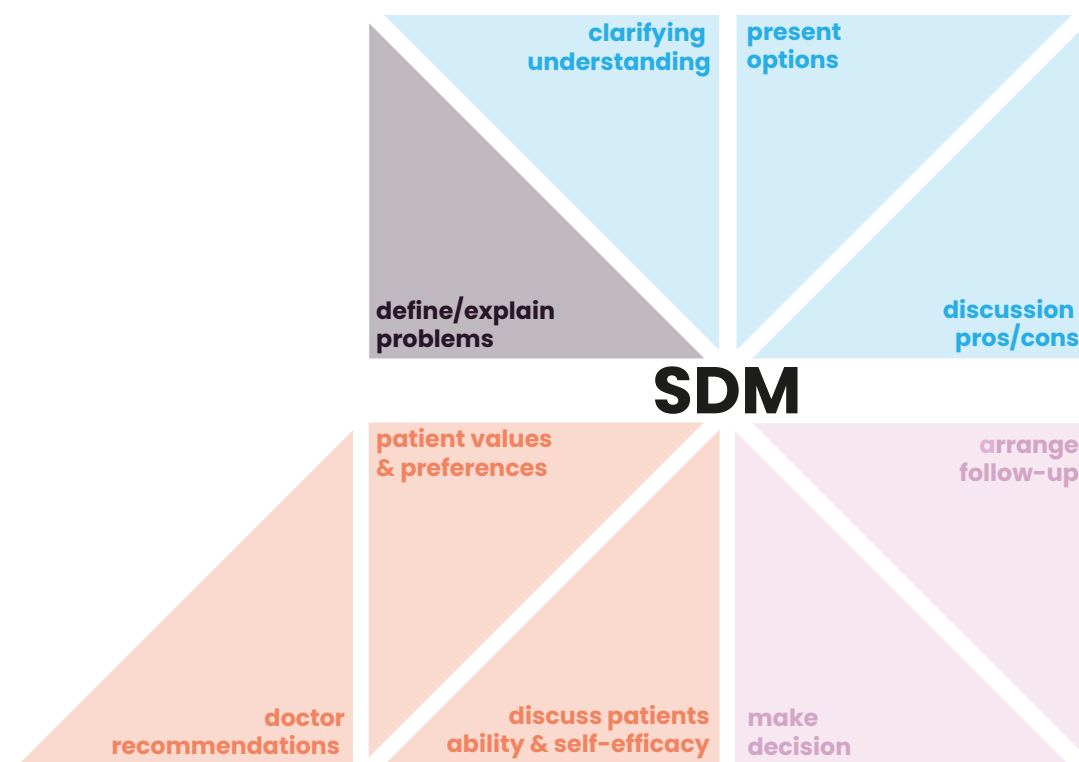


Figure 27: SDM elements

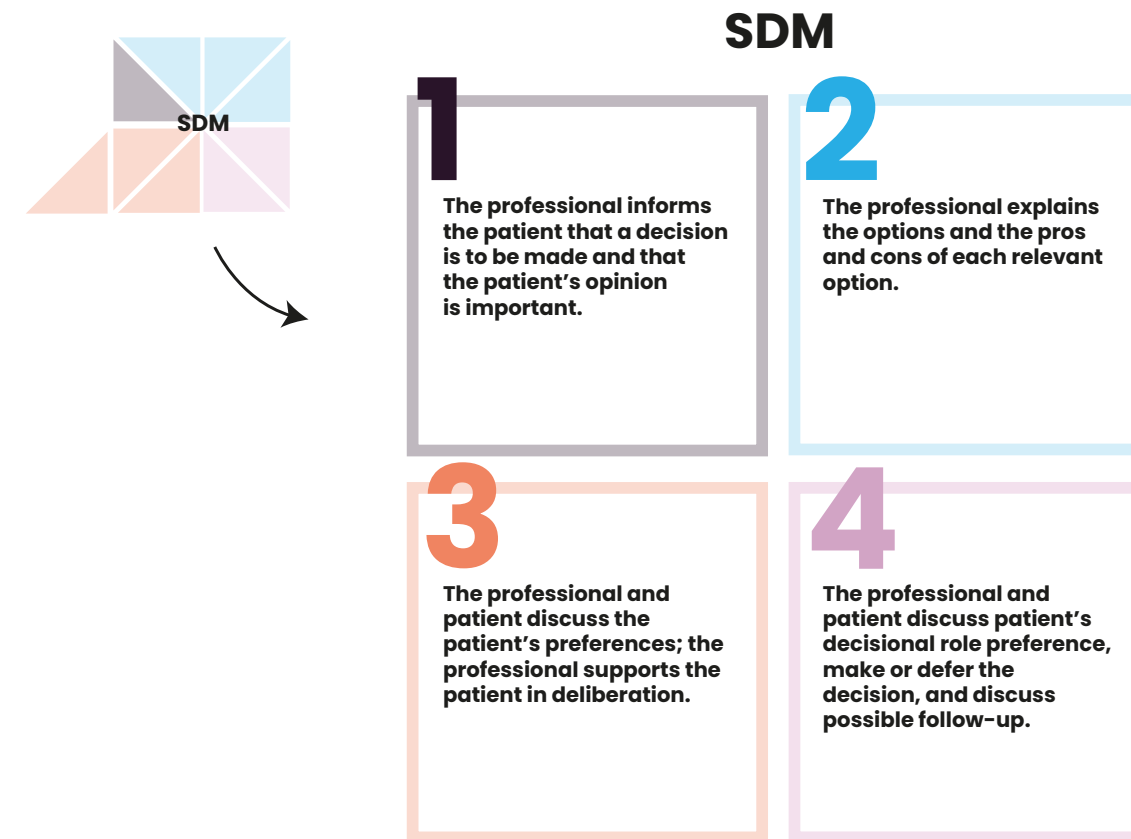


Figure 28: Four SDM steps

moments, by means of the four steps and interview input, a star can be replaced with a star that shows a planned SDM moment is present (see Figure 29).

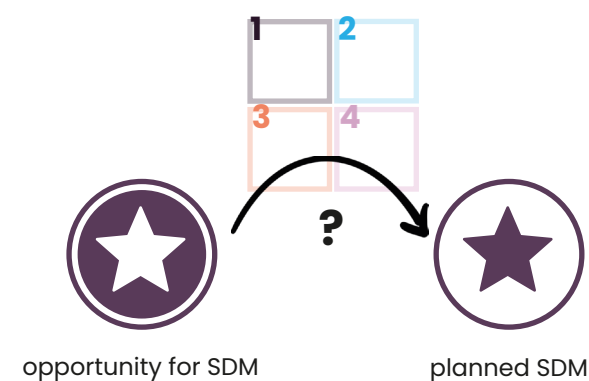


Figure 29: SDM analysis

Below the four steps of Stiggelbout et al. (2015) are further explained.

1. The professional informs the patient that a decision is to be made and that the patient's opinion is important; In a paper by Kambhampati et al., 2016 the importance of this step is stressed by mentioning patient empowerment begins with the caregiver acknowledging the patient is in control of their own care.
2. The professional explains the options and the pros and cons of each relevant option; The professionals should present the options in a non-steering manner.

3. The professional and patient discuss the patient's preferences; the professional supports the patient in deliberation; As a patient might not have immediate preferences, these preferences need to be

4. The professional and patient discuss the patient's decisional role preference, make or defer the decision, and discuss possible follow-up; Patients defer in their willingness to make the decision or preference to leave it up to the care professionals. However, it is important to go over steps 1-3 to really

... patient empowerment begins with the acknowledgement that patients are in control of their care.

... often there is a mismatch between the information HCPs think is important and the information patients really need.

Older patients can be used to the traditional way of care that accepts the authority of clinicians and do not question this authority.

People tend to “blindly” trust the doctor which decreases patient involvement in SDM.

make sure the patient knows what kind of decision needs to be made before deciding on if they want to make this decision or not. Furthermore, patients sometimes need some time to make a decision and discuss it with others. Therefore, the option of a second appointment needs to be available. If no time is needed, a decision can be made alongside the agreements on how to proceed.

3.6.3. Barriers for SDM

*Limited Time*

As there is only limited time during consultations, patients can get the impression that there might be limited time allocated for SDM. In addition, if there is no time to process a diagnosis, this can cause a consultation or a decision to be overshadowed by the shock patients might experience (Joseph-Williams et al., 2014).

*Lack of Knowledge*

An SDM process can be challenging when individuals lack insight into their disease (Kambhampati et al., 2016). Increased knowledge about the illness and the relation of the illness to their context could be an

important step in strengthening a patient’s role as an expert about their everyday life and as an active partner in the interaction with HCPs (Wolf et al., 2016).

*Not Giving the Rights to a Patient*

Providing patients with information is not enough to reach SDM. Next to knowledge, patients also need the power to be involved in SDM (Bunn et al., 2018). Some patients feel that they do not have “the right” to contribute to decisions (Joseph-Williams et al., 2014). Moreover, patient empowerment begins with the acknowledgement that patients are in control of their care (Kambhampati et al., 2016). Therefore, it is important care providers acknowledge this control and communicate this to the patient, which is in line with step 1 of Figure 28.

*Preconception Patient Involvement*

HCPs might think beforehand that patients do not want to participate in SDM (Siyam et al., 2019). There is often a mismatch between the information HCPs think is important and the information patients need (van der Voorde, 2020). Therefore, it is important for caregivers to ask about the patient’s information needs. Furthermore, HCPs can be concerned about the cognitive function that affects the ability

of patients to be involved in SDM (Bunn et al., 2018).

*Older Age*

Older patients can be used to the traditional way of care that accepts the authority of clinicians and do not question this authority (Joseph-Williams et al., 2014). In other words, patients might not be aware that there is a choice to be made (Bunn et al., 2018). This can explain why older patients are less involved than younger patients (Davis et al., 2007).

*Overtrust*

People tend to “blindly” trust the doctor which decreases patient involvement in SDM (Joseph-Williams et al., 2014). Elaborating on this, a long relationship with a health care provider will lead to trust and a belief that the health care provider knows the patient well enough to decide on a treatment that is most suitable for them. This trust can be a reason for low patient involvement (Eliacin et al., 2015).

*Fear Negative Impacts Disagreement*

Patients can be afraid to be described as “difficult patients” which can decrease their quality of care (Joseph-Williams et al., 2014;

Stiggelbout et al., 2015). This fear can cause patients to ask fewer questions and avoid disagreements (Eliacin et al., 2015).

*Perception Wright or Wrong Answer*

Patients can choose to be less involved in SDM because they fear that they will make a poor decision that could affect their health (Eliacin et al., 2015). This fear of making a bad choice also has to do with the perception that there is a “right” or “wrong” decision during the decision making moment (Joseph-Williams et al., 2014).

*Severity of the Disease*

The more severe a patient’s condition is, the less involved patients will be in decision making (Davis et al., 2007). For example, patients with mild hypertension are more involved in their care than patients with severe heart diseases or cancer.

*Lack of Belief in Self-Efficacy*

Patients often underestimate their ability to understand and provide valuable information. This affects the open information exchange that is needed for SDM (Eliacin et al., 2015).

A family member or friend present in a consultation can be a facilitator for SDM as they can act as an advocate that supports practical and social needs of the patient.

The use of medical terminology can cause patients to feel that clinicians are “talking another language”.

Decision aids are tools that support patients in SDM by providing information and help to form a preference.

3.6.4. Facilitators for SDM

More Time

As limited time is a barrier, more time automatically is a facilitator. Research also showed that longer consultations are linked to improved SDM and increased patient satisfaction (Bunn et al., 2018).

Trusting Relationship

Although overtrust is a barrier, a trusting relationship is a facilitator. A relationship is required for SDM as it causes patients to ask more questions, share more information, and discuss their concerns more easily (Joseph-Williams et al., 2014). A trusting relationship can cause trust in the patient and respect for a patient’s intelligence or (cultural) norms (Lown et al., 2009). Besides, trust will make older people feel respected and understood (Bunn et al., 2018).

Discussion

Discussion of concerns with care providers might overcome disagreement. It can also be the case that care providers and patients agree to disagree (Lown et al., 2009). However, for this discussion trust is needed (Eliacin et al., 2015). Furthermore, it is valuable to discuss within the broader context of

patients’ preferences. A clinician should invite patients to ask questions and express values and lifestyle considerations by facilitating a discussion (Kambhampati et al., 2016).

Family and Friends Involvement

A family member or friend present in a consultation can be a facilitator for SDM as they can act as an advocate that supports the practical and social needs of the patient (Joseph-Williams et al., 2014). Besides, family members can provide extra input about experiences with treatment (Eliacin et al., 2015). Moreover, family or friends can listen more objectively to the information provided which can support the patient in understanding the information correctly (Lown et al., 2009).

Understandable Language

The use of medical terminology can cause patients to feel that clinicians are “talking another language” (Joseph-Williams et al., 2014). To facilitate SDM, it is important the language used is understandable by the patients (Lown et al., 2009). Besides using an understandable language, it is also good to often ask if the patient understood what is communicated (Lown et al., 2009).

Continuity of Care

Having too many clinicians involved in your care can cause patients to not be personally known by the clinician. This lack of personal recognition can negatively influence the relationship patients have with their clinicians (Joseph-Williams et al., 2014). Good continuity of care is therefore a facilitator of SDM. Furthermore, patients also like to have continuity of care as this avoids repeatedly reading and sharing the same information or seeing a lot of different HCPs (van der Voorde, 2020).

Explore Patient Perception

HCPs that respond positively to a patient’s needs and views, and provide feedback to a patient’s concerns, can increase patient involvement (Davis et al., 2007). To respond to a patient’s needs, one first needs to explore the patient’s ideas, fears, and expectations (Kambhampati et al., 2016). Moreover, patients prefer a personal approach in which a patient’s preferences are considered (Bente et al., 2021).

Decision Aids

Decision aids are tools that support patients in SDM by providing information and helping to form a preference (Stiggelbout et al., 2015).

Decision aids can increase patient knowledge, participation in SDM, and decisional self-efficacy (Bunn et al., 2018).

Patient Empowerment

Patient empowerment is crucial for SDM. Part of this empowerment is a patient’s acceptance of the responsibility for his or her health (Kambhampati et al., 2016). Patient empowerment is influenced by factors such as education, access to healthcare and resources, and risk perception (Kambhampati et al., 2016).

Education

Research shows that highly educated patients want to be more engaged than less educated patients (Davis et al., 2007).

3.6.5. Context Influence

In the facilitators and barriers discussed above it can be noted the patient’s home context is influencing SDM. Namely, educational background, family support, and cultural norms can influence SDM. As each home context is different, research into the home context of an MI Box user is important to find out what is influencing SDM. The insights of the interviews from the next chapters aim to explain more about the context influence

in the MI Box care trajectory. Moreover, a broader context of patients will be explored to understand their preferences and needs (Kambhampati et al., 2016).



**KEY TAKEAWAYS** | Chapter 3.6. SDM

1. SDM can reduce anxiety over the care process, provide more consistent care, and reduce healthcare costs (Siyam et al., 2019).
2. The 4 steps defined by Stiggelbout et al. (2015) are used to analyse if and how SDM is implemented in the care trajectory of the MI Box.
3. Patient empowerment begins with the acknowledgement that patients are in control of their care (Kambhampati et al., 2016).
4. If there is no time to process a diagnosis this can cause a consultation or a decision to be overshadowed by the shock patients might experience (Joseph-Williams et al., 2014).
5. Often there is a mismatch between the information HCPs think is important and the information patients really need (van der Voorde, 2020).
6. Older patients can be used to the traditional way of care that accepts the authority of clinicians and does not question this authority (Joseph-Williams et al., 2014).
7. People tend to “blindly” trust the doctor which decreases patient involvement in SDM (Joseph-Williams et al., 2014).
8. Patients can choose to be less involved in SDM because they fear that they will make a poor decision that could affect their health (Eliacin et al., 2015).
9. A relationship is required for SDM as it causes patients to ask more questions, share more information, and discuss their concerns more easily (Joseph-Williams et al., 2014).
10. A family member or friend present in a consultation can be a facilitator for SDM as they can act as an advocate that supports the practical and social needs of the patient (Joseph-Williams et al., 2014).

11. The use of medical terminology can cause patients to feel that clinicians are “talking another language” (Joseph-Williams et al., 2014).

**LITERATURE SUMMARY**



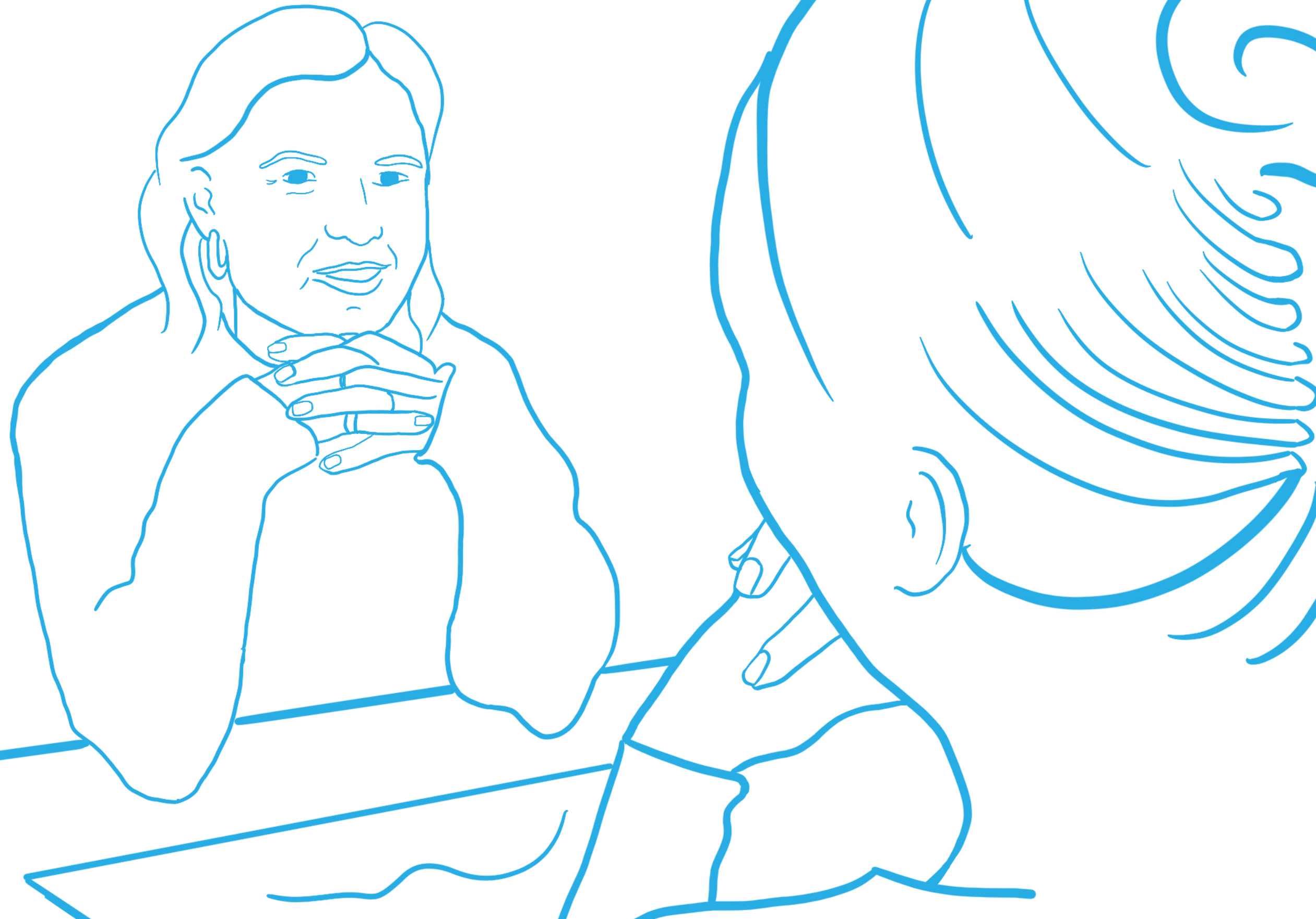
An MI is an incident that happens suddenly. This suddenness can cause fear and a lack of knowledge. Because treatment needs to happen quickly, this increases the risk of poor discharge, which increases the risk of rehospitalization. Risks of a recurring MI can be decreased by means of self-care that involves medication, self-monitoring, and lifestyle change. The lack of knowledge caused by the unexpectedness of the MI and a poor discharge experience can have a negative influence on lifestyle change. Lifestyle change is also influenced by social support, environmental facilitators and barriers, normative beliefs, behavioural skills, and self-efficacy. Rehabilitation supports people in reaching for a lifestyle change. Digital tools have the potential in facilitating lifestyle change by sending motivational

messages and offering information and support tools that help people to keep track of their medicine and recognise symptoms. These potentials already show opportunities for the MI Box to increase self-care activities. Patients need to understand their health status in order to engage in self-care activities. Therefore, increasing a focus on SDM in the MI Box can facilitate increasement of self-care as it will increase patient involvement. Although HCPs indicate the importance of SDM, it is applied only limited in practice. Barriers for SDM are: lack of continuity of care, lack of trust, overtrust, lack of knowledge, lack of belief in self-efficacy, fear of disagreements, preconceptions about patients’ ability to perform SDM, lack of time, and older age.

## INTERVIEWS HEALTHCARE PROFESSIONALS

Interviews with HCPs are performed to get a better understanding of the MI Box care trajectory, the interactions of HCPs with patients, and if and how the SDM steps stated by Stiggelbout et al. (2015) are performed. Analysis of the SDM steps aims to find out moments in which patients could be more involved and how. This way it can be determined what is needed to shift from monitoring to coaching. Furthermore, these interviews are used to determine the steps within the Metro Map of the MI Box trajectory.

# 4





4.1. Research Questions

- 1. What care steps are performed during the care trajectory of the MI Box?
- 2. What are potential SDM moments?
- 3. How do HCPs involve patients in their care trajectory and potential SDM moments?
- 4. How is the MI Box used in the care trajectory?

4.2. Participants

During the care trajectory of the MI Box different healthcare professionals are included. An overview of the most relevant HCPs in the MI Box care trajectory is provided in Table 3. Basalt is the name of the cardiac rehabilitation centre LUMC patients are referred to.

In total five interviews with different HCPs are performed. In Table 4 an overview of the participants and their function is given. In this thesis, participants are referred to by their anonymous names P1 to P5.

|        | Hospitalisation                            | Rehabilitaiton                                                                                                                                 | Consults                           |
|--------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| LUMC   | Cardiologist<br>Nurse Specialist<br>Nurses | <i>If needed:</i><br>Psychologist                                                                                                              | Cardiologist / Nurse<br>Specialist |
| BASALT |                                            | Cardiologist<br>Physiotherapist<br><br><i>If needed:</i><br>Psychologist<br>Social worker<br>Sexologist<br>Dieticien<br>Occupational therapist |                                    |

W

Table 3: Involved HCPs

4.3. Method

4.3.1. Recruiting

The participants were recruited by means of the connections within the LUMC and phone calls with Basalt.

4.3.2. Preparation

The interviews are prepared with an interview script. Topics that are touched upon in this script are the care steps, people involved in the care steps, the approach of the HCPs, the information provided to patients, common questions of patients, the introduction of the MI Box, and the description of HCPs of the overall value of the MI Box throughout the care trajectory. For each interview, the script is adjusted according to the different roles of the participants within the care trajectory. Moreover, sometimes HCPs only had limited available time which in turn resulted in a shorter interview script. The visual templates of Appendix B and C are used as a toolkit for expression during the physical interviews.

4.3.3. Data Analysis

- Data analysis is performed according to the following steps:
- 1. Transcripts of the interviews are made;
  - 2. In a Miro board, the transcripts are placed and important quotes are highlighted;
  - 3. Statement cards are made from different quotes;
  - 4. A first clustering is performed based on the topics within the statement cards;
  - 5. SDM is analysed by means of the 4 SDM steps described by Stiggelbout et al. (2015);
  - 6. The data is compared to the FITT framework;
  - 7. The data is analysed by means of the Metro Mapping tool.

The data analysis of all the interviews can be found in Appendix H.

| Participant | Location | Function                           | Time            |
|-------------|----------|------------------------------------|-----------------|
| P1          | LUMC     | <i>Interventional cardiologist</i> | 45 min          |
| P2          | LUMC     | <i>Nurse Specialist</i>            | 30 min          |
| P3          | LUMC     | <i>Psychologist</i>                | 30 min (online) |
| P4          | Basalt   | <i>Cardiologist</i>                | 45 min          |
| P5          | Basalt   | <i>Physiotherapist</i>             | 45 min (online) |

Table 4: Participants HCPs

If the heart vessels are still closed the doctors need to work as fast as possible to save as much heart muscle as possible.

## 4.4. Results

### 4.4.1. Themes

From the interview a few themes appear. These themes are summarised by placing them below the phase in the process described in Chapter 3.



#### Time is Muscle

If the heart vessels are still closed the doctors need to work as fast as possible to save as much heart muscle as possible. This leaves little time to inform patients about what is happening.

P1: “It is not possible to start a whole conversation as everything needs to happen as quickly as possible.”

This causes patients to still have questions about the procedure when they arrive at the rehabilitation.

P4: “Sometimes they also have questions about what they did exactly.”

*Patient dependent information provision*  
During the catheter ablation a patient

is awake which means an informative conversation could happen. However, as the patient often is in shock or in a lot of pain, communication is dependent on the responsiveness of patients.

P2: “... or sometimes it happens during the procedure if people are in good shape or they do not have a lot of pain or are just good approachable.”

Besides, HCPs at the LUMC base the amount of information provided on their estimation of what they think could be understood by the patient.

P2: “It is very patient dependent, because of course one just comes from a lower social economic status than another.”

All patients are referred to rehabilitation. ... At the rehabilitation patients get more information and support to cope with their MI.

#### Box Choice

The MI Box is used as standard care at the LUMC. However, patients are always provided with a choice if they want to use the MI Box or not. For this choice, however, there is only limited time as after the Mission Talk this decision needs to be made immediately. This causes patients to not know what to expect from the MI Box when they choose to use it.

P2: “Yeah, they don’t really have a clue about what they are supposed to do with it. So they have a little bit of an “I will see” attitude.”



#### Reliance on Basalt

All patients are referred to rehabilitation. LUMC pushes patients to go to the intake and communicates that after the intake they can choose if they want to pursue rehabilitation. Little information is provided to the patient during hospitalisation about what rehabilitation entails. During the conversations with HCPs, it became clear that they rely a lot on Basalt. At the rehabilitation, patients get more information and support to cope with their MI.

#### Mission Talk and Booklet

During the Mission Talk the Mission Booklet is handed out and explained. In the interviews with HCPs from LUMC a lot is referred to this Mission Booklet, which shows that this is the most important source of information provided to patients from the LUMC.

P1: “That’s what the booklet is for. That’s why they need the booklet as soon as possible. Then they can start reading what it’s all about.”

P2: “And then you see that 4 months later they start calling every week with: I still have a question, I still have this and that. And you can overcome all that by simply rehabilitating.”

However, patients have to wait a period of time before they start the rehabilitation program.

P4: “They start, or at least the aim is to start two weeks after discharge in the case of a

Patients need to regain trust in their body and need reassurance about what they are able to do again.

A major topic during rehabilitation is when people are able to work again.

The MI Box is not involved during the treatments at the rehabilitation centre.

The fact patients seek for more information shows that patients are not provided with enough means by HCPs to be fully reassured about the medication.

heart attack. And what we do at the start of rehabilitation is actually, the first phase is more the screening phase, the inventory phase.”

*Biking Test*  
A biking test investigates the remaining heart vitality of MI patients. It is performed during the intake of the rehabilitation and used as the baseline for the rehabilitation programme designed for a certain patient.

*Regain Trust*  
A common question people have after an MI is about what they are able to do again. This is because patients need to regain trust in their bodies. By means of exposure, which is provided by rehabilitation, patients try to learn to know their boundaries and trust their bodies again.

P4: “Well, often it’s about what they can and can’t do. Whether they can move again or they can cycle again, things like that.”

Furthermore, people are really alert to their bodily signals and find it difficult to filter out unimportant signals. This makes patients insecure and suspicious about what signs could be signs of a recurring MI.

P3: “You have a hyper alertness on your body which is really logical, so with everything you think, oh dear, what does this mean?”

*Work*  
A major topic during rehabilitation is when people are able to work again. Work is an interesting context factor that influences patients’ choices. On the other hand, someone who is already retired does not experience the pressure of getting back to work again.

*Box Use During Rehabilitation*  
The MI Box is not involved during the treatments at the rehabilitation centre. Only the monitored values of the MI Box are used for comparison with the measurements gained during the rehabilitation program. Furthermore, HCPs of the rehabilitation centre are not fully aware of the function of the MI Box. This shows a poor FITT (Kujala et al., 2020) of the MI Box in the rehabilitation trajectory.

P5: “We actually do not use the Box.”

*Fear as Barrier and Facilitator*  
Fear is causing the training with the physiotherapist to slow down as a patient

first needs to gain mastery experiences and trust in their body. Therefore, little steps are taken and the group training is not followed by a fearful patient until more trust is gained. Although emotional support is provided to fearful patients, this support comes a bit later than the physical support. On the other hand, fear can also facilitate motivation as people

often experience an MI as an eye-opening experience to change their lifestyle. In other words, their intentions (see Chapter 3.4) are straightened up which enables lifestyle change.

P4 “Often an infarct is a kind of “wake-up moment” which we also try to emphasise.”



*Medication Struggles*  
Patients are provided, according to protocol, with a standard amount of medication. During the Mission Talk, these medications are explained. However, it is patient-dependent on how much information about the medication is provided.

P2: “... with one I will say well, you have this pill for this and this reason and with the other I think well, I will not do that.”

Once at home, patients will become more critical about the medication they received from the hospital. They will seek for more information in their home environment which

will be discussed during consults. The fact patients seek for more information shows that patients are not provided with enough means by HCPs to be fully reassured about the medication.

P2: “Medication, that’s always a hot topic...”

During rehabilitation, the medication and its side effects are discussed with the patient. The patient is supported in evaluating the medication during rehabilitation, after which feedback from Basalt is sent to LUMC. Then, during consultations, the patient’s medication can be adjusted to specific patient needs.

This lack of understanding is causing people to call the hospital if nothing is actually wrong.

Besides, patients know the doctor watches their values. This awareness can cause either motivation or lack of involvement.

Moreover, the MI Box is currently sent to patients due to work overload of the Box support team, and not handed over in person.

P5: “Attention is paid to that [medication]. Especially the side effects experienced by the patients. This is always discussed during the intake, ... .”

*Box Values*  
The measured MI Box values can cause reassurance but at the same time stress. Namely, if values are good this is helpful for patients to regain trust in their body. On the other side, if values are off this can cause stress. Overall, patients focus a lot on the threshold value provided on the patient issue form in the MI Box and the visual representation of the values. Meaning, they do not fully understand what the values actually mean. This lack of understanding is causing people to call the hospital if nothing is actually wrong.

P2: “If people are just in the orange, which is totally irrelevant to us, people get extremely stressed out about that.”

Some patients can get really stressed from performing measurements. This stress is due to the fact patients rely too much on the measured values and do not fully understand the meaning of them. This shows that the task (see Chapter 3.3, FITT framework) for the

patient is not clear (Ammenwerth et al., 2006). Besides, patients know the doctor watches their monitored values. This awareness can cause either motivation or lack of involvement. It causes motivation if someone feels the doctor is watching and thus will focus more on their improvement. It causes a lack of involvement if the patients feel that they do not need to monitor their own values as the doctor is already doing it.

Furthermore, HCPs miss personal input of patients which causes not all current monitored values to be used by HCPs because they lack valuable information.

P2: “If someone takes 10,000 steps or takes 6,000 steps, I don’t really care. It doesn’t say much either, because if people go to the gym 4 times a week...”



*Independent lifestyle adjustments*  
During rehabilitation the aim is to strive for lifestyle adjustments. A big focus at the end of the rehabilitation is to motivate people to already take action in their home environment. Patients will be supported during the first independent lifestyle

adjustment steps. After rehabilitation, the patients are not controlled and supported anymore by the rehabilitation centre.

P4: “Well what we often advise is to take those first steps during rehabilitation. So you register at the gym and go sometime.”

4.4.2. SDM

From the interviews some interesting moments can be noted in which SDM would be beneficial. These are analysed by means of the barriers and opportunities from literature (see Chapter 3.6), the four SDM steps of Stiggelbout et al. (2015), and the Metro Map tool. The outcomes of this analysis will be explained in this section.

*The MI Box Choice*  
Barriers: Limited time

Although HCPs make clear that a choice can be made if patients want to use the MI Box or not, it can be seen in the Metro Map that clear information and instructions about the MI Box are only presented after this

decision. Moreover, the MI Box is often sent to patients, instead of handed over in person, due to the work overload of the Box support team. The fact that the MI Box needs to be sent shows that the organisation has difficulties with implementing the MI Box in a suitable manner. This barrier is in line with the eHealth implementation barriers mentioned in the paper of Kujala et al. (2020).

*Medication*  
Barriers: Perception of patient involvement, lack of knowledge, and not giving the rights to patients.  
Facilitators: Education

During the Mission Talk it is explained that HCPs and the patients need to look together

Although patients are able to recall certain values as well, this is not stimulated.

Basalt involves patients in the decisions and gives them the rights to make their own decisions.

for the best medication combination as every patient is different. However, patients are not provided with information or tools that inform them about the different possibilities and the pros and cons. This lack of information makes it difficult for the patients to be involved in decisions about medication.

Treatment Adjustment

Barriers: Limited time, perception of patient involvement, lack of knowledge, not giving the rights to patients.

If monitored values are off, a protocol is followed to see if action is required. For example, a monitored value needs to be off three times before action is taken by the hospital. These actions can include a decision about treatment adjustments. Although a patient will be informed about these decisions, the decisions are happening without a patient’s involvement. The patients can also see that their values are off, but they have little knowledge about what that means and how their treatment can affect these values.

Consult

Barriers: Limited time, perception of patient involvement, lack of knowledge, no continuity of care.  
Facilitators: Family involvement

During a consult, values are used to discuss

the patient’s vitality. Although patients are able to recall certain values as well, this is not stimulated. Moreover, little time availability causes little room to discuss the patient’s preferences.

Setting Rehabilitation Goals

Facilitators: Exploration of patient perception, giving the rights to patients, understandable language, family and friends involvement.

At Basalt they have a focus on SDM and HCPs are trained in SDM. This training can be seen in the SDM moments in the rehabilitation care trajectory. Basalt involves patients in the decisions and gives them the rights to make their own decisions. During rehabilitation, people work towards tangible goals. These goals are set with the patients during the intake. In the first phase of rehabilitation, the screening phase, the aim is to state goals that are suitable for a certain patient. Before the first intake, a patient is already asked to think about these goals by means of a questionnaire.

P4: “So we really have those decision moments that we go through with the patients and influence this moment as little as possible, but yes, discuss all the pros and cons.”

4.5. Discussion

In the discussion the answers to the research questions are concluded and the limitations of the research are summarised.

4.5.1. Conclusions

The most important care steps that resulted from the interviews are already explained in Chapter 3. A more detailed version of the care steps can be found in the Metro Map composed in this thesis (see MI\_Box\_MetroMap.pdf, Figure 8). In this Metro Map, the use of the MI Box in the different care steps can be found by means of the “tools” layer. The care trajectory comprises

three important phases: hospitalisation, rehabilitation, and independence. Figure 30 shows the amount of guidance and involvement of patients throughout these phases. What can be understood from the interviews is that there is currently a lot of guidance provided by HCPs during hospitalisation and rehabilitation. This guidance ends after the end of the rehabilitation. Furthermore, during the transition between hospitalisation and rehabilitation, there is little guidance. Besides, there is a lack of involvement of the patient in the entire care process. Only during the

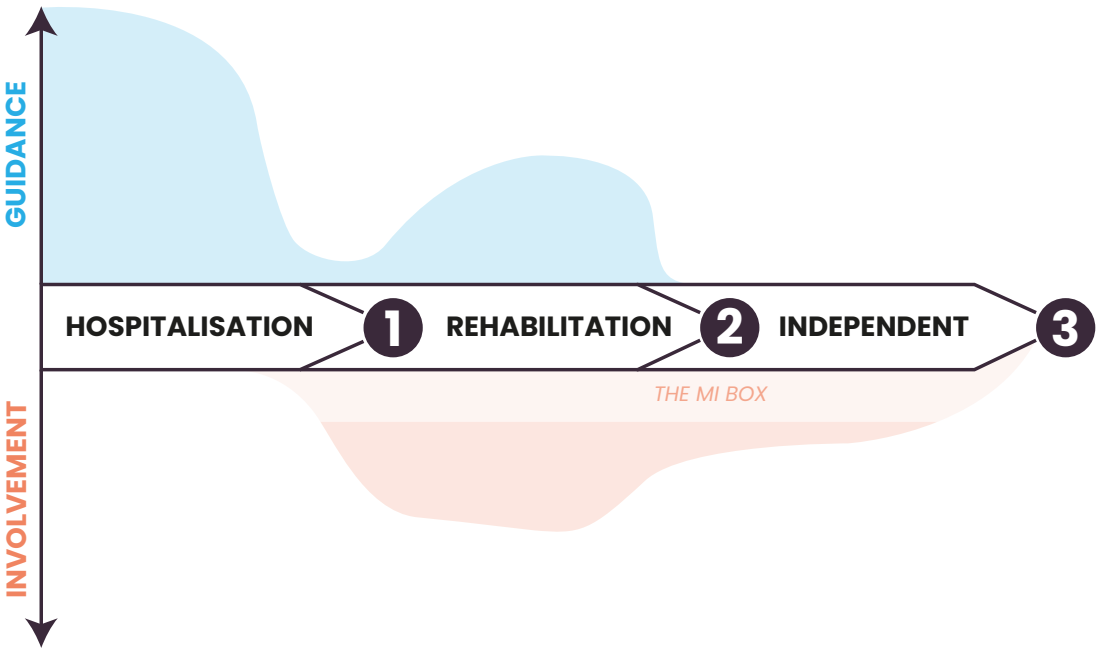


Figure 30: Involvement and guidance throughout the process



rehabilitation, the patient is more involved due to the SDM approach employed by Basalt employees. The LUMC is far away from an SDM approach because of the presence of the SDM barrier “preconception patient involvement” (Chapter 3.6). This is concluded from the fact that information provided to patients is depending on the estimation from doctors of a patient’s ability to understand information. This estimation causes a mismatch between the information HCPs think is important and the information patients really need. As a result, patients have numerous questions about their treatment decisions during consults which confirms no SDM model is employed. The MI Box has potential to involve patients more in the process as it enables access to the values that are monitored. However, from the interviews with HCPs, it is understood that patients do not fully understand how to interpret the values monitored. It is therefore not clear how much the MI Box actually helps with the involvement of patients. Even the decision made during the Mission Talk to use the MI Box does not follow the four SDM steps of Stiggelbout et al. (2015), as sufficient information to make an informed choice only comes after the choice has been made. “Limited time” appears to be the biggest

barrier for SDM during hospitalisation and consultations. On the other hand, this can explain why SDM is employed more during rehabilitation as more time is available then. Although the patients are more involved during the rehabilitation, the MI Box is currently not used during the treatment of Basalt. The fact there is not an informed choice made by the patient to work with the MI Box, the lack of understanding of the values by the patients, and the lack of implementation of the MI Box during the rehabilitation phase show that the MI Box is not used to its full potential.

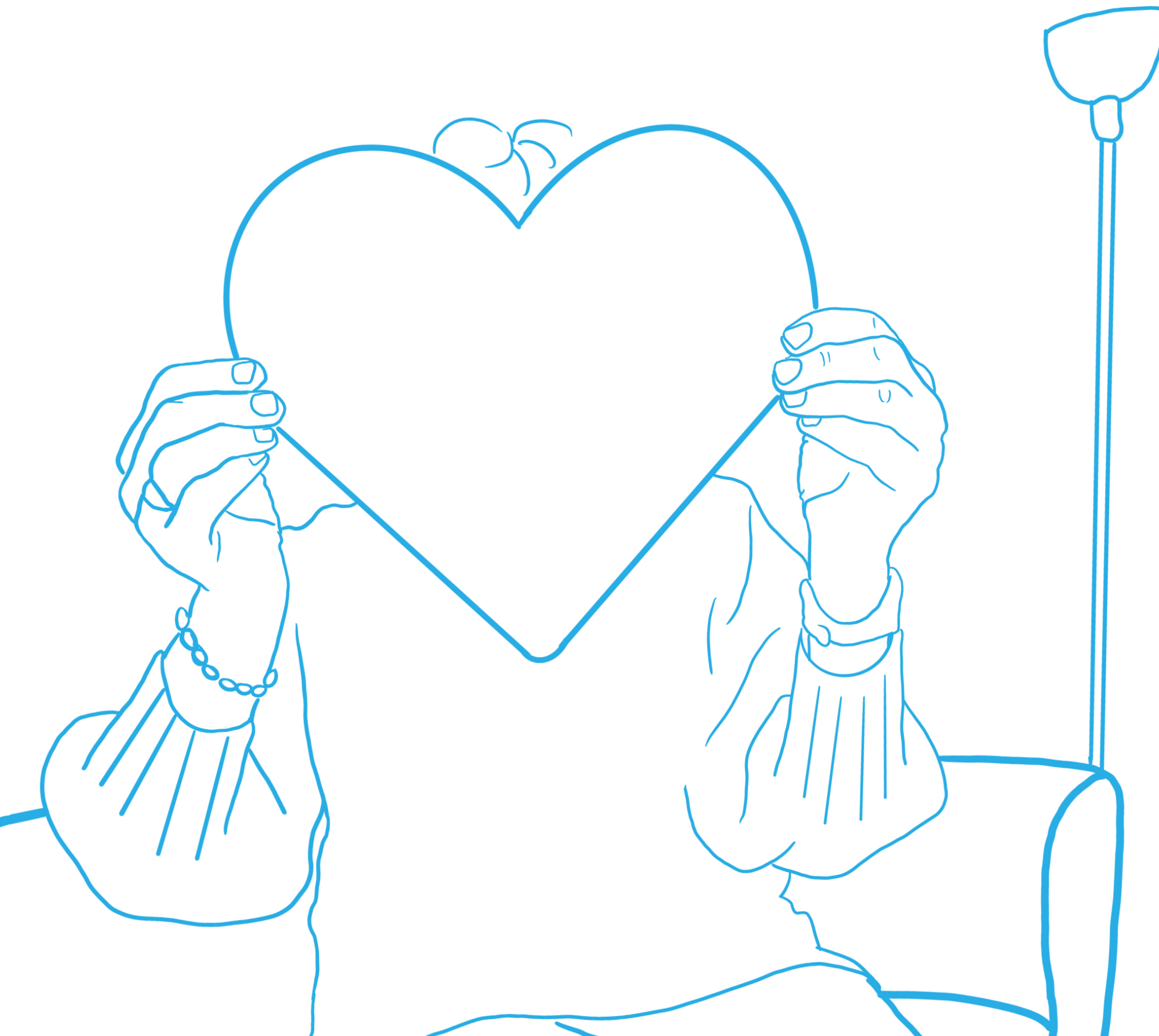
#### 4.5.2. Limitations

The interviews with HCPs are performed with numerous stakeholders in the care trajectory which provides different perspectives. However, from each group of stakeholders, only one participant is interviewed. During the interviews with the cardiologist of the LUMC, it was often mentioned “at least that is what I do”, which means different people can have different approaches. Therefore, there is a high chance of biased research outcomes.



#### KEY TAKEAWAYS | Chapter 4

1. If the heart vessels are still closed the doctors need to work as fast as possible to save as much heart muscle as possible.
2. Time limitation is the biggest barrier for SDM in the MI Box care trajectory.
3. The MI Box is used as standard care at the LUMC.
4. The MI Box is currently sent to patients’ homes and not handed over personally due to the work overload of the Box support office.
5. The Mission Talk and Booklet are the most important sources of information provided by the LUMC.
6. During consults, patients are asked to think along for the best medication combination. However, patients are not provided with enough means to do that.
7. Lack of understanding of the measured MI Box values is causing patients to call the hospital if nothing is actually wrong.
8. All patients are referred to rehabilitation.
9. Patients are insecure about their capabilities after an MI and need to regain trust in their bodies by exploring their boundaries during cardiac rehabilitation.
10. The MI Box is not used during the treatment at the rehabilitation centre.
11. During rehabilitation, the medication and its side effects are discussed with the patient.
12. A big topic during rehabilitation is when people are able to work again.
13. Basalt involves patients in the decisions and gives them the rights to make their own decisions.
14. The LUMC care trajectory does not include SDM yet but has potential to include it more by means of the MI Box.



# 5

## INTERVIEWS MI PATIENTS

Interviews with MI Patients that do not use the MI Box are performed. These interviews help to understand the impact an MI has on a patient's and his/her context. Analysing the interviews aims to find context factors that could influence care decisions and experiences. Moreover, the supportive needs mentioned by MI patients are valuable to consider for the design of an intervention. The main insights of the interviews are shared in this chapter and implemented in the Metro Map (see MI\_Box\_MetroMap.pdf, Figure 8).

## 5.1. Research Questions

1. What adjustments after an MI are most difficult for patients to perform and why?
2. What support is valuable for MI patients?
3. How does the context influence the care experience?

## 5.2. Participants

An overview of the patients that are interviewed can be found in Table 5. Throughout this thesis, reference is made to the participants by their anonymous names M1 to M4.

## 5.3. Method

### 5.3.1. Recruiting

The participants were recruited by means of a flyer that is posted in the Facebook group named "Harteraad community: hartinfarct en pijn op de borst".

### 5.3.2. Preparation

The interviews are prepared with an interview script. The topics that are touched upon in

these scripts are the experiences of the care journey, the adjustments after an MI, and the background and context of a participant. This script is adjusted according to the time and location of a certain interview. As some interviews were performed online, this required a different approach than the physical interviews. Besides, the visual templates of Appendix C and D are used

| Participant | Age | Gender | Location                | Time            | MI Date     |
|-------------|-----|--------|-------------------------|-----------------|-------------|
| M1          | 76  | Female | Wormerveer              | 60 min          | Nov, 2022   |
| M2          | 73  | Male   | Roermond                | 60 min (online) | March, 2023 |
| M3          | 63  | Female | Amersfoort / Heerenveen | 60 min (online) | Dec, 2012   |
| M4          | 51  | Male   | Beverwijk               | 60 min          | April, 2020 |

Table 5: Participants MI patients

as a toolkit for expression during physical interviews.

### 5.3.3. Data Analysis

Data analysis is performed according to the following steps:

1. Transcripts of the interviews are made;
2. In a Miro board, the transcripts are placed and relevant quotes are highlighted;
3. Statement cards are made from different quotes;

4. A first clustering is performed based on the topics within the statement cards;
5. The data is compared to the SCT;
6. The data is analysed on self-care activities;
7. The data is compared to the FITT framework;
8. The data is analysed by means of the Metro Mapping tool.

The data analysis of all the interviews can be found in Appendix H.

## 5.4. Results

The most common and most interesting themes that could be derived from the interviews are structured by means of the SCT constructs and the self-care elements of Figure 26.

### 5.4.1. SCT

COGNITIVE | *Knowledge*

Not enough information is provided to patients to fully understand how their medication works. Furthermore, because of the large number of medications, it is difficult for patients to understand where certain side effects are coming from.

M4: "If you use about 7/8 medicines, all with certain side effects, ... Yes, then it is difficult to determine where what is coming from."

COGNITIVE | *Regain Trust*

Patients need to regain trust in their bodies during the recovery process. In other words, they need to gain mastery experiences. This is in line with the information mentioned by the HCPs. Moreover, because patients need to regain trust, they also would like reassurance about the things that they can do when arriving home.

*“But yes, some regular contact would be nice in the beginning. They ask, for example, “are you alone” but after that nothing is actually done with the answer.”*

COGNITIVE | *Fear and Emotional Support*

Fear and the emotional burden of accepting the MI are hindering the patients to perform certain activities like movement or monitoring blood pressure. This is in line with the literature about fear and anxiety (see Chapter 3.1). The emotional support is often offered too late and too little. Especially in the first period at home, it is valuable to provide sufficient emotional support.

M1: *“But yes, some regular contact would be nice in the beginning. They ask, for example, “are you alone” but after that nothing is actually done with the answer.”*

COGNITIVE | *Fear of a Bad Decision*

Patients do not feel they have a choice around their medication since they do not have sufficient knowledge. Consequently, patients feel that they need to listen to the HCPs as they fear other decisions can badly affect their health. This is an SDM barrier (see Chapter 3.6)

M3: *“Anyway, you don’t want to blame yourself later that you should have listened.”*

COGNITIVE | *Familial MI*

If the patient has a familial MI, the

expectation can arise that the effect of lifestyle change will be negligible compared to the familial risks. Furthermore, a familial MI can also be confusing if patients always have had a healthy lifestyle.

M4: *“Well I also seem to have a familial MI, you know. And they say smoking is 20% of the problem. Well if I would do everything I could have won only 20% and that’s all it is. I was born with that other 80% and I can’t do anything about it.”*

ENVIRONMENTAL | *Work*

Work brings extra stress during the recovery as there is a lot of insecurity about how and if the patient will be able to go back to work. Besides, employers can have little empathy to the situation as the financial effect of an absent employee can be more relevant to them.

M4: *“Well then you will receive a letter from that employer because they want you to be completely rejected so that they do not have to pay.”*

ENVIRONMENTAL | *Movement*

If patients were already prescribed to a gym or medical gym, this can be a facilitator for movement as it will be easier to resume

*Work brings extra stress during the recovery as there is a lot of insecurity about how and if the patient will be able to go back to work.*

movement routines after rehabilitation. On the other hand, paying money for the gym can be a barrier for people. This money barrier is also mentioned in the interviews with HCPs.

M4: *“That is now only once a week, but if I had had a subscription myself I would have gone twice a week.”*

ENVIRONMENTAL | *Phone Use*

Patients often put a medication overview in their phone. Therefore, it can be an opportunity to provide this feature in the LUMC Care app.

ENVIRONMENTAL | *Beliefs in Medication*

People have different beliefs about the need for all the medication prescribed by the hospital. Overall, people prefer not to have any medications but are aware it is needed for their condition.

ENVIRONMENTAL | *Social Support*

Performing sport activities in a social environment is motivating. Also, the company of someone in the home environment during sports activities can be a facilitator for physical activity.

*Patients often put a medication overview in their phone.*

M1: *“I used to always go to the gym with my husband, but then he died and I found it a bit too much to go to the gym alone...”*

Besides, the lifestyle of a patient’s social environment influences the effort to change their lifestyle. For example, in the case of M4, everyone in the family smoked which also makes it more difficult for the patient to change this lifestyle behaviour (if the family does not support this change).

BEHAVIOURAL | *Medication Routine*

Due to the amount of medication a patient requires to build a new routine around taking their medication. Different means are used to keep up with their medication. Some tools that were mentioned by the participants were: medication boxes, medicine rolls, a list of medications on their phone and reminders for medication with the use of their phone.



Due to the amount of medication a patient requires to build a new routine around taking their medication.

This difference in proactiveness can also be due to the fact someone is less skilled in using resources (e.g. internet) to look for information.

... due to the side effects of the medication, filtering non-life threatening symptoms becomes more difficult.

5.4.2. Self-Care

With the results of the interviews, it could be interpreted what elements of self-care are deemed easy, medium or difficult to implement. Figure 31 visualises the result of this self-care analysis. The most important self-care themes found in this analysis are further explained in this section.

Gaining Knowledge

Not all patients are equally active in searching for information about their condition. This difference in proactiveness can also be due to the fact someone is less skilled in using resources (e.g. internet) to look for

information. Besides, although the majority of interview participants did know about self-care elements, they did not fully understand how these self-care elements could affect their health.

Adherence to Treatment

The (large) amount of different medications can make it difficult for patients to understand their medication and where side effects are coming from.

Know Signs and Symptoms

Symptoms can appear vaguely during the infarct. This can cause insecurity during the

rest of the care trajectory. This insecurity shows there is a need for more knowledge and awareness about the signs and symptoms of a (recurring) MI.

Monitoring Signs and Symptoms

All interview participants monitored their blood pressure and aimed for a decrease in blood pressure. However, the exact meaning of the monitored values was difficult for the participants to understand and interpret. Moreover, M1 did not like to monitor blood pressure as it was causing stress and worries instead of reassurance.

Discern Non-Life Threatening Symptoms

Patients are alert on their bodies and insecure about signs and symptoms. From these worries it can be noted there is a lack of knowledge about how to filter signs and symptoms. Moreover, due to the side effects of the medication, filtering non-life-threatening symptoms becomes more difficult.

Have a Plan & Know When to Call

A clear action plan for dealing with symptoms works reassuringly.

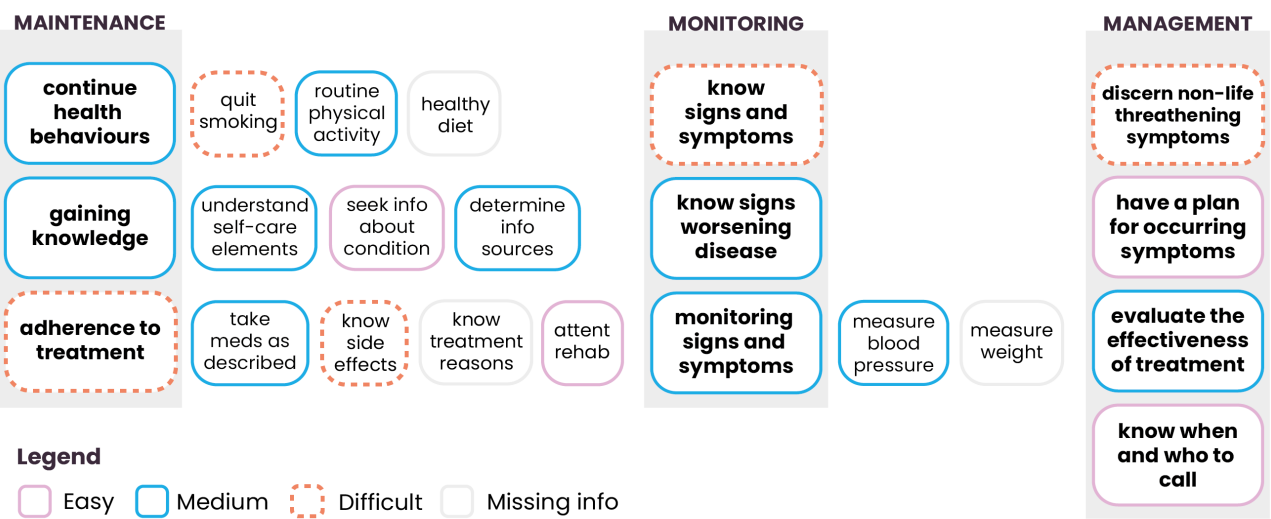


Figure 31: Self-care analysis MI patients

5.5. Discussion

In the discussion the answers to the research questions are concluded and the limitations of the research are summarised. Furthermore, a table in Appendix I compares the most important insights of the interviews in this chapter with the insights gained from the interviews with HCPs and the literature research.

5.5.1. Conclusions

Most importantly, it can be concluded medication is difficult for patients to accept

and implement in their daily routine. This can explain why medication is often asked about during consults (see Chapter 4). Furthermore, the side effects of medication make it difficult to distinguish non-life-threatening symptoms from life-threatening symptoms. This shows that the difficulties around medication can decrease some of the self-care elements mentioned by Riegel et al. (2017). Besides, the difficulty to distinguish side effects from symptoms negatively influence a patient's lack of trust in one's body. Next to the



*"You get that standard medication package, you go to rehabilitation and then you just have to figure it out yourself"*

experiences around medication, the after-care experience is often bad as patients would like more support around discharge.

M4: *"You get that standard medication package, you go to rehabilitation and then you just have to figure it out yourself."*

More emotional support and frequent contact, especially at the beginning of the recovery process, is needed. This is in line with literature that shows fear and anxiety are common themes (Fållun et al., 2016; Hildingh et al., 2006; Qin et al., 2022). The emotional support becomes even more important if a patient lives alone. Another context factor that influences a patient's need and experience is work. Work has been mentioned as a big influence on the recovery experience as it pressures the recovery of a patient. This is overlapping with the results from the interviews with HCPs. Next to work, the influences of the lifestyle and social support of family and friends are present. Especially for movement, family members can facilitate more movement by socially supporting this behaviour. This is in line with the literature structured in the SCT model (Chapter 3.4. Lifestyle Change). Also, the context has an influence on what

information is received. For example, if an MI is familial a lot of information can come from the family. In cases of a familial MI, it can happen that a patient already had a relatively healthy lifestyle before an MI. Then, it becomes even more important to seek specific improvements in lifestyle as otherwise patients can get confused about what to do.

**5.5.2. Limitations**

The different perspectives of the patients enabled an in-depth idea of common themes in MI care trajectories of different hospitals. This also provides good comparison means with the interviews of MI Box users. However, the number of participants is relatively low. This can cause important context factors to be missing. Furthermore, 2/4 interviews are kept online, which hindered the use of the expressive toolkits, causing difficulties to find out what adjustments were needed in the home context. Also, no sensitising booklets are used to sensitize the participants. This is due to the fact the original research plan of this thesis was to only interview MI Box users, so only booklets for these interviews were made. However, sensitising booklets would have been enormously valuable in the interviews with MI patients as it would have helped to already gain some insights

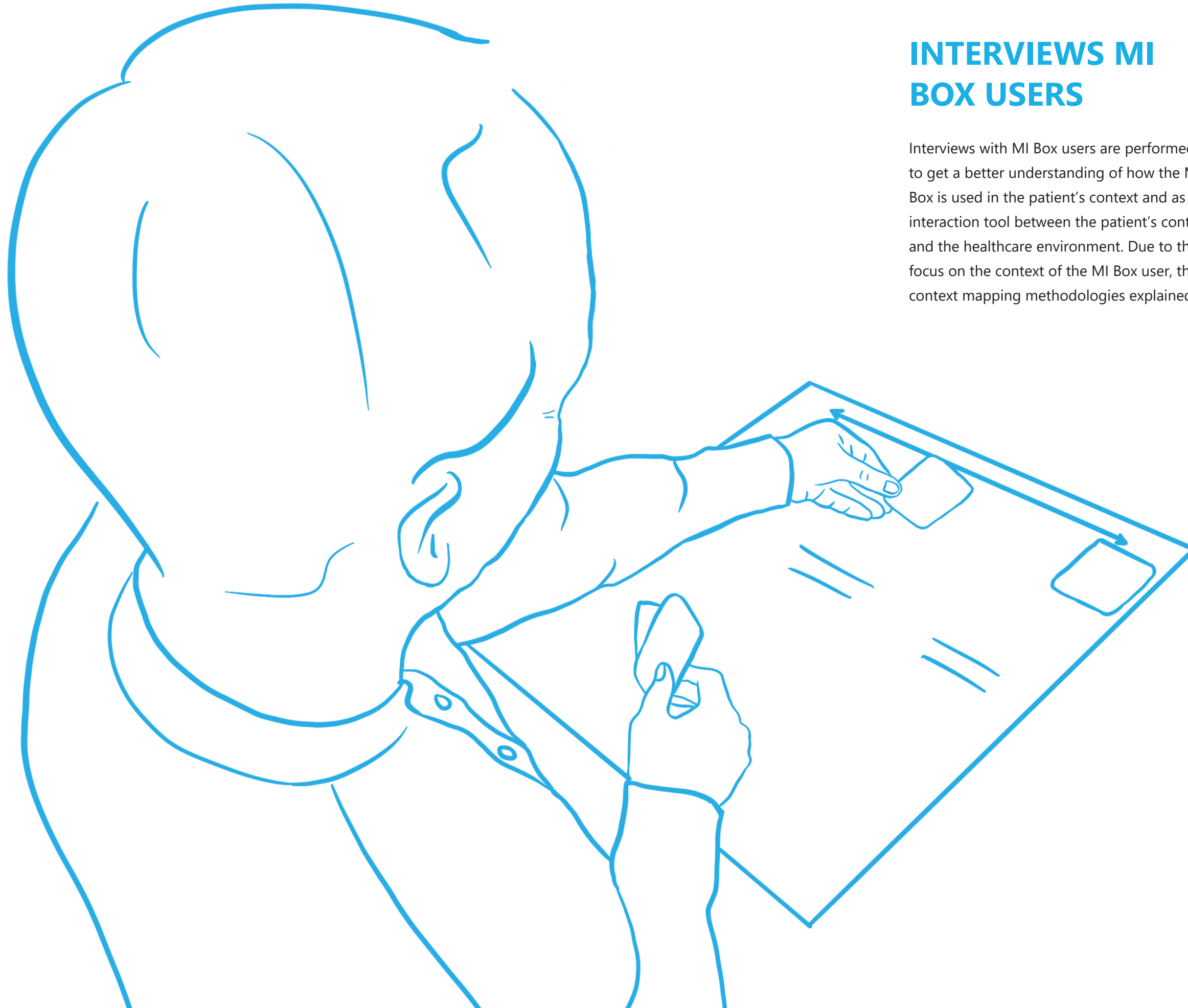
about the participant's context before the interviews. This would have enabled the collection of more in-depth insights about the influence of the context on the care journey. Luckily, the decision to use an open-end interview methodology and the use of

the SCT model to analyse the interviews still provided valuable insights into the common problems and influences on the behaviour and experiences of MI patients.



**KEY TAKEAWAYS | Chapter 5**

- 1. The aftercare is often experienced as bad.
- 2. Because of the large number of medications, it is difficult for patients to understand where certain side effects are coming from. These side effects also make it more difficult to filter non-life-threatening symptoms.
- 3. Patients often put a medication overview in their phone.
- 4. Patients would like reassurance about the things they can do when they arrive home
- 5. Emotional support would especially be valuable during the first period at home.
- 6. Knowledge and awareness about the signs and symptoms of a (recurring) MI seems necessary.
- 7. If the patient has a familial MI, the expectation can arise that the effect of lifestyle change will be negligible compared to the familial risks.
- 8. Paying money for the gym can be a barrier for movement.
- 9. When a patient temporarily suspends work, it brings extra stress as there is a lot of insecurity about how and if the patient will be able to go back to work.
- 10. Although patients have knowledge about self-care elements, they do not fully understand how these self-care elements could affect their health.
- 11. A clear action plan for recurring symptoms can be reassuring.



## INTERVIEWS MI BOX USERS

Interviews with MI Box users are performed to get a better understanding of how the MI Box is used in the patient's context and as an interaction tool between the patient's context and the healthcare environment. Due to the focus on the context of the MI Box user, the context mapping methodologies explained

in Chapter 2 are used for these interviews. Furthermore, the interviews aim to find out what support patients need to be involved in their care trajectory and perform self-care activities. The insights are implemented in the Metro Map (see MI\_Box\_MetroMap.pdf, Figure 8).

# 6



6.1. Research Questions

- 1. How is the MI Box implemented in the home context of an MI patient?
- 2. What support is missing throughout the care trajectory of an MI Box user?
- 3. How do MI patients experience the use of the MI Box throughout their care trajectory?

6.2. Participants

An overview of the patients that are interviewed can be found in Table 6. Throughout this thesis, reference is made to

the participants by their anonymous names B1 and B2.

6.3. Method

6.3.1. Recruiting

B1 (see Figure 32) has been contacted by means of a personal initiative to share flyers at Basalt. Further in the project progress, B2 has been recruited with support from the LUMC. This participant is contacted for a co-creation session and a short interview has been kept before the co-creation session. The data from this short interview is lightly analysed and only used for answering the research questions. However, the insights of the interview of B2 have not been considered

during the composition of concept directions as the delay in recruitment caused the interview to be performed after the concept compositions.

6.3.2. Preparation

A sensitize booklet is sent to the patients before the interview (Appendix A). Furthermore, the interviews are prepared with an interview script. The topics that are touched upon in this script are experiences of the care journey, the adjustments after an MI,

| Participant | Age | Gender | Location  | Time   | MI Date     |
|-------------|-----|--------|-----------|--------|-------------|
| B1          | 66  | Male   | Leiden    | 60 min | March, 2023 |
| B2          | 74  | Male   | Nieuwkoop | 30 min | Sep, 2022   |

Table 6: MI Box users



Figure 32: B1



the implementation of the MI Box in the daily routine, the use of the MI Box throughout the care journey, and the background and context of a participant. Before the interview, this script is adjusted according to the results of the sensitize booklet. During the interviews, the visual material of Appendix D is used as a toolkit for expression.

6.3.3. Data Analysis

Data analysis is performed according to the following steps:

- 1. Sensitize booklets are analysed as the first data source and preparation for interviews;
- 2. Transcripts of the interviews are made;
- 3. In a Miro board, the transcripts are placed

- and important quotes are highlighted;
- 4. Statement cards are made. A first clustering is performed based on the topics within the statement cards;
  - 5. The clusters are compared to the statement cards of the interviews with HCPs and other MI Patients;
  - 6. The data is compared to the SCT;
  - 7. The data is analysed on self-care activities;
  - 8. The data is compared to the FITT framework;
  - 9. The data is analysed by means of the Metro Mapping tool.

The data analysis of all the interviews can be found in Appendix H.

treatments and symptoms. This awareness can cause a rational way of looking at the MI.

B1: “But I wasn’t scared or anything. Only a bit restless about “that could be a heart attack.”

COGNITIVE | Expectation Assignments

During the use of the MI Box, the interview participant was asked to perform extra

The interview participant was asked to perform extra measurements in the afternoon to see the effect of the medication. This caused an active attitude towards the measurements ...

measurements in the afternoon to see the effect of the medication. This caused an active attitude towards the measurements and comparison with the outcome expectations.

B1: “I do notice that it is a bit lower around noon. And that is indeed what you expect from the medicines.”

COGNITIVE | Biking Test

The biking test can be reassuring as it shows the remaining vitality, and therefore the movement abilities, of the patient.

B1: “First I wanted to make sure it [heart symptoms] would stay good. But the bike test was good [which was reassuring].”

ENVIRONMENTAL | Work

Suddenly stopping working can be difficult as certain tasks need to be handed over to colleagues. Moreover, expectations about the reintegration process are present, but information about the actual process of reintegration is missing.

B1: “I actually thought: well, if we start rehabilitation processes, then we can also start thinking about working again...”

“First I wanted to make sure it [heart symptoms] would stay good. But the bike test was good [which was reassuring].”

ENVIRONMENTAL | Family

Family members can help patients determine what rehabilitation goals are desirable.

B1: “And especially that goal related to height, [wife] insisted that I should also mention that.”

BEHAVIOURAL | Routine

If a routine is implemented, this makes the performance of measurements and self-care activities easier.

B1: “In the morning it’s routine, then I really do it. But around noon I sometimes forget.”

BEHAVIOURAL | Clear Symptoms

Clear symptoms can cause worries at the beginning of the care trajectory but reassurance during the recovery process. The body can be trusted more easily during recovery because of easy symptom recognition.

B1: “... then I felt it [symptoms] a little bit, but that went away immediately.”

BEHAVIOURAL | Side Effects

Even if there are little to no side effects, the side effects of the medication are still difficult to grasp.

“I have noticed that even for those 8000 passes you just have to be outside or active for 45 minutes to an hour. And if I am going to work more than 9 hours per day again, then that is a bit difficult to fit in.”

BEHAVIOURAL | *Reinforcement*

When the MI Box is received by patients, it can feel like a big present. This present experience motivates people to use the product. Looking into the monitored data and seeing improvements works as a reinforcement for treatment adherence. This reinforcement can be increased by asking patients to actively look into the improvements caused by the treatment. Besides, the motivational messages sent by the watch are experienced positively.

B1: “Gigantic box with a scale in it and the blood pressure monitor and this beautiful watch.”

BEHAVIOURAL | *Intentions*

An intrinsic motivation for recovery is beneficial for health behaviour (e.g. movement). On the other hand, when a certain behaviour is a habit, the patient can experience a conflict. Namely, although a patient can acknowledge the need for change, it is difficult to change the old behaviour as the patient intrinsically loves the behaviour (e.g. drinking wine during dinner).

6.4.2. Self-Care

With the results of the interviews it could be interpreted what elements of self-care

are deemed easy, medium or difficult to implement. Figure 33 visualises the result of this self-care analysis. The most important self-care themes found in this analysis are further explained in this section.

*Routine Physical Activity*

Work can make it more difficult to keep up with the new physical activities routines as the sedentary full-time office work is conflicting with the advised amount of physical activity.

B1: “... even for those 8000 steps you just have to be outside or active for 45 minutes to an hour. And if I am going to work more than 9 hours per day again, then that is a bit difficult to fit in.”

*Gaining Knowledge*

If a patient trusts the HCPs, the patient can be less active in seeking knowledge as the patient has trust in the HCPs.

*Adherence to Treatment*

Similar to the results of the interview with MI patients (Chapter 5), the side effects of medication are acknowledged as difficult to grasp. Also, a medication box is used to manage the medication intake. This shows extra support is needed for the intake of medication.

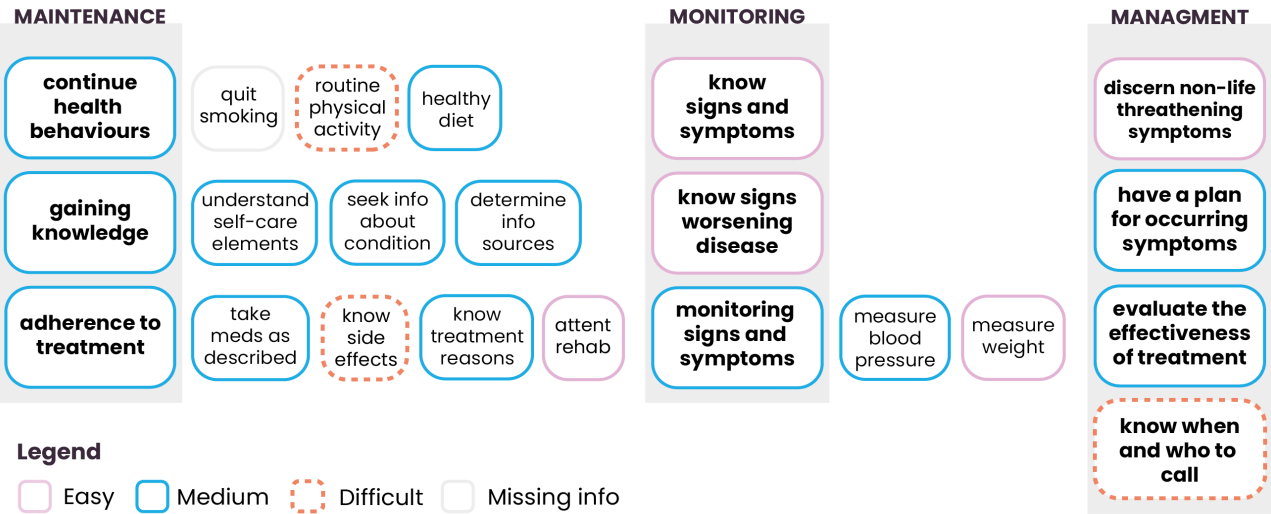


Figure 33: Self-care analysis MI Box user

*Self-Care Monitoring*

B1 is motivated about monitoring. The participant already measured weight daily before the MI. However, the participant was not aware of the LUMC Care app as this was not clearly mentioned in the instruction manual, meaning the Withings Health Mate app is used for monitoring. Furthermore, the patient experienced technical difficulties that could be caused by the fact a relatively old phone is used for monitoring. This lack of awareness about the tools and the technical

difficulties have a bad influence on the FITT of the MI Box (Ammenwerth et al., 2006; Kujala et al., 2020).

*Know How to Contact*

Interview participant B1 came across as unsure about what to do when questions around their health or the MI Box arise. Moreover, the intuition of the participant was to call the hospital, but it was mentioned by the cardiologist of the LUMC that they prefer patient contact to go via e-mail.



## 6.5. Discussion

In the discussion the answers to the research questions are concluded and the limitations of the research are summarised. Furthermore, a table in Appendix J compares the most important insights of the interviews in this chapter with the insights gained from the previous chapters.

### 6.5.1. Conclusions

The MI Box seems to have a good influence on the aftercare experience as the patients still feel connected to the hospital. Moreover, the MI Box feels like a big present they receive after hospitalisation. Although the MI Box is experienced as a big present, a patient needs more guidance on how to open up and properly use this present. Especially if the MI Box is sent and not handed over personally, the instructions need to be very clear as otherwise tools, like the LUMC Care app, are not noticed by the user. Furthermore, the LUMC Care app could motivate people more to actively engage with the monitored values. Namely, if HCPs give patients assignments to perform with the monitored values, a patient is already more actively engaged with one's monitored values and treatment. The fact an assignment from the doctor has to come before patients are going to actively engage with their values, confirms that patients use

the MI Box to be monitored by the doctor and lack coaching during the use of the MI Box. Furthermore, the interviews showed that overtrust in the HCPs can cause a lack of patient engagement. This is in line with the literature insights of Chapter 3.6 (Joseph-Williams et al., 2014). Although it can work reassuringly for patients that they are being watched by the doctor, it can cause them to expect that the doctors can see if something is wrong.

B2: “... *but if there is something wrong, they are aware of it.*”

It is confirmed by the interview results in this chapter, that the MI Box is not implemented during the treatment of the rehabilitation. Data about the transition from rehabilitation to independence, and the role of the MI Box during this transition, is missing. However, it was acknowledged that it might be difficult to embed the lifestyle changes (and therefore self-care activities) learned during rehabilitation into the old (work) routine.

Before values can be monitored, a new routine needs to be built in to ensure an easy measurement experience. For example, the participants weighed themselves immediately after waking up. However, if a change needs

to be made in this routine (e.g. measure at noon to see the effect of medication) this is experienced as difficult. Also in the medication routine extra support is needed. The medication has been mentioned to be a burden, which is in line with the insights of the interviews of Chapter 4 and 5. More information and support around medication intake are needed.

B1: “*With the transition to [another medication], I looked up what this new medication was exactly and what it does.*”

Besides, clear experienced MI symptoms and scientific knowledge about an MI causes a patient to look into their condition more rationally. This resulted in no need for emotional support. Meaning, providing this knowledge to MI patients might decrease the need for emotional support. Some knowledge that works reassuringly during the recovery is information about the biking test result which reflects the movement ability of patients. Some knowledge that is missing during recovery is information about when patients are able to work again. Similar to the other interviews (Chapter 4 and 5), it can be concluded that work has a big influence on the experience of the care journey.

### 6.5.2. Limitations

All in all, although the research focussed a lot on how the MI Box is implemented in the home context, in-depth insights are missing. This is due to the fact only one participant (B1) is interviewed elaborately. As this participant had a background in research of cardiovascular diseases, he is not a good representation of the common MI Box user. Namely, B1 already was more familiar with the use of monitoring devices before the use of the MI Box. Besides, B2 is part of a group that is motivated to provide feedback to the MI Box. Meaning, participants that actually do not like the MI Box, possibly because it does not fit in their home context, are missing. This causes in-depth insights about common struggles that can appear when the MI Box is implemented, to be missing. Furthermore, B1 was still in rehabilitation and thus in-depth insights about how the MI Box is used after the rehabilitation are also missing. The interview with B2 provided only a few insights about this. Luckily, the insights from the interviews with other MI patients provided an idea about the struggles that might arise if an MI Box would be implemented in different contexts.



#### KEY TAKEAWAYS | Chapter 6

1. Clear experienced MI symptoms can work reassuringly because a patient knows better what bodily signals to listen to.
2. Providing assignments to patients around the monitoring of values ensures patients look more actively into their data.
3. The LUMC Care app is not known by one of the interview participants as it is not mentioned clearly in the instruction manual.
4. Once a routine was embedded for measurements and medication intake, it was experienced as an easy adjustment.
5. Matching the new movement routine with the old daily routine is expected to be challenging.

Problem  
Statement

Design Goal

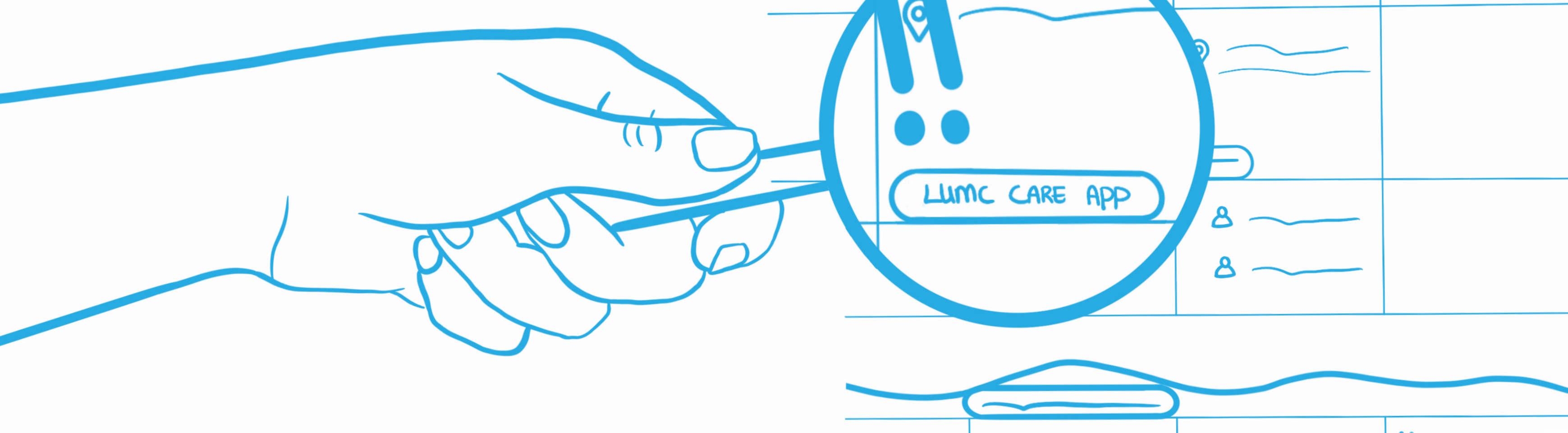
Opportunity  
Spaces

DEFINE

# 7

## PROBLEM STATEMENT

After analysing the interviews and comparing them to insights from the literature research, a problem analysis is performed and a problem definition can be stated. This chapter will present an overview of the problem that has been found in the insights and themes mentioned in the previous chapters. Based on the problem definition in this chapter, solution spaces will be explained and a design goal (DG) will be formulated.



7.1. WWWWWH: Who, What Where, When, Why, and How

WWWWWH is a checklist of the most important questions to be asked to analyse a design problem (Van Boeijen et al., 2014). In Table 7 this checklist is filled in.

Because the tools provided in a digital care trajectory have a huge impact on the interactions and experiences in the care trajectory, it is important to map these tools

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Who has the problem?        | LUMC, other hospitals (if beds at LUMC are full), Box Support, Basalt, MI patients, MI Box users, and family of MI patients.                                                                                                                                                                                                                                                                                                              |
| What is the problem?        | Patients have difficulties performing self-care activities, contact the hospital unnecessarily, and can not use the MI Box to its full potential.                                                                                                                                                                                                                                                                                         |
| Where is the problem?       | During the transition moments to more independent patient phases, when a patient is expected to perform independent care activities at home, it becomes clear patients are not provided with enough reassurance and confidence to perform independent self-care activities.                                                                                                                                                               |
| When did the problem occur? | The MI Box started as a monitoring concept. However, more interest arises in the potential of the MI Box to shift from monitoring to coaching. For this shift, the problem of lack of involvement and guidance needs to be solved.                                                                                                                                                                                                        |
| Why is it a problem?        | Because patients do not understand the monitored values, the hospital is contacted unnecessarily which can cause more workload for the hospital. This extra workload is in conflict with the purpose of the eHealth intervention. Besides, the lack of understanding is also causing a lack of confidence and knowledge to do self-care activities. If self-care activities are not performed, the risks of a recurring MI will increase. |
| How is it a problem?        | Because of limited patient involvement, a scarce introduction of MI Box, and limited user guidance, monitored values are not understood by the patients and the tasks expected to perform with the monitored values are unclear to the patients.                                                                                                                                                                                          |

Table 7: WWWWWH checklist

out in the Metro Map. By mapping out the tools provided in the care trajectory, problems around the provision of these tools became clear (see Figure 34). Namely,

offering a lot of tools is not always the solution, especially if little introduction is provided alongside these tools.

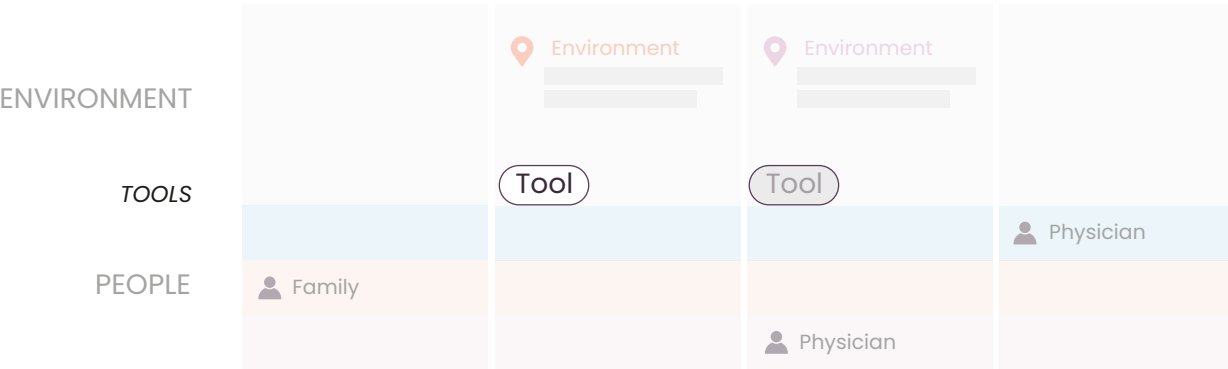


Figure 34: Tools in the Metro Map

7.2. Context Factors

- During the interviews a few context factors are mentioned that influence the impact of the problem. The most relevant context factors are summed up below:
1. Educational (medical) background

2. Familial MI or not

3. Attitude towards medication

4. The lifestyle of family members

5. (Grand) children

6. Living area
  - Nature nearby
  - Shops nearby
  - Family and friends nearby

7. The weather season

8. Sports routine before the MI

9. Old daily routine
  - Work/retired

10. Income (to spend on a gym)

11. Diet restrictions before the MI



These and more context factors are incorporated in the Metro Map. The amount of influence of the context factors is changing throughout the care trajectory. This is visualised with the influence curve in the Metro Map (see Figure 35). The more a patient needs to perform activities at home

and independently, the more influence of factors increases.

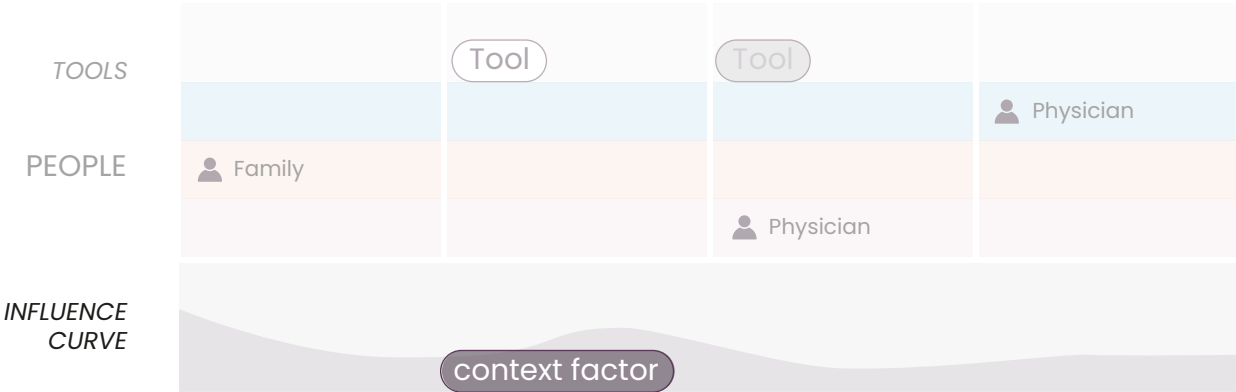


Figure 35: Influence curve in the Metro Map

7.3. Problem Statement

Due to the lack of involvement and guidance during the MI Box care trajectory, the transition moments to phases in which patients need to perform care activities independently, are experienced as a big step.

This is causing patients to contact the hospital unnecessarily, have difficulties performing self-care activities, and not use the MI Box to its full potential. A systematic visual of the problem is provided in Figure 36.

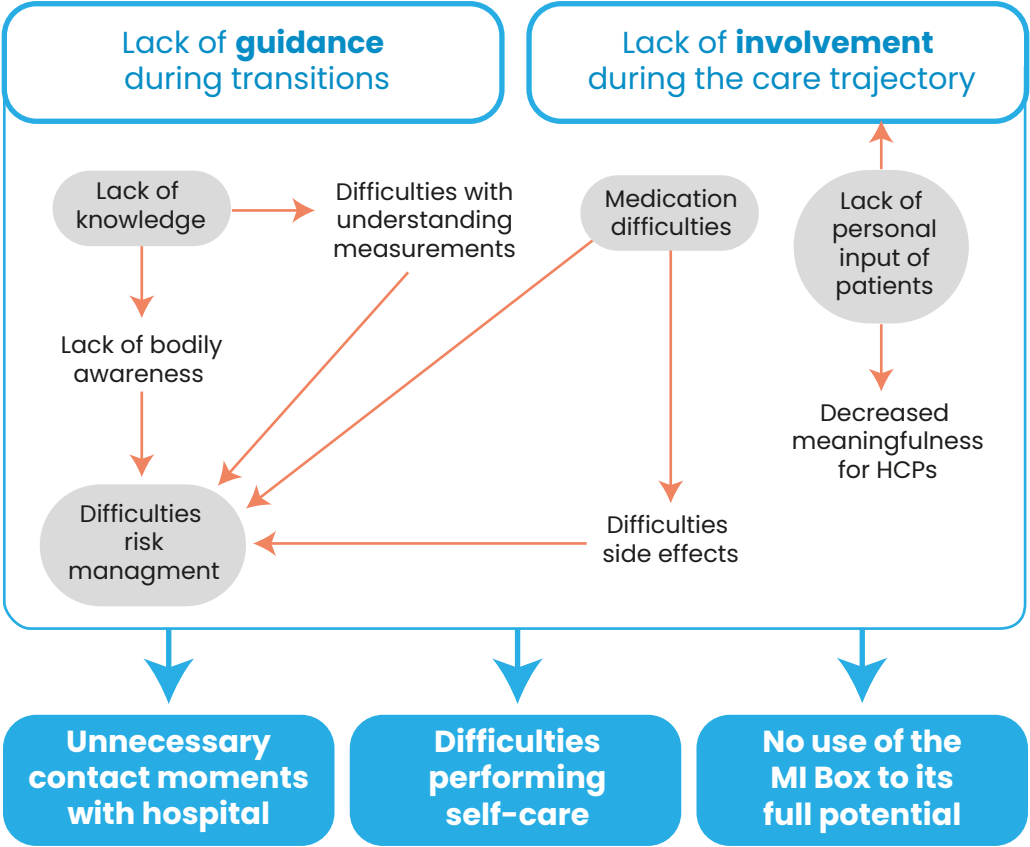
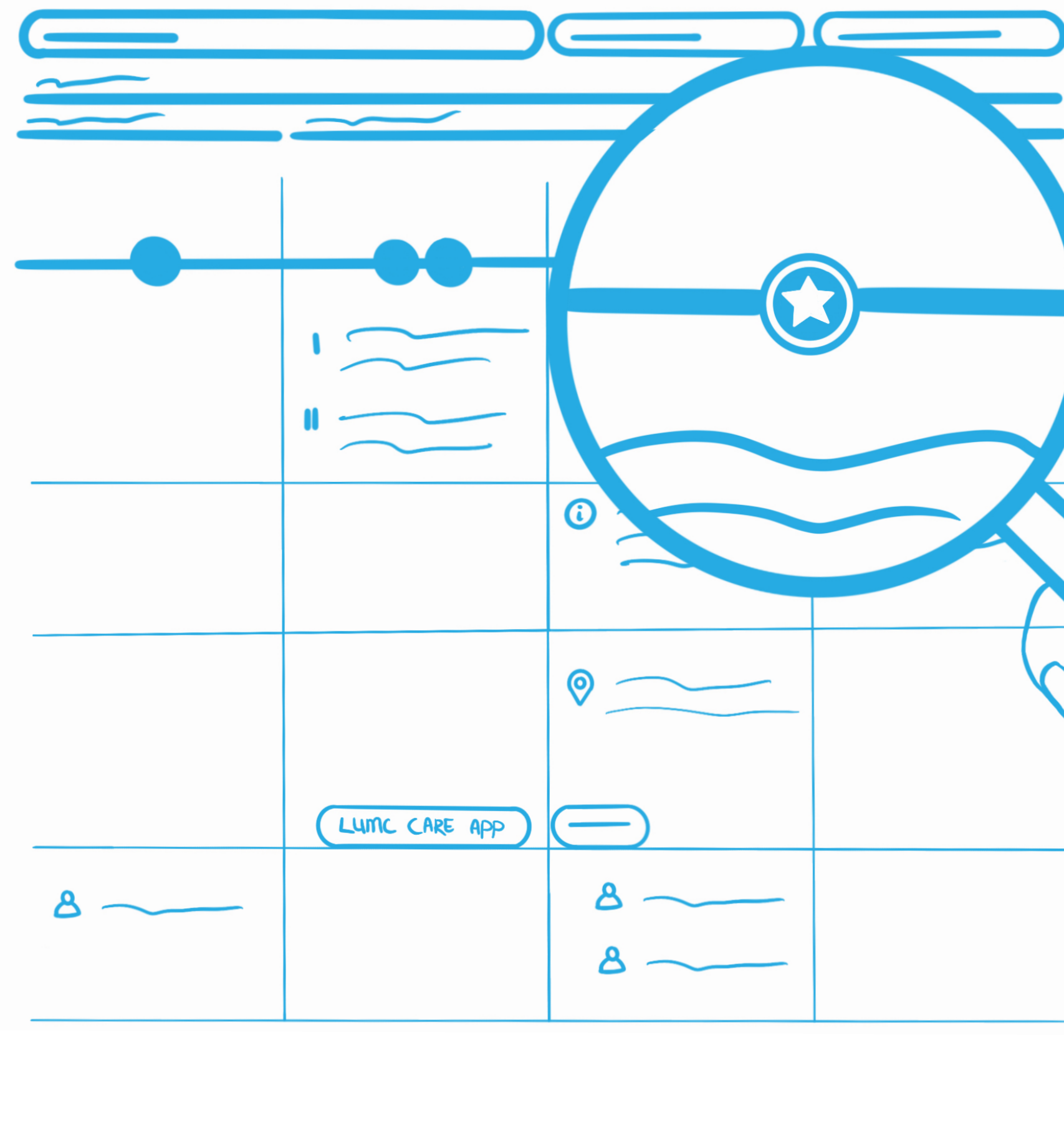


Figure 36: Problem visualisation

# 8

## OPPORTUNITY SPACES

After analysing the interviews using the different theoretical models (SCT, FITT, and self-care elements) and putting the insights in the Metro Map, some opportunity spaces appeared for facilitating the change from monitoring to coaching. Besides, the Metro Map showed opportunities to increase SDM in certain moments of the care trajectory. The different opportunity spaces are explained in this chapter and are clustered according to the 3 main phases derived from the Metro Map.





*MI Box Choice*

SDM around the MI Box choice could be increased if more time is present to make a decision. The opportunities are limited as time is limited and patients are still in shock during hospitalisation. However, the fact that the MI Box is currently sent to patients can be used as an advantage. Namely, if the MI Box is sent alongside a return label and materials that help patients consider the MI Box, this can ensure an informed decision can be made.

*Discharge With the Box*

MI patients often experience poor discharge. The MI Box has a positive impact on the discharge experience as the patient feels a remaining connection to the hospital. This positive impact can be elaborated on by providing means that enable patients to get familiar with their condition and their

care trajectory. Currently, a lot of tools are provided around the discharge. However, because of a lack of introduction, these tools (e.g. LUMC Care app) are not used to their full potential. Moreover, the tools do not provide the involvement and guidance needed around the discharge.

*Unboxing Experience*

Currently, a poor onboarding experience is present due to the fact the MI Box is sent with little instruction means. This is causing a lack of awareness of the LUMC Care app and a lack of personal commitment to the MI Box. As patients experience receiving the MI Box like receiving a big present, an opportunity is to elaborate on this positive experience by providing more unboxing means. These means should help people to understand the full potential of the MI Box.



*Consult Goals*

During the rehabilitation tangible personal goals are aimed for. After the rehabilitation, these goals are not called upon anymore. As working towards tangible personal goals works very well for patients during

rehabilitation, it would be valuable to still use these kinds of goals after rehabilitation. This could be realised by means of consultation goals that can be discussed and changed during the consults. The hospital can coach patients to reach their consultation goals.



After the hospitalisation period a lot of context influences appear. Therefore, the correct use and support of the digital health means provided become more crucial.

*Value Guidance & Activation*

More guidance needs to be provided next to the monitored values of patients to make them more understandable. Information about monitored values could be provided through e-learning modules that help patients understand how they can interpret and use the monitored values. Furthermore, the LUMC Care app could invite patients to look more actively into their monitored values by offering means that enable them to do something more with their values. For example, save the monitored values to discuss in consults.

*Embedding Basalt in the LUMC Care App*

Currently, rehabilitation is not implemented in the LUMC Care app, however, this can be an opportunity. Namely, the LUMC Care app is used over a longer period of time than the rehabilitation period. Implementing more of the rehabilitation goals and tools into the LUMC Care app can ensure support and guidance for patients after rehabilitation. Besides, the biking test results often are

reassuring for patients. Therefore, making the results of this test more visible to the patients might be valuable.

*Medication Evaluation Means*

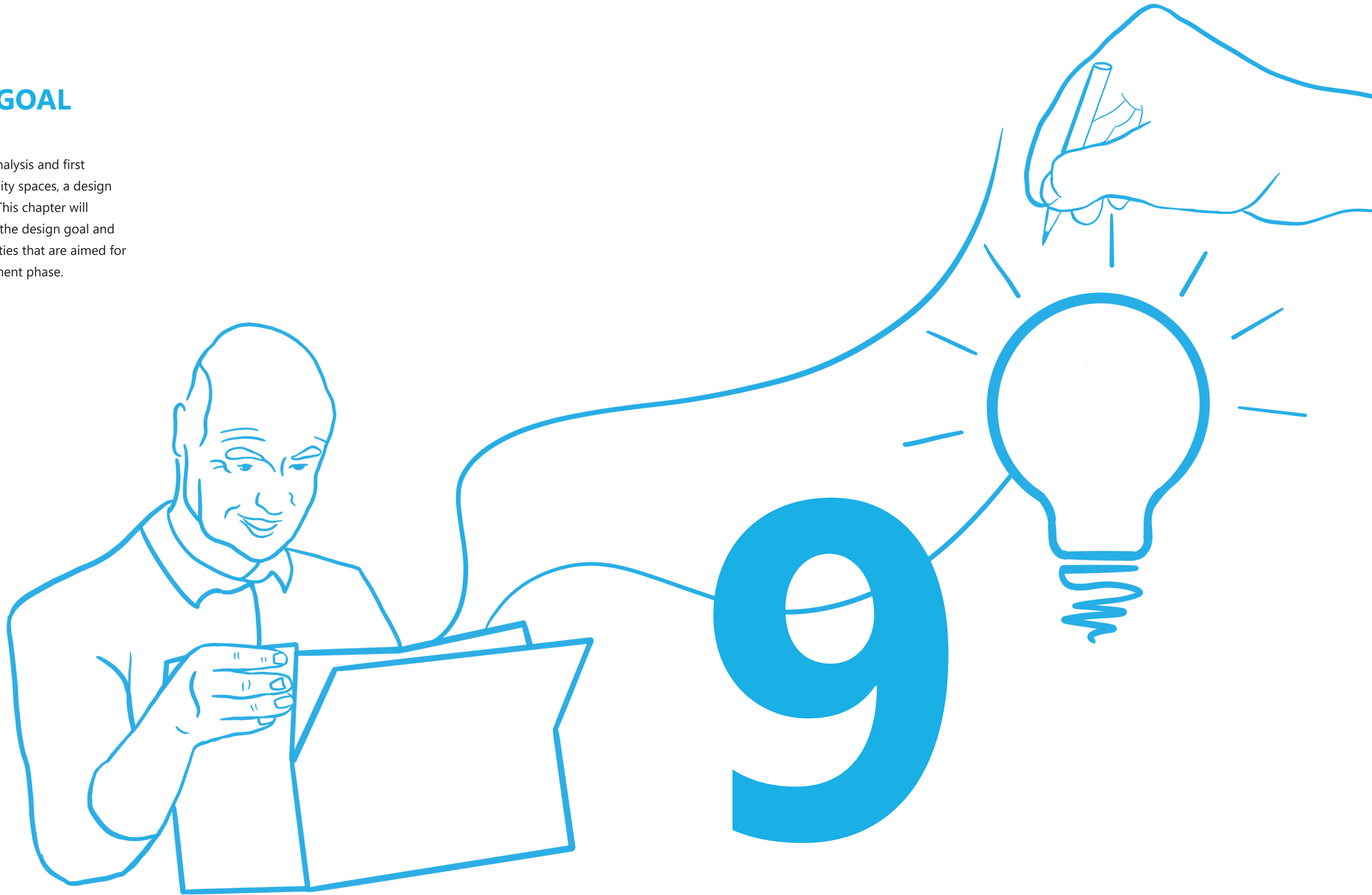
Medication has been a big topic during the various research activities. Therefore, patients should be supported more in their medication use. This support could be offered in the LUMC Care app. Monitoring the side effects of medication in the LUMC Care app can help patients to evaluate their treatment. Furthermore, this treatment evaluation can be used by HCPs as input for decisions about treatment adjustments. Next to monitoring means, information about medication, the side effects, different medication options, and tips could be provided.

*Preparation Consultation Tools*

The consult moments are currently potential moments for a planned SDM but currently do not use an SDM approach (see MI\_Box\_MetroMap.pdf, Figure 8). To stimulate patients' involvement during the consults, preparation tools might be valuable to offer. These preparation tools could function as decision aids.

## DESIGN GOAL

After the problem analysis and first analysis of opportunity spaces, a design goal can be stated. This chapter will present and explain the design goal and the interaction qualities that are aimed for during the development phase.





9.1. Design Goal

The goal is to increase patients’ **confidence** to perform **self-care** activities by increasing patients’ **involvement** and **guidance** with the use of the MI Box.

An essential part of the aimed change from monitoring to coaching is the ability of patients to perform self-care activities. Therefore, it has been decided that the MI Box should make patients more confident to perform self-care activities to reach the aim to change towards coaching. If a patient’s confidence to perform self-care increases and there is a constant delivery of guidance

and involvement by means of the MI Box, the expectation is that the transition moments in the care trajectory will also be experienced more smoothly by the patient. To explain this expectation, the design goal can be visualised in Figure 37 by means of an elaboration on the previous graph (Figure 30) that is shown in Chapter 4.

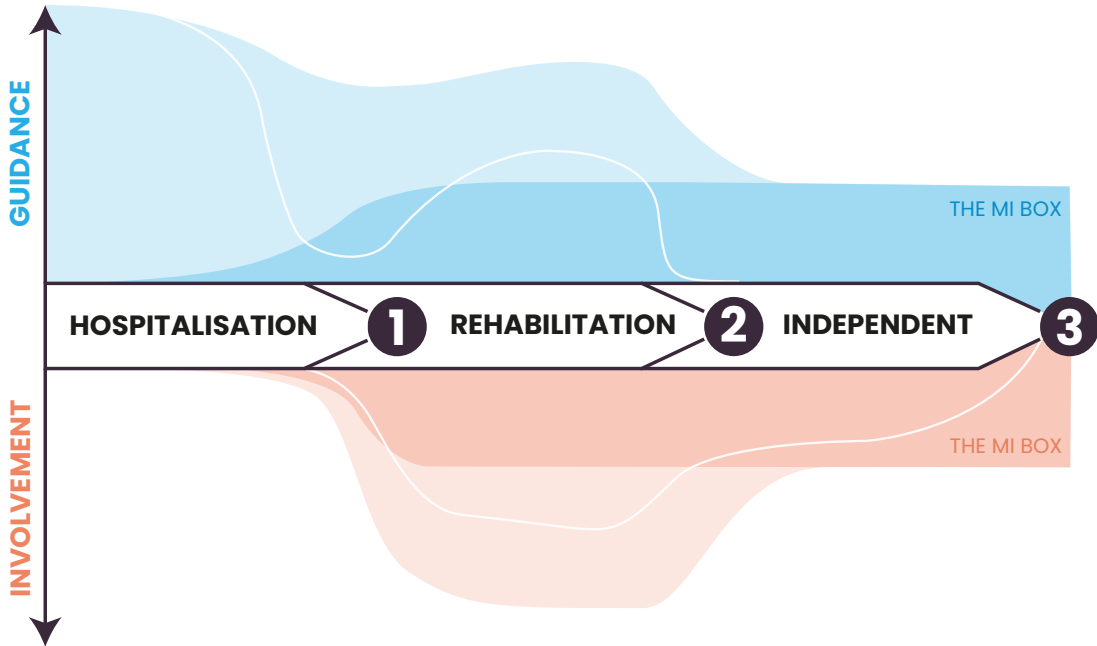


Figure 37: Involvement and guidance in the design goal

9.2. Interaction Vision

To achieve a journey with the MI Box visualised in Figure 37, the interaction with the MI Box during this journey needs to aim for an interaction that is similar to the dental journey (see Figure 38). In this journey, the teeth of a person are first brushed by the parents (guidance). The parents use a toothbrush that looks like one that will be used independently. Then a person slowly learns how to use a toothbrush and other supporting tools (tooth pics, mouth water, etc.) with the guidance of one’s parents (involvement). Eventually, a person knows how to use a toothbrush and other tools independently. The dentist checks whether

the teeth are correctly taken care of and refers (if necessary) to the brush or other tools to increase self-care around one’s teeth.

Interaction Qualities of the Dental Journey

- 1. The product involves and guides the person in the journey;
- 2. The product can be referred to in an understandable language;
- 3. There are different supporting tools that a person can choose from based on their personal preferences;
- 4. Advice about supporting tools can be provided during appointments with a professional.

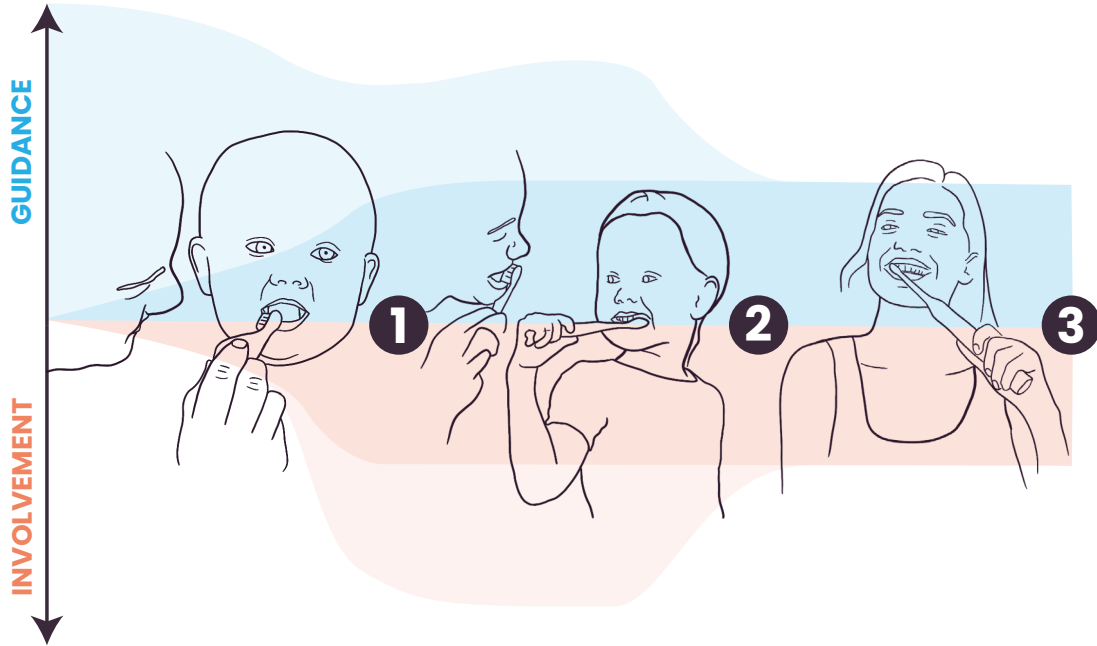


Figure 38: Involvement and guidance in the interaction vision

### 9.3. Design Criteria

To ensure quick and easy evaluation of ideas and concepts, design criteria are stated. These criteria are based on the design goal, the subgoals, and the evaluation format that will be explained in Chapter 13. The design criteria that result from this are:

**The design should ensure...**

**... value guidance**

Guidance about the use and meaning of the monitored values should be offered. For example, when a high blood pressure can be determined and how this can be avoided.

**... value activations**

Patients should be invited to use the monitored value for their own purposes. So apart from only sending the values to the doctor, the patient should be enabled to do something more with these values.

**... value involvement**

The monitored values can be used in a manner that will increase patient involvement. For example, patients can be invited to show what monitored values they think are most important.

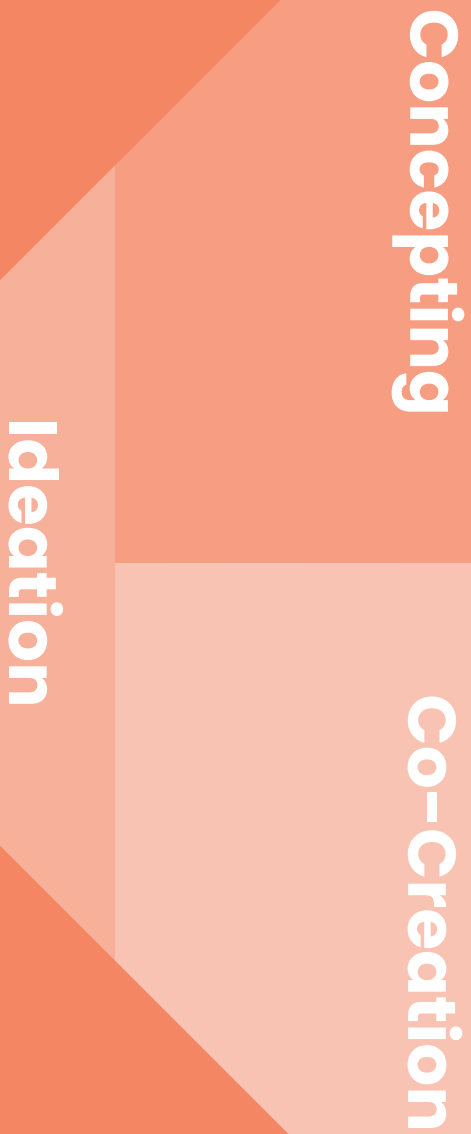
**... treatment awareness**

By using the design, a user should become more aware about the treatment (e.g. medication or care appointments) that is offered.

**... user guidance**

The user should be guided in how to use the app and its features, especially in the onboarding period. Just like in the dentist journey, a patient should first be guided in how to use the MI Box before it can be used independently.

DEVELOP





## IDEATE

An ideation is employed to generate different ideas for the opportunity spaces. An ideation session has been organised with employees of Online Department to get an expert perspective on the opportunity spaces presented. This ideation session also avoids fixation on the first ideas that arose during the analysis of interviews. The format used during the ideation session with Online Department

is presented in Appendix K. After the ideation session, ideas mentioned during the session are elaborated on. Furthermore, a personal ideation for the opportunity spaces that lacked attention during the ideation session has been performed. In this chapter, the ideas that resulted from the entire ideation process will be presented and evaluated.

# 10

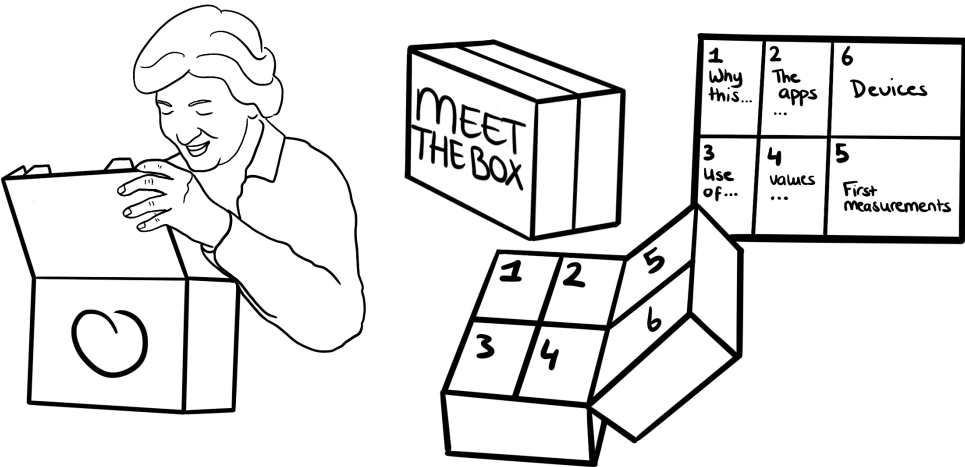


10.1. Ideation Session Results

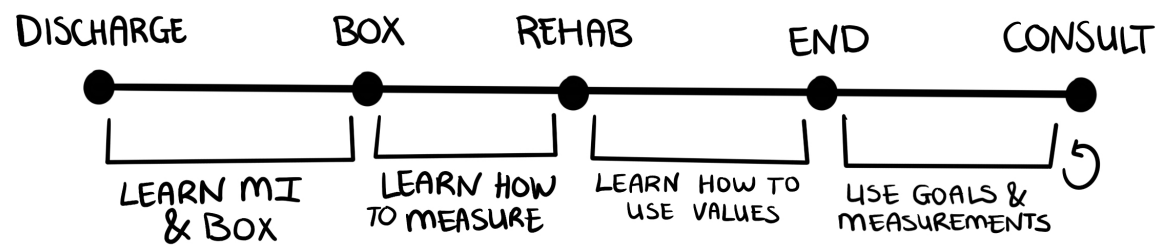
The ideas generated in the ideation session (see Figure 39), and the elaboration on these ideas after the session, are explained below. Every idea is connected to a number (#) and the elaboration on these ideas is marked with a sub-number (#.x). The ideas are visualised above the blue lines and the explanations of the ideas can be found below the blue lines.



Figure 39: Ideation session



Guiding the onboarding by means of unboxing the box of the MI Box.



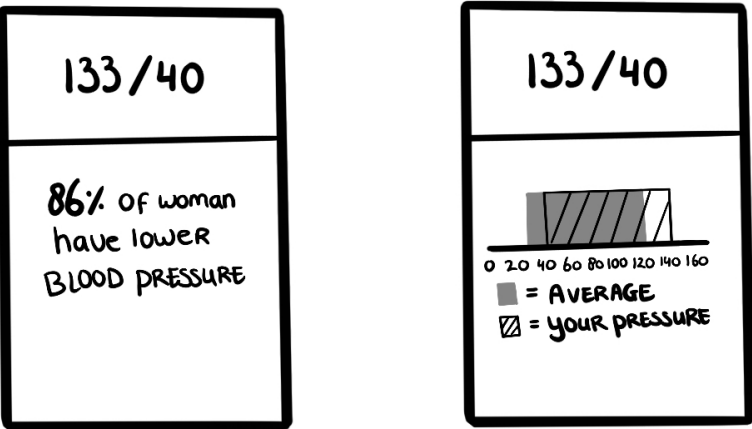
Design of the timing of deployment and introduction of the MI Box: Introduction of the app in the hospital and use of the MI Box for the first time during rehabilitation.



Elaboration

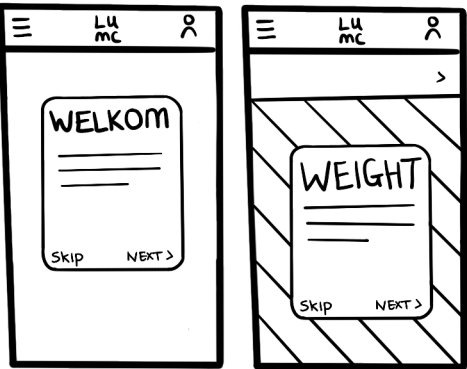
**2.1.** Download the LUMC Care app while waiting for the devices of the MI Box. This ensures the visibility of this app and enables familiarisation with the tools before they are received.

**2.2.** Timeline of the care trajectory and MI Box process in the app.



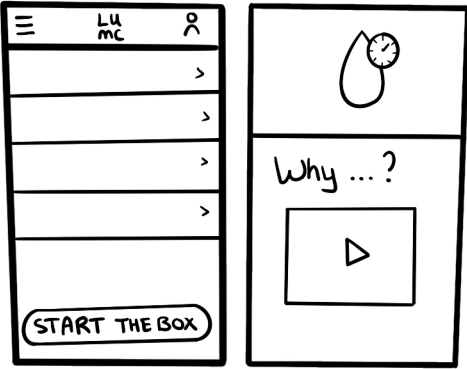
5

Visualising and explaining the monitored values by means of comparison to a representative average value.



3

Onboarding of the MI Box in the app: introduction video in the app and/or an app tour explaining the different features.

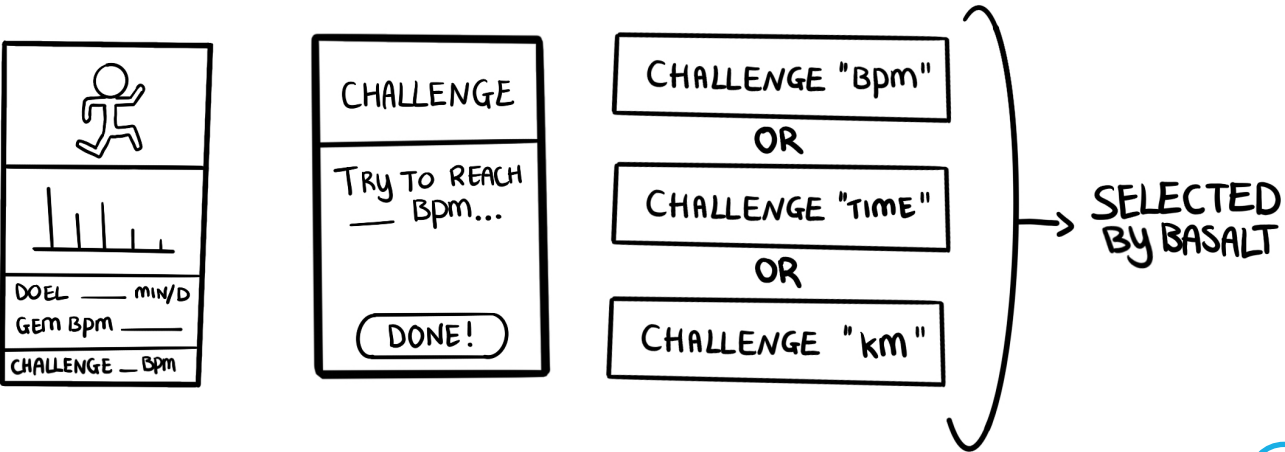


4

Explanation of why measurements are performed by means of e-learning and provision of extra information about the monitored values.

Elaboration

- 4.1.** Explain what the doctor does with the monitored values.
- 4.2.** Explain what patients can do with the monitored values themselves.
- 4.3.** User experience stories.
- 4.4.** Measurement explanation in the onboarding of the app.

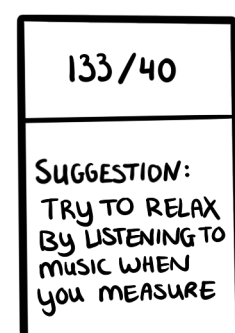


6

Use of BPM to reassure and challenge people to move.

Elaboration

**6.1.** BPM as a lifestyle module or movement challenges. The challenges can be set with the advice of Basalt.



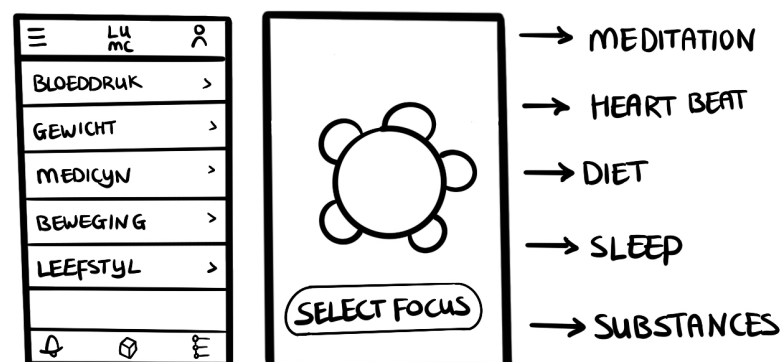
7

Offer suggestions on how to (positively) influence the outcome values of the measurements (e.g. meditation exercises).

## 10.2. Personal Ideation Results

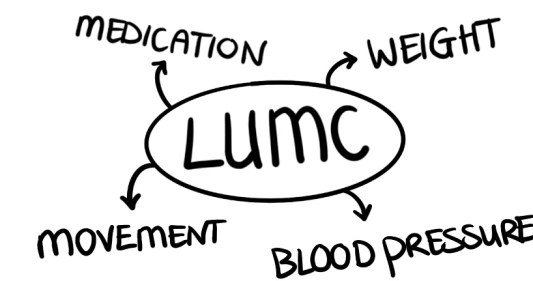
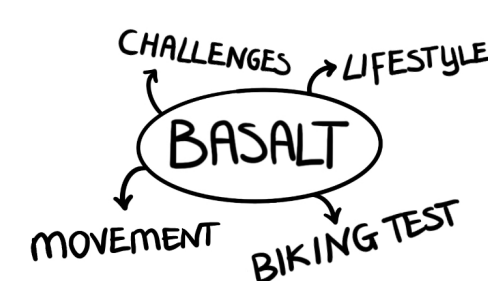
The ideas generated in the personal ideation session are explained below. Every idea is connected to a number. The ideas are

visualised above the blue lines and the explanations of the ideas can be found below the blue lines.



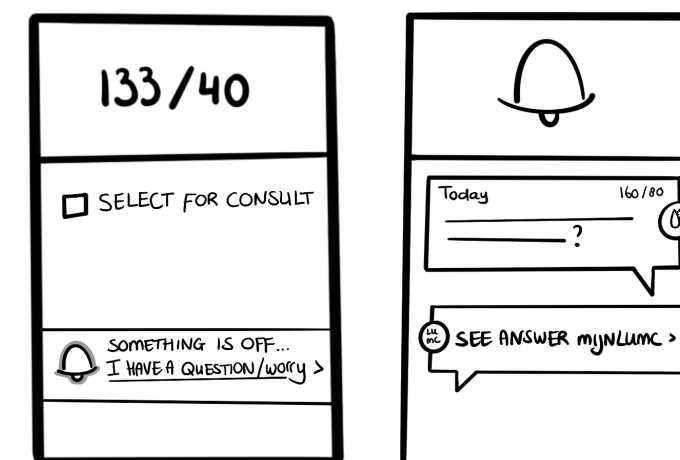
8

A redesign of the home screen that implements the lifestyle modules as a means to provide value guidance.



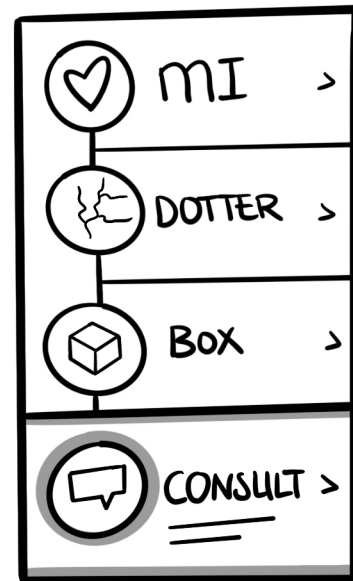
9

Implement consultation goals and challenges for patients to strive for during the year. In this idea, the patients will still have a yearly consultation with the rehabilitation centre. During this consultation, a biking test will be performed and challenges will be selected based on this biking test.

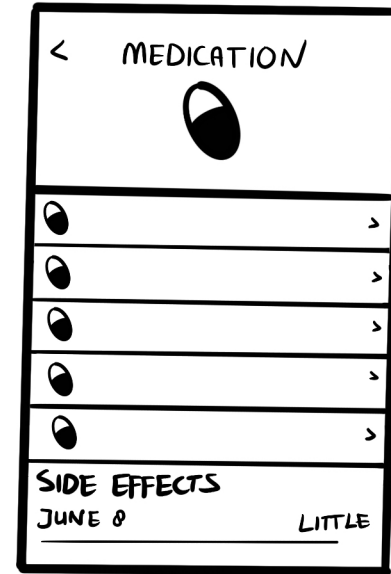


10

Measurements can be selected by patients for consults. Furthermore, patients can notify doctors about alarming measurement values.



11 Care overview.



12 Medication list and evaluation.

If a particular idea has a lot of grey-coloured blocks, this can result in an elimination of the idea. All the resulting Harris Profiles are rated quite positively. This can be explained by the fact that the Harris Profiles are used for ideas instead of concepts. Normally, the selection and combination of certain ideas for a concept result in design criteria to be less or more satisfied. Furthermore, the design criteria used in this thesis can be interpreted quite broadly. This broad interpretation can cause ideas to meet the design criteria quickly. Although this is recognised, the Harris Profiles still provide guidance for the selection

of ideas for concept directions. Namely, the amount of grey-coloured blocks shows comparisons of what ideas are already more comprehensive than others. Also, it helps to compare different ideas to each other to consider what idea satisfies certain design criteria the best. Lastly, the comparison of different Harris Profiles to each other shows opportunities for combinations of ideas. The negative rating of a certain design criteria in one idea can be compensated by combining it with an idea that shows a better rating for this same design criteria.

## 10.3. Idea Evaluation

Ideas are evaluated by means of Harris Profiles (see Chapter 2) that are composed with the design criteria stated in Chapter 9. The Harris Profiles of all the ideas can be found in Appendix L.

Normally, Harris Profiles are used for full concept ideas. In this thesis, they are used for the selection of idea directions. However, due to the fact ideas can focus on a certain part of the concept, not all design criteria were relevant for certain ideas. These criteria are

therefore not rated in the ideas and are filled with a grey-coloured block (see Figure 40).

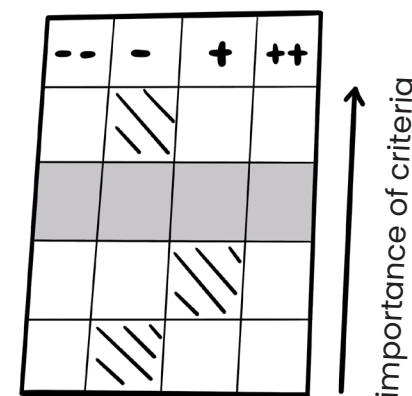
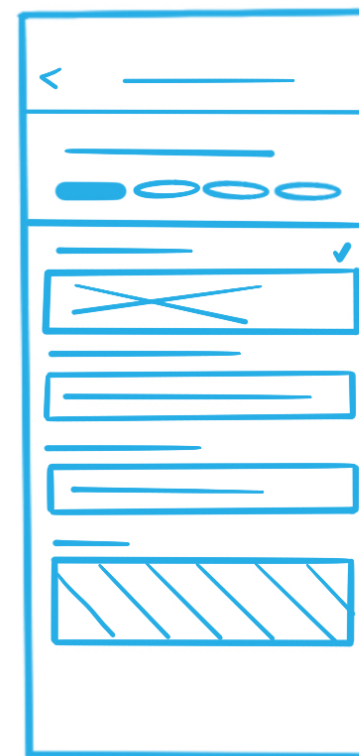
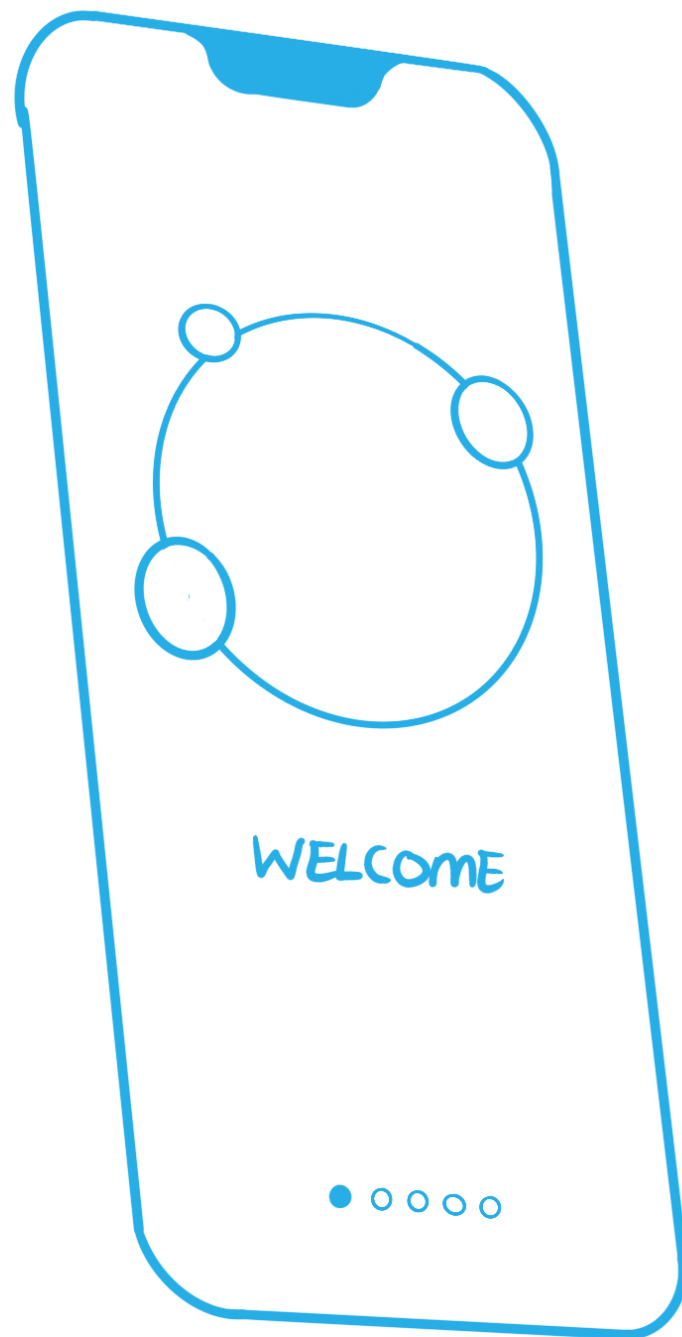
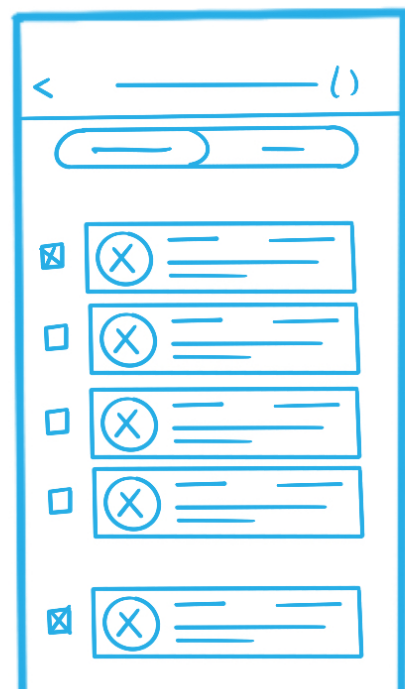
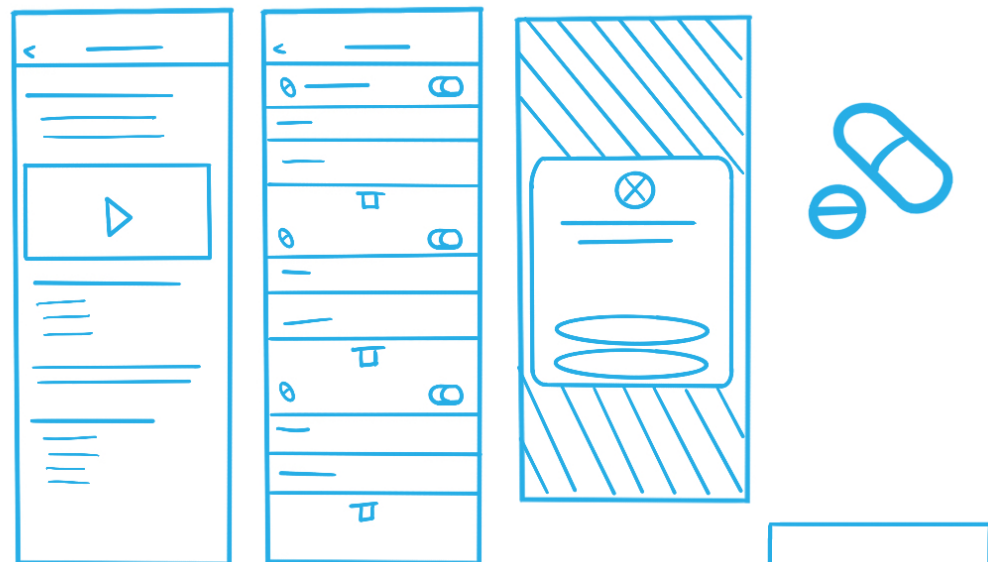
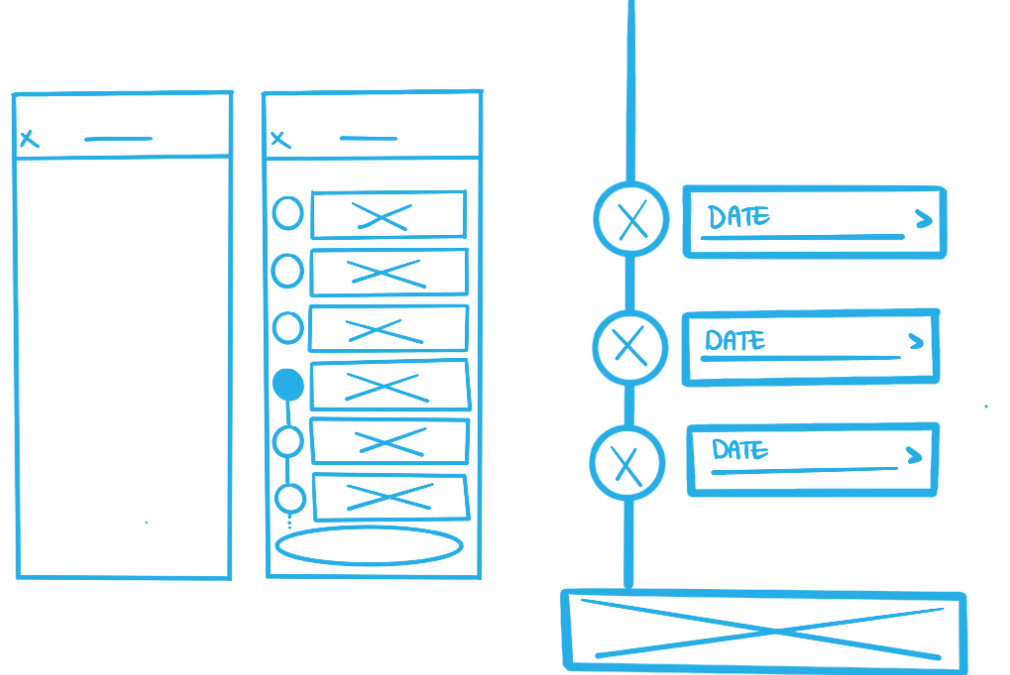


Figure 40: Grey-coloured blocks Harris Profiles

## 10.4. Idea Selection

The most promising ideas resulting out of the Harris Profiles are: 3, 4, 6, 10, 11, 12. These ideas will be used to compose concepts. The

different ideas will be combined to form the four concepts, which will be explained in the next chapter.



## CONCEPTING

From the selected ideas four concepts are created. These concepts are presented and explained in this chapter.





11.1. Unboxing Experience

The goal of this concept is to increase the guidance and involvement of the patient during the onboarding of the MI Box. Currently, the MI Box is often sent to the patient instead of handed over personally due to the work overload of the Box support team. However, more instructions should be provided to enable sufficient onboarding with the MI Box. This is why the “Unboxing Experience” concept offers an introduction to the MI Box within the LUMC Care app (see Figure 41). Furthermore, the LUMC Care app will be stimulated to download shortly before or after hospital discharge. This ensures a patient can get more comfortable and familiar with the concept of the MI Box before it is actually used. Three types of introductions are presented in this concept.

- 1. An introduction when you open the app after it is downloaded. This introduction will show the purpose of the app.
- 2. A tour through the app that explains where to find the different features of the app, why performing measurements is necessary, how the doctor uses the measurements, and how the patients themselves can use the measurements to their benefit.
- 3. An instruction about how to connect the devices to the app once the MI Box is received. The user will be guided through the first-time use of these devices.

The expected increased guidance and involvement of this concept are visualised in Figure 42. More concept screens can be found in Appendix M.

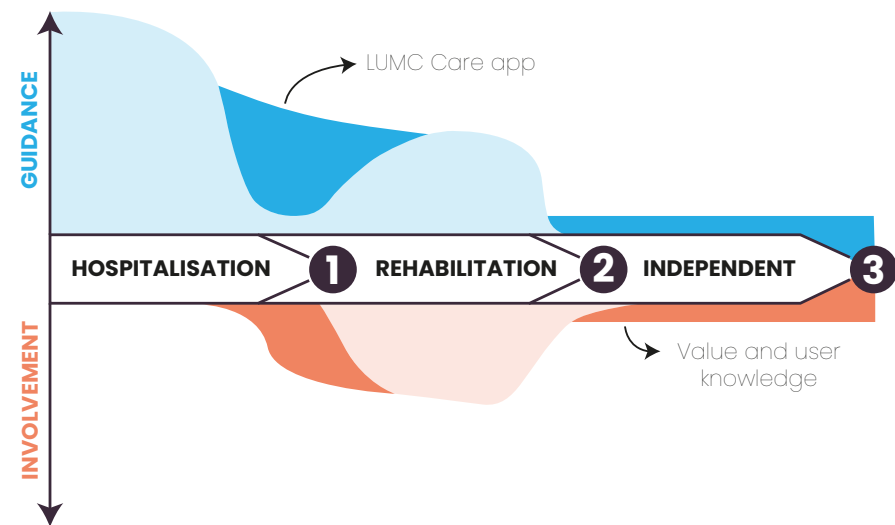


Figure 42: Involvement and guidance Unboxing Experience concept

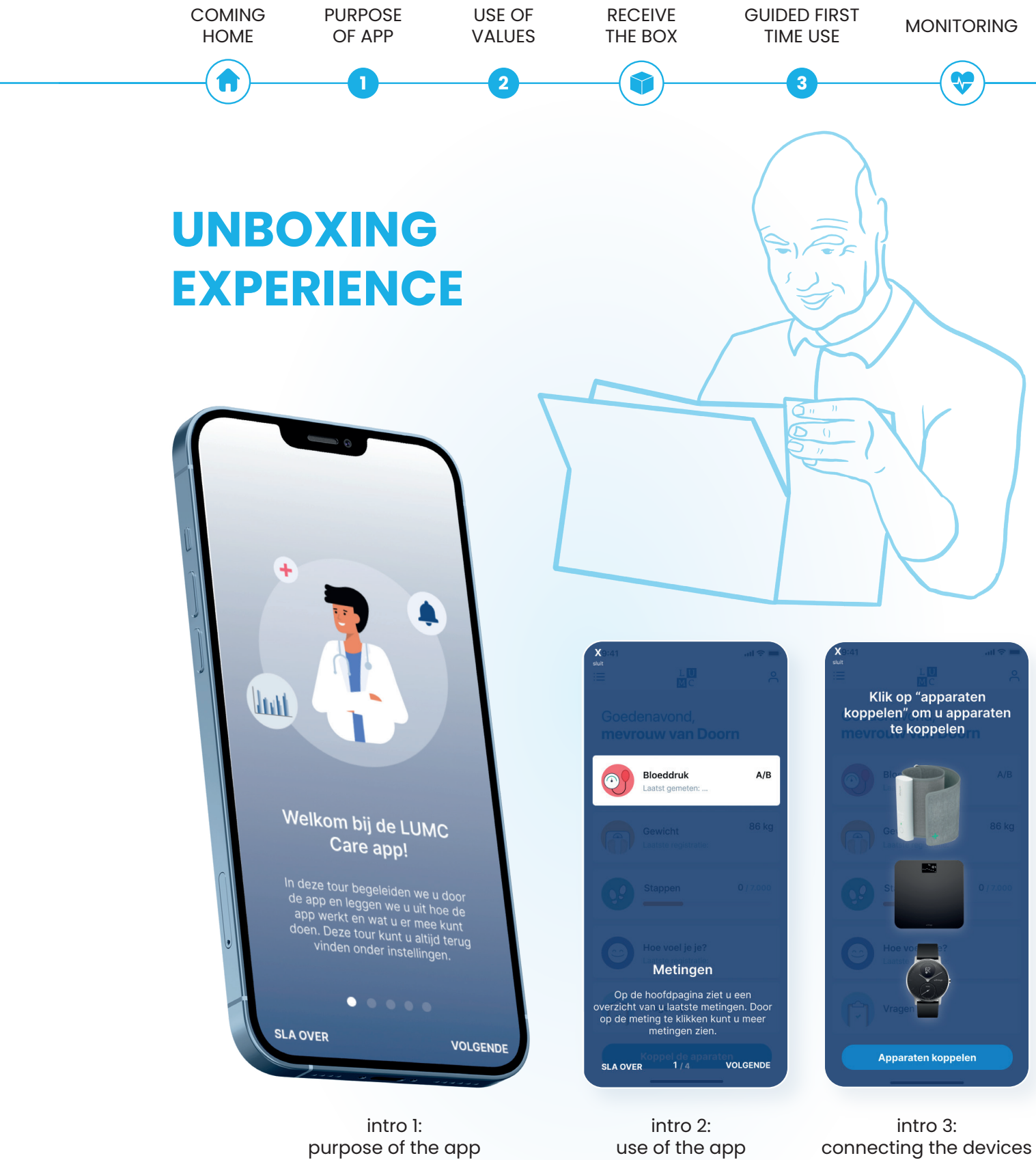


Figure 41: Unboxing Experience concept

## 11.2. Medication Monitoring

The goal of this concept is to guide and involve patients more in their medication intake. A large number of medications are provided to an MI patient. It is difficult for a patient to keep track of all these medications and grasp the side effects. To provide a patient with more support around their medication intake a concept is created that enables patients to put a medication overview in the app, evaluate their side effects, receive information about the different medication types, and receive reminders about their medications (see Figure 43). This concept aims to involve patients more in the decisions of their treatment as it stimulates to already evaluate the medications themselves. Furthermore, this evaluation will be seen by

the doctor which serves as input for decisions around medication adjustments. Therefore, it also supports the doctor around medical decisions.

The expected increased guidance and involvement are visualised in Figure 44. More concept screens can be found in Appendix N.

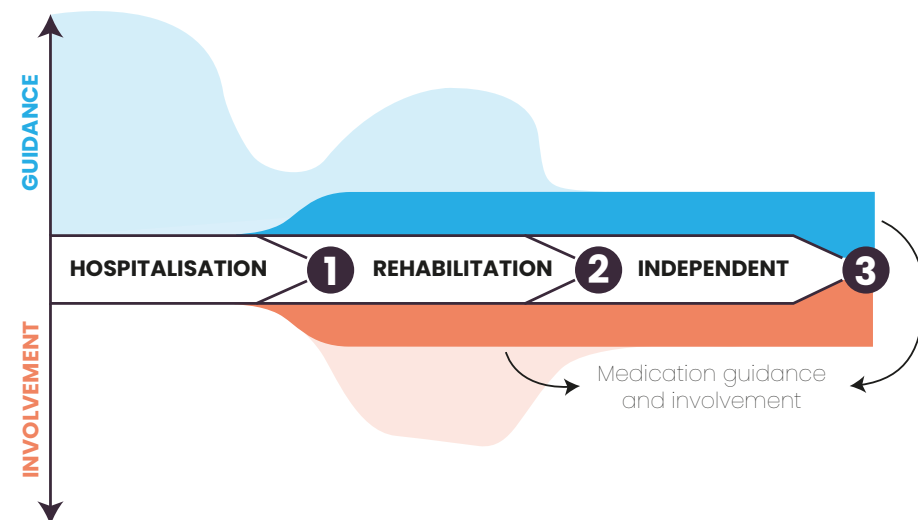


Figure 44: Involvement and guidance Medication Monitoring concept



Figure 43: Medication Monitoring concept

11.3. Value Activation

The goal of this concept is to actively engage patients with their monitored values. In the app different values are presented; blood pressure, weight, etc. To ensure a patient knows the meaning of these values and how to use them, the concept in Figure 45 is created. In the concept, different possibilities are provided for the presentation of the values: add more background information alongside the monitored value, compare the monitored value with a representative average of healthy people, provide suggestions on how to influence the monitored value, and provide fun facts and stories of other patients that perform the same measurements. Next to informing the patient more about the meaning of

monitored values, the concept also tries to stimulate the patient to do something extra with the values. Namely, a patient is offered to add personal notes, save the monitored value to discuss in the next consult or notify a doctor about any worries or questions on the value that cannot wait until the consult. These notifications will be received by the doctor via e-mail, which is the contact means preferred by HCPs. By providing contact means within the app, the aim is to avoid unnecessary hospital calls.

The expected increased guidance and involvement are visualised in Figure 46. More concept screens can be found in Appendix O.

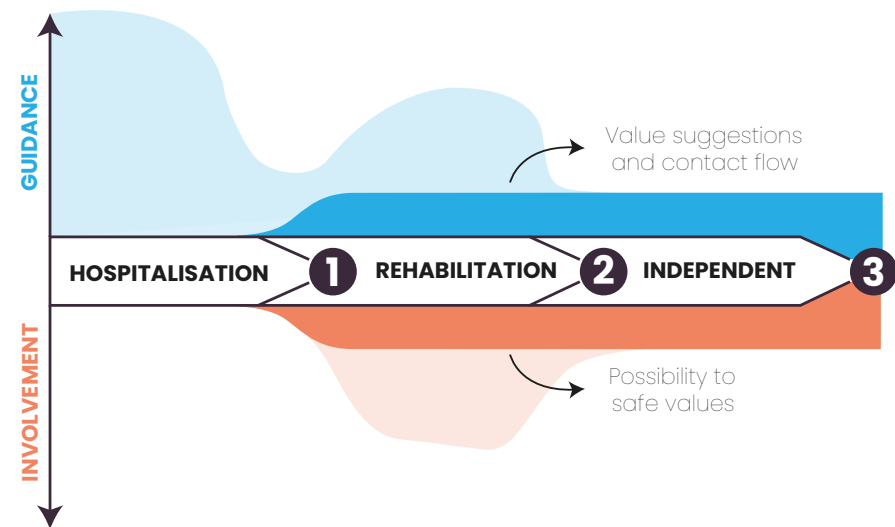


Figure 46: Involvement and guidance Value Activation concept

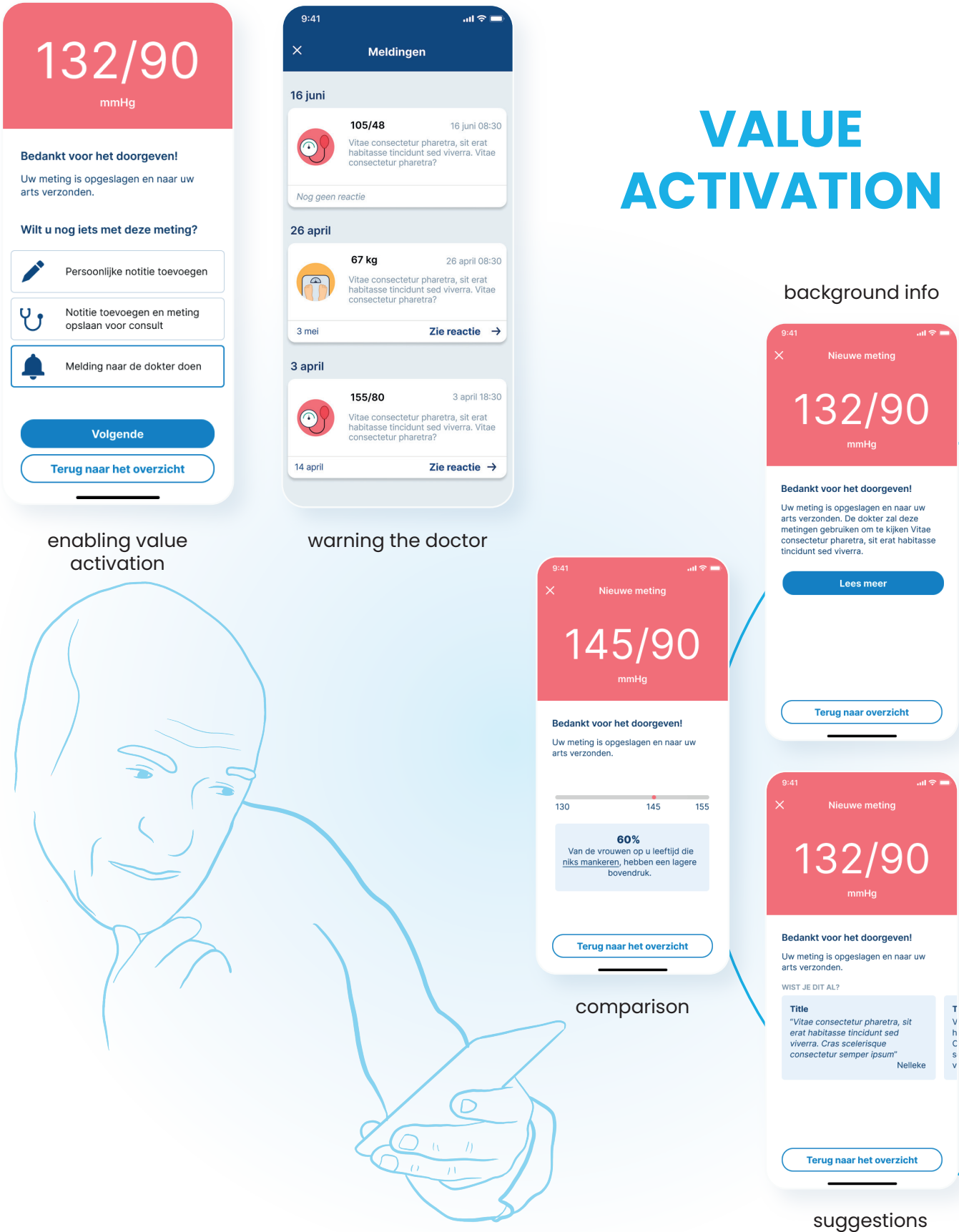


Figure 45: Value Activation concept



11.4. Care Overview & Preparation

The goal of this concept is to increase patients' engagement and contribution to their care trajectory. In the concept in Figure 47 the care steps that happened in the past and are going to happen in the future are visualised to provide more insights into the care trajectory. In this way, a patient can look back on what happened during the hospital visit and can form expectations about the rest of their care trajectory. The consult moments will be highlighted in this care overview as a patient is able to prepare these consultations in this concept. The preparation means are meant to involve a patient more during the consults in which (often) treatment decisions are made. A patient can prepare the consults by selecting measurements and formulating

questions for the doctor. Furthermore, a doctor can ask a patient questions via an added questionnaire. Besides, consultation challenges will be set to guide and motivate the patient to keep pushing their boundaries and improving their vitality. These challenges will be discussed during the consultation. The expected increased guidance and involvement are visualised in Figure 48. More concept screens can be found in Appendix P.

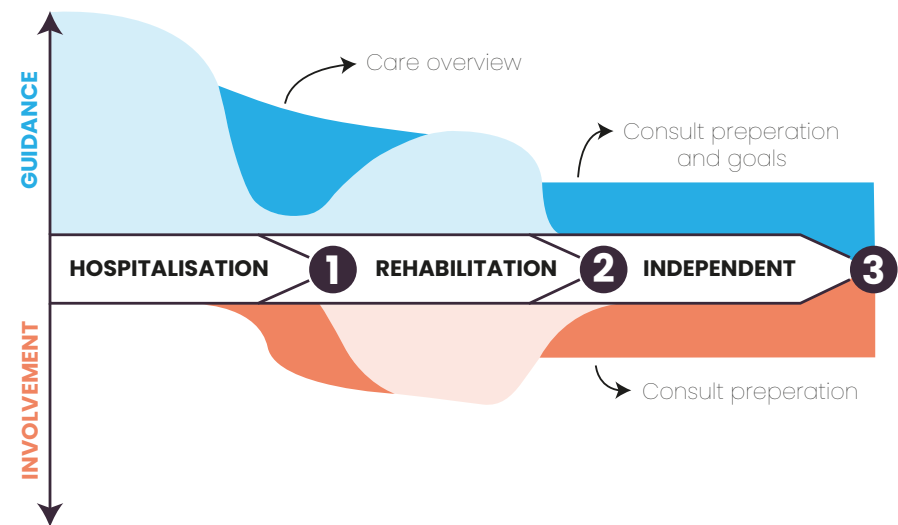


Figure 48: Involvement and guidance Care Overview & Preparation concept

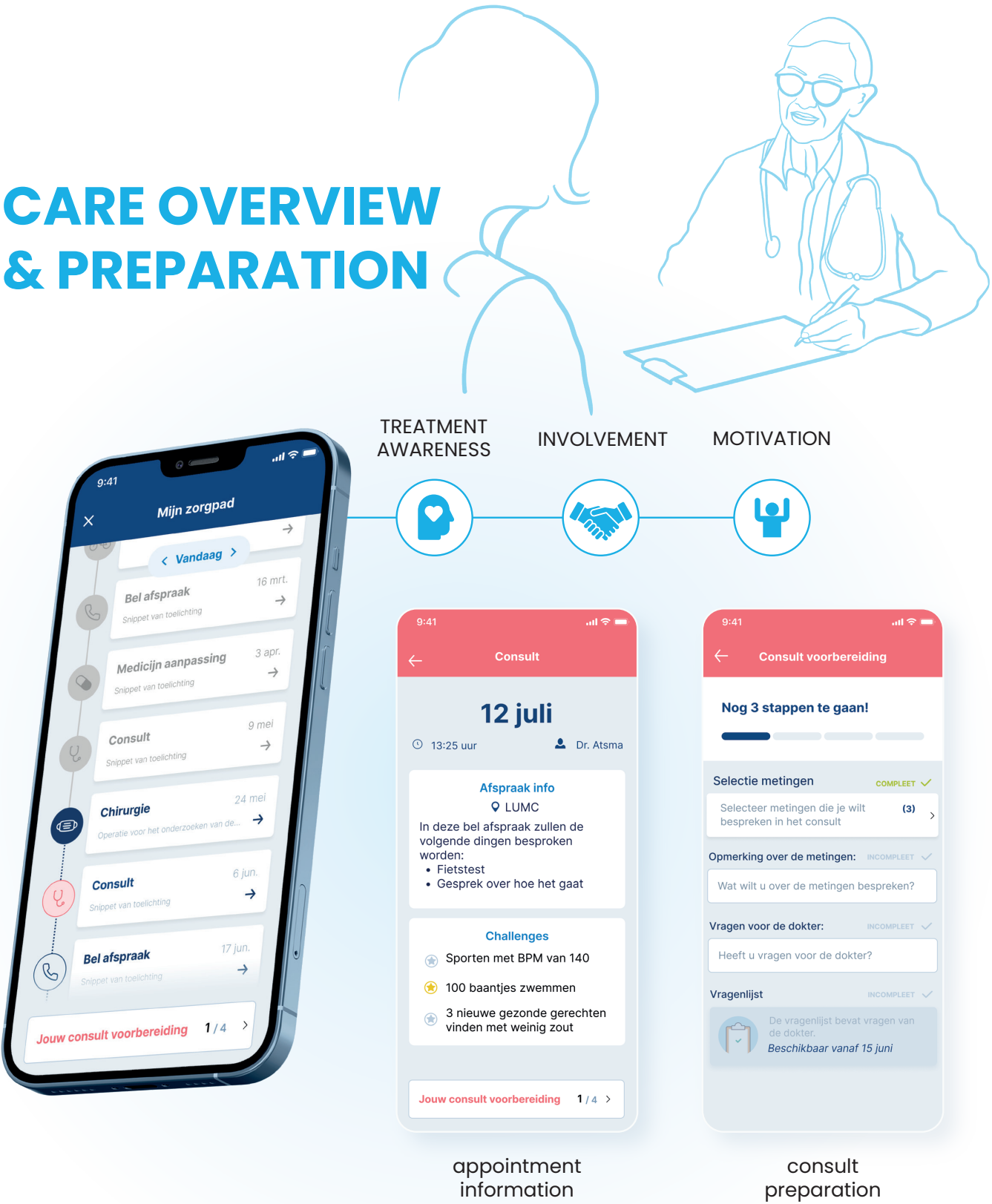


Figure 47: Care Overview & Preparation concept

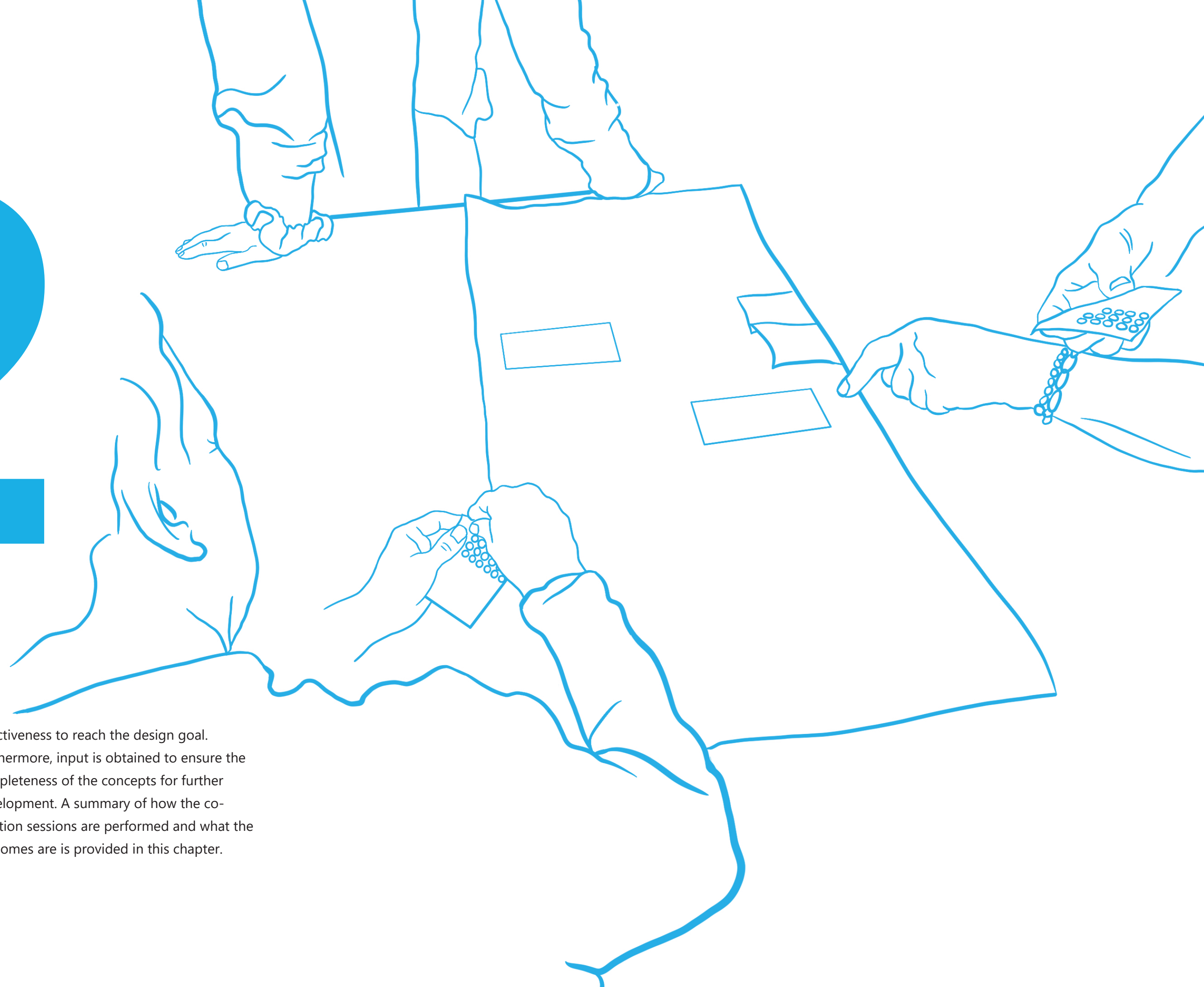


# 12

## CO-CREATION

Co-creation sessions are performed with various stakeholders included in the MI Box care trajectory. The concepts explained in Chapter 11 are discussed with the different perspectives of the stakeholders on desirability, viability, feasibility, and

effectiveness to reach the design goal. Furthermore, input is obtained to ensure the completeness of the concepts for further development. A summary of how the co-creation sessions are performed and what the outcomes are is provided in this chapter.



12.1. General Set-Up

During the co-creation a standard set-up is used. On top of that, due to the different expertises of the stakeholders involved, a different focus was set per session. Although desirability, viability, feasibility, and the overall effectiveness are discussed in all sessions, the emphasis and focus on certain topics was different during the sessions. Figure 49 shows in what sessions which focus was mostly present. These focuses will be explained more elaborately in the following sections.

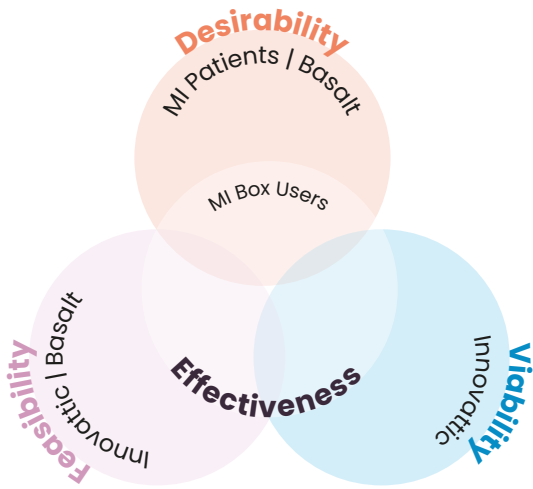


Figure 49: Co-creation session focus

The general setup of the co-creation consisted of the materials in Figure 50 that will be explained in the following steps:

- 1. An introduction about the co-creation session;
- 2. Discussion of each of the concepts;
  - a. A participant’s first reaction is discussed after presenting the concept;
  - b. Vote dots are placed on the most interesting aspects of the concept;

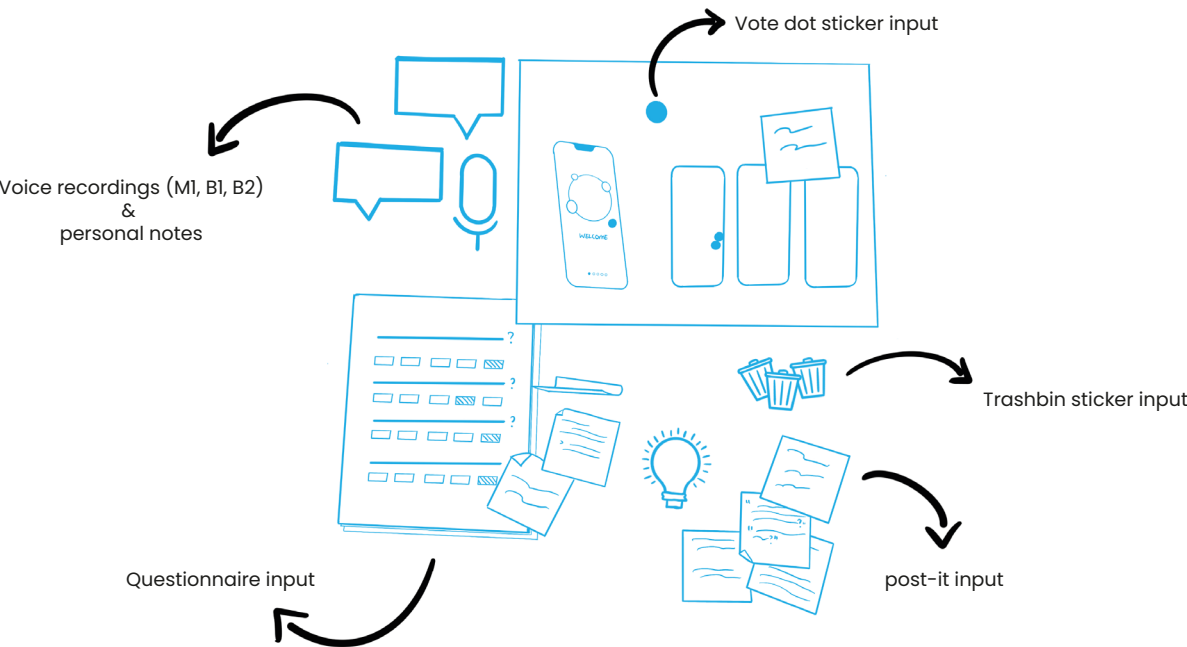


Figure 50: Co-creation setup

- c. Extra input for the concept is asked and written down on post-its;
  - d. A “trash bin opportunity” is offered for concept elements that need to be cancelled. If this is the case, a trash bin image is placed on that part of the concept;
  - e. A questionnaire, which will be explained in Chapter 13, is filled in by the participant.
3. The overall concept preference is asked alongside with the question if something is still missing in the different concept directions.

12.2. Co-Creation With Innovattic

12.2.1. Participants

Two employees participated in the co-creation session:  
I1: Designer & Marketing Lead  
I2: UX/UI Designer

12.2.2. Focus

Innovattic designed the original LUMC Care app. Therefore, they know more about the vision of the app and the technical possibilities. During this co-creation, the implementation difficulties of certain concepts are discussed (feasibility) and the concepts are compared to the vision of the future of the LUMC Care app (viability).

12.2.3. Main Co-Creation Questions

- What concept is easiest to implement?
- What concepts are mostly in line with the vision and dreams for further

development of the LUMC Care app?

- What are important things to consider if concepts are selected for further development?

12.2.4. Outcomes

Overall the reaction of Innovattic to all the concepts is confidently positive. The “Unboxing Experience” concept is expected to cost the least effort to implement, making it a feasible concept. Regarding the “Care Overview & Preparation” concept, the consult preparation feature is especially perceived positively. A downside of this concept is that care appointments need to be automatically adjusted for which software needs to be developed. Although the “Care Overview & Preparation” concept will cost the most effort, it was acknowledged that the concept is in line with the vision of the overall

development of the LUMC Care app. The “Medication Monitoring” concept received positive feedback as the concept would ensure a complete monitoring and support experience for the entire care trajectory of an MI patient. Also, it was mentioned it is a good idea that patients register the medication themselves as this avoids technical difficulties and medical regulations around the application. Not everything in the “Value Activation” concept is perceived as valuable. However, the concept element in

which suggestions are added was evaluated as the most valuable concept element. Finally, regarding the option to notify the doctor within the “Value Activation” concept, Innovattic highlighted the risk of increased contact with the hospital as the threshold to contact the hospital is lowered. The idea of saving the measurements for a consult, however, is deemed as a good manner to activate the patients to do something more with the measurements.

**12.3.1. Participants**

The cardiologist P4 from Table 4 is interviewed for this co-creation.

**12.3.2. Focus**

As certain ideas and concepts focused on the incorporation of Basalt in the LUMC Care app, it is relevant to involve them in the design process. Namely, the design intervention should support Basalt and should not conflict with their regular way of working. Besides, as the aim is to extend and increase support after rehabilitation by means of the MI Box, input around what kind of support should

be provided is valuable to receive from the rehabilitation centre. As the availability of the HCPs of Basalt was limited, the concepts were sent via e-mail alongside a questionnaire (see Chapter 13). After this, an online interview is held with the cardiologist to receive more in-depth input and feedback about the concepts.

**12.3.3. Main Co-Creation Questions**

- How can the concepts offer support for Basalt?
- What (new) role would Basalt have in the concepts?

- What support should be implemented in the different concepts and is (most) valuable for the patients to have after the rehabilitation?

**12.3.4. Outcomes**

While discussing the concepts it became clear the role of Basalt in the various concepts would be different. In general, it is concluded that after the rehabilitation no support could be provided by Basalt during the rest of the MI care trajectory. However, as they are working on a digital trajectory named Physitrack, it was mentioned it could be an opportunity to link the different digital trajectories to each other. Besides, it was estimated as technically difficult to share the biking test results with the MI Box. The biking test results are currently provided by means of a comparison to the average of other people which is in line with elements

of the “Value Activation” concept. Other insights in the care trajectory are expected to be valuable to visualise. This is why the “Care Overview & Preparation” concept received a positive reaction. However, it was mentioned by Basalt that showing changes in medications in the care overview is deemed risky as it could cause more confusion due to the lack of patients’ knowledge about medication. On the other hand, information about how patients could aim to decrease their medication is considered an valuable addition to the medication concept. Information about how monitored values can be influenced was also mentioned as valuable. Overall, the concept preparation element in the “Care Overview & Preparation” concept is chosen as the most interesting element as it was expected it could support the patient as well as the cardiologist.

**12.4. Co-Creation With Patients**

**12.4.1. Participants**

Two MI Box users have been asked to participate; B1 and B2 (Table 6). Furthermore, to receive more input, participant M1 (Table 5) also participated in the co-creation.

**12.4.2. Focus**

As patients are experts around the experience of coping with an MI, their input is valuable to evaluate the desirability and effectiveness of the concepts. Therefore, during the sessions,

it is often asked “if this concept would be realised, what should be incorporated in the screens presented?” Furthermore, as the concepts aim for the involvement and guidance of the patients, comparison to their current experience gauges whether the concepts are desirable and have the potential to be effective in increasing a patient’s confidence to perform self-care activities.

#### 12.4.3. Main Co-Creation Questions

- What concept is most desirable?
- Do the concepts offer the support and guidance needed?
- What should be incorporated in the concepts to make them most valuable?

#### 12.4.4. Outcomes

The participants reacted positively to all the concepts presented. On the “Medication Monitoring” concept and the “Unboxing Experience” concept, both MI Box users mentioned that this feature is desired and currently missing. Elaborating on this, participant B1 mentioned he was currently looking for an app that could support his medication use. Also, it was deemed valuable that the doctor would have insights into the experienced side effects, if any. For the “Unboxing Experience” concept input

has been provided about what kind of introduction info is valuable. For example, participant B2 mentioned extra attention should be paid to the connection to bluetooth as bluetooth is something new and abstract for elderly. Besides, all participants reacted positively to the concept preparation element of the “Care Overview & Preparation” concept. The participants were especially enthusiastic about the representation of the different monitored values below each other and the opportunity to select certain values. Opinions about the care overview element were varying. For example, participant B2 found it not necessary as there is already a care overview in the MijnLUMC portal and in the portal from Basalt. On the other hand, participant M1 mentioned a care overview would be reassuring. Lastly, extra information around monitored values has been mentioned as valuable. It became unanimously clear what kind of value presentation is most desirable. Namely, the background information and the suggestions of the “Value Activation” concept. Participant M1 highlighted that suggestions should only be provided if monitored values are (too) high, as these suggestions can cause the perception that the monitored values are not good.

**Co-Creation  
Evaluation**

**Final Concept,  
Recommendations**

**EVALUATE**

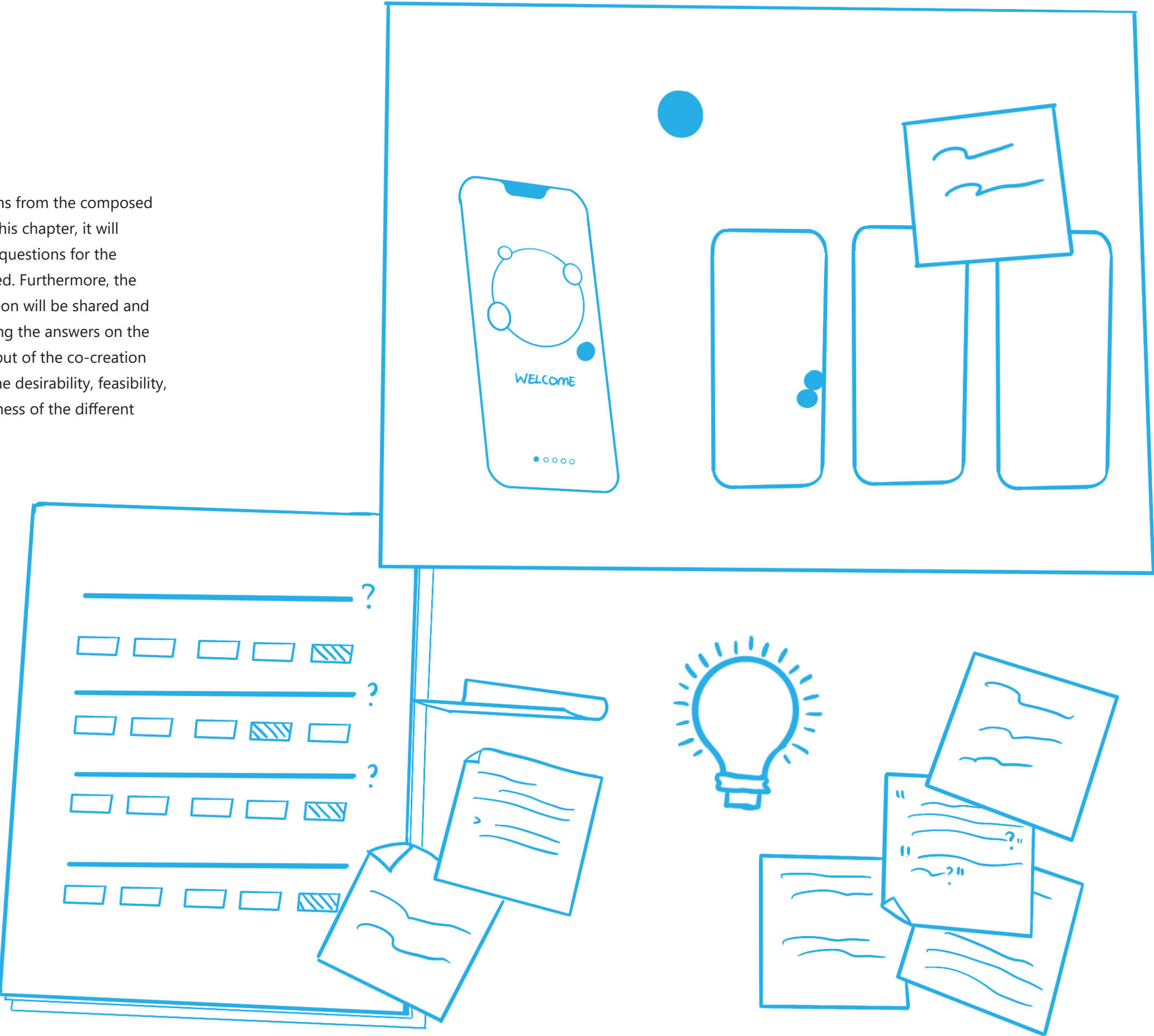


# 13

## EVALUATION

Validated questionnaires are questionnaires that are validated to measure what they intend to measure. Therefore, an evaluation format is composed by means of the exploration of validated questionnaires to ensure a highly reliable evaluation of the design goal. This format will be explained in this chapter. Evaluation of the different concepts is performed during the co-creation sessions by means of six extracted

questionnaire questions from the composed evaluation format. In this chapter, it will be explained how the questions for the co-creation are selected. Furthermore, the results of the co-creation will be shared and discussed. Besides using the answers on the questionnaires, the input of the co-creation will be evaluated on the desirability, feasibility, viability, and effectiveness of the different concepts.



### 13.1. Proposed Evaluation Format

To evaluate and validate the design goal stated in Chapter 9, evaluation formats are explored, suggested, and explained in this section. The design goal can be split up into four main topics; self-care, confidence, involvement, and guidance. Within these topics, subgoals can be defined that can be evaluated. These subgoals and the suggested evaluation are placed in columns that are inspired by a UX methodology named the HEART framework (Gecis, 2022). This framework enables clear structuring of the evaluation format. The framework is filled in for the four topics of the design

goal. The resulting tables will be explained in the next sections (Table 8 - 10). Validated questionnaires are referred to in the right column of these tables. As the topics self-care, confidence, involvement, and guidance can be interpreted quite broadly, the questionnaires are also used to define the subgoals of these topics in more detail. Then, these detailed subgoals are used as search criteria for validated questionnaires and the selection of evaluation questions. Meaning, the selection of (questions from) the validated questionnaires has been an iterative process (see Figure 51).

The validated questionnaires are selected with the use of an elaborated data sheet of a systematic review about patient and staff experience evaluation in remote patient monitoring (Pannunzio & Morales Ornelas, 2023). Questionnaires within this data sheet are selected by means of looking at the experience constructs that are similar to the design goal topics. The resulting validated questionnaires related to health care are the short version of the Patient Activation Measurement (PAM) (Hibbard et al., 2005), the 5-item version of the Patient Health Engagement (PHE) scale (Graffigna et al., 2015), and part of the questions of Patient Experiences and Satisfaction with Medications (PESaM) (Kimman et al., 2019). As medication is not the main focus of this thesis, questions that are deemed most relevant to the design goal are selected from the PESaM questionnaire. However, the fact that only part of the questions is used, causes a decrease in validity. Next to the health questionnaires, usability questionnaires are selected. A combination of the System Usability Scale (SUS) and the Telemedicine Satisfaction and Usefulness Questionnaire (TSUQ) is employed to ensure high-quality questionnaire questions about the usability of the design intervention (Bakken et al.,

2006; What Every Client Should Know About SUS Scores, n.d.). Although it decreases the validity if only part of the questions in SUS and TSUQ are used, questions are selected from these questionnaires to avoid repetition and ensure relatedness to the design goal. An overview of all the selected questionnaire questions alongside the design goal topic and the subgoal evaluated, is provided in Appendix Q.

#### 13.1.1. Self-Care

The core elements of self-care are self-care maintenance, self-care monitoring, and self-care management (Riegel et al., 2017). Based on these elements the subgoals are stated. The final subgoals and their suggested evaluation are summed up in Table 8 (on the next page).

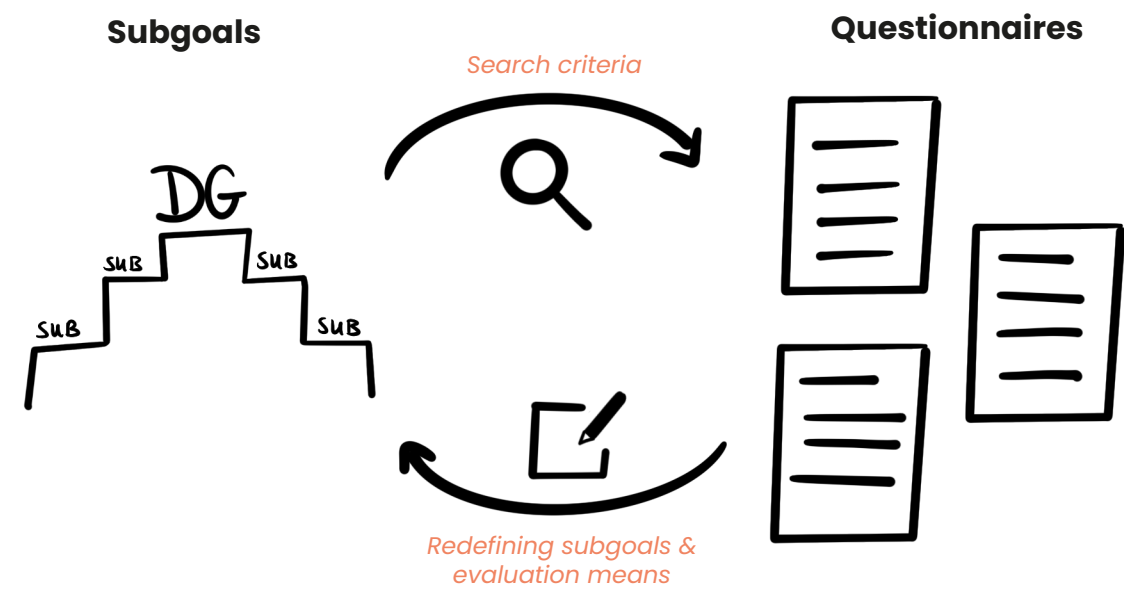


Figure 51: Use of validated questionnaires

| Subgoal                                                                   | Signal                                                                                                                                                                                        | Evaluation                                                                                                                                             |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Continue health behaviours                                                | <ul style="list-style-type: none"> <li>Patients keep up with routine physical activities</li> </ul>                                                                                           | <ul style="list-style-type: none"> <li>Monitored (increased) physical activities</li> <li>PAM</li> </ul>                                               |
| Increased body awareness and knowledge about risk management              | <ul style="list-style-type: none"> <li>Patients have confidence about health management</li> <li>The consult discussion looks different.</li> </ul>                                           | <ul style="list-style-type: none"> <li>PHE</li> <li>PAM</li> </ul>                                                                                     |
| Create more awareness about the medication that is provided               | <ul style="list-style-type: none"> <li>Increased patient involvement during the treatment discussions.</li> <li>Fewer questions from patients about the reason for the medications</li> </ul> | <ul style="list-style-type: none"> <li>PAM</li> <li>PESaM</li> <li>Added question</li> </ul>                                                           |
| Evaluate the effectiveness of the treatment                               | <ul style="list-style-type: none"> <li>Increased patient involvement during the treatment discussions</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>PESaM</li> </ul>                                                                                                |
| Increase confidence about symptom recognition                             | <ul style="list-style-type: none"> <li>Increased patient knowledge about symptoms</li> <li>Less worries of patients about symptoms</li> </ul>                                                 | <ul style="list-style-type: none"> <li>PHE</li> <li>PESaM</li> <li>PAM</li> <li>Added question</li> </ul>                                              |
| Establish routine for monitoring signs and symptoms                       | <ul style="list-style-type: none"> <li>Consistent monitoring behaviour from patients</li> <li>Increased patient awareness about symptoms</li> </ul>                                           | <ul style="list-style-type: none"> <li>Look into the consistency of the monitoring times.</li> <li>Added question</li> <li>PHE</li> <li>PAM</li> </ul> |
| Distinguish cardiac signs and symptoms from non-life threatening symptoms | <ul style="list-style-type: none"> <li>Less unnecessary calls with to hospital</li> </ul>                                                                                                     | <ul style="list-style-type: none"> <li>Frequency unnecessary hospital contacts about symptoms</li> <li>Added question</li> <li>PHE</li> </ul>          |
| Provide a clear system for patient communication of questions and worries | <ul style="list-style-type: none"> <li>Less unnecessary calls with the hospital</li> <li>Less time spent to answer unnecessary questions and worries</li> </ul>                               | <ul style="list-style-type: none"> <li>PAM</li> </ul>                                                                                                  |

Table 8: Self-care evaluation means

13.1.2. Involvement

In this thesis, involvement is referring to the involvement of a patient in their care trajectory by means of engaging with the LUMC Care app. To evaluate and validate this involvement with the proposed concept, the evaluation in Table 9 is suggested.

| Subgoal                      | Signal                                                                                                                                                                                                         | Evaluation                                                                                                                                   |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Increase patient involvement | <ul style="list-style-type: none"> <li>Prepared consults</li> <li>Patients actively look into measurements</li> <li>Increased personal input from patients during consults</li> </ul>                          | <ul style="list-style-type: none"> <li>PAM</li> </ul>                                                                                        |
| Increase patient engagement  | <ul style="list-style-type: none"> <li>Patients actively look into measurements</li> <li>More time spent in the app by the patients</li> <li>Increased personal input from patients during consults</li> </ul> | <ul style="list-style-type: none"> <li>Monitor Average session length and frequency of use</li> <li>PAM</li> <li>PHE</li> <li>SUS</li> </ul> |
| Increase app use             | <ul style="list-style-type: none"> <li>Increased app use by patients</li> </ul>                                                                                                                                | <ul style="list-style-type: none"> <li>Monitor frequency of use</li> <li>-SUS</li> </ul>                                                     |

Table 9: Involvement evaluation means

13.1.3. Guidance & Confidence

The topic “guidance” in the design goal is reflecting the aim to shift towards coaching with the MI Box. In this shift, the HCPs will also experience a changed role and interaction with the MI Box and the patients. Furthermore, for HCPs, the change towards coaching can be helpful as it can increase the meaningfulness of the monitored values and decrease workload. Although the changing role of the HCPs should be noted, this will not be evaluated within this thesis as the design goal in this project focuses on the

patient. Guidance and confidence are closely related to each other. While composing the different subgoals for these two design goal topics, the same tables appeared. This can be explained by the fact that guidance is used as means to increase confidence to perform self-care activities. In other words, if enough guidance is provided, the user’s confidence

will be increased. Therefore, these topics can be evaluated in a similar manner shown in Table 10. However, within the selected questionnaires, certain distinctions can be made between questions that evaluate “guidance” or “confidence”. In the table in Appendix Q, this distinction is shown.

| Subgoal                                                     | Signal                                                                                                                                                                                                     | Evaluation                                                                                          |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Increased patient’s confidence during the use of the MI Box | <ul style="list-style-type: none"><li>Fewer questions from patients about the use of the values</li><li>questions from patients about the use of the values</li><li>Increased patient activation</li></ul> | <ul style="list-style-type: none"><li>TSUQ</li><li>SUS</li><li>PAM</li><li>Added question</li></ul> |
| Increased patient activation                                | <ul style="list-style-type: none"><li>Patients actively look into measurements</li><li>Increased personal input during consults</li></ul>                                                                  | <ul style="list-style-type: none"><li>PAM</li></ul>                                                 |
| Increased functionality                                     | <ul style="list-style-type: none"><li>The MI Box is used for more than only monitoring for the hospital</li></ul>                                                                                          | <ul style="list-style-type: none"><li>PAM</li><li>TSUQ</li><li>Added question</li></ul>             |
| Increased usability                                         | <ul style="list-style-type: none"><li>Improved onboarding with the MI Box</li><li>Easier interpretation of the values by patients</li></ul>                                                                | <ul style="list-style-type: none"><li>Error rate per user</li><li>SUS</li><li>TSUQ</li></ul>        |

Table 10: Guidance & involvement evaluation means

## 13.2. Evaluation Co-Creation

The evaluation format suggested in Chapter 13.1 is recommended to use for the evaluation of the final concept. However, due to the limited time available for evaluation in this thesis, a shorter version of this suggested evaluation format is composed to employ during the co-creation sessions. A questionnaire consisting of six questions is used during the co-creation sessions to evaluate if the design goal in the different concepts is realised. This questionnaire will be explained in section 13.2.1. Next to this questionnaire, the input provided during the discussions in the various co-creation sessions is used to evaluate the elements of the different concepts on desirability, effectiveness and implementation effort, i.e., feasibility. The outcomes result in a graph that helps to define the most desirable and most feasible concept elements. Finally, a comparison with the interaction vision provided in Chapter 9 will help to compose a final concept that is in line with the envisioned interaction and satisfies the design goal.

### 13.2.1. Co-Creation Questionnaire

In total six multiple-choice questions are extracted from the table in Appendix Q. This amount has been chosen as it ensured quick

and yet proper evaluation. A combination of questions is selected that covers all design criteria. The selected questions consist of statements that can be evaluated by the participant on the amount of agreement (strongly disagree - disagree - neutral - agree - strongly agree). In Table 11 (on the next page) the selected statements alongside the related design goal topics are shown. The questions in Table 11 are written slightly differently than the original questions from the questionnaires they are selected from (see Appendix Q). This is due to the fact that during the co-creation session concepts are evaluated, instead of the experience of a product or service in use. These rewritten questions ensure a bigger focus on guidance. For example, “I am confident that I can follow through on medical treatments I may need to do at home” changed into “This design makes me confident that I can follow through on medical treatments I may need to do at home”.



| # | Statement                                                                                                                                               | Design goal topic                             |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 1 | This design helps me understand the nature and causes of my health condition.                                                                           | Self-care, guidance*                          |
| 2 | This design makes me confident that I can follow through on medical treatments I may need to do at home.                                                | Self-care (medication), confidence, guidance* |
| 3 | This design gives me more confidence / a greater sense of control in managing my heart health.                                                          | Self-care, involvement, confidence, guidance* |
| 4 | This design offers me the guidance I need during my care trajectory.                                                                                    | Guidance                                      |
| 5 | This design makes me confident that I can take actions that will help prevent or minimise some symptoms or problems associated with my health condition | Self-care, confidence                         |
| 6 | This design makes me confident that I can tell a doctor concerns I have even when he or she does not ask                                                | Involvement, confidence                       |

guidance\*

In the original selected question these criteria would not have been evaluated. Because the selected question is rewritten for co-creation purposes, guidance is also evaluated.

Table 11: Selected co-creation questions

13.2.2. Co-Creation Results

Answers questionnaires

In Table 12 the average of all questionnaires is visualised. The average weighs the answers of the MI Box users twice as much because they represent the actual users. All the questionnaire answers can be found

in Appendix R. As shown in Table 12, the design goal is confirmed in all concepts. This result shows all concepts of Chapter 11 are promising to ensure the design goal will be realised in the final concept.

| Concept          | strongly disagree | disagree | neutral | agree | strongly agree |
|------------------|-------------------|----------|---------|-------|----------------|
| Unboxing...      |                   |          |         |       |                |
| Medication...    |                   |          |         |       |                |
| Value...         |                   |          |         |       |                |
| Care Overview... |                   |          |         |       |                |

Table 12: Average co-creation answers

Desirability & implementation efforts

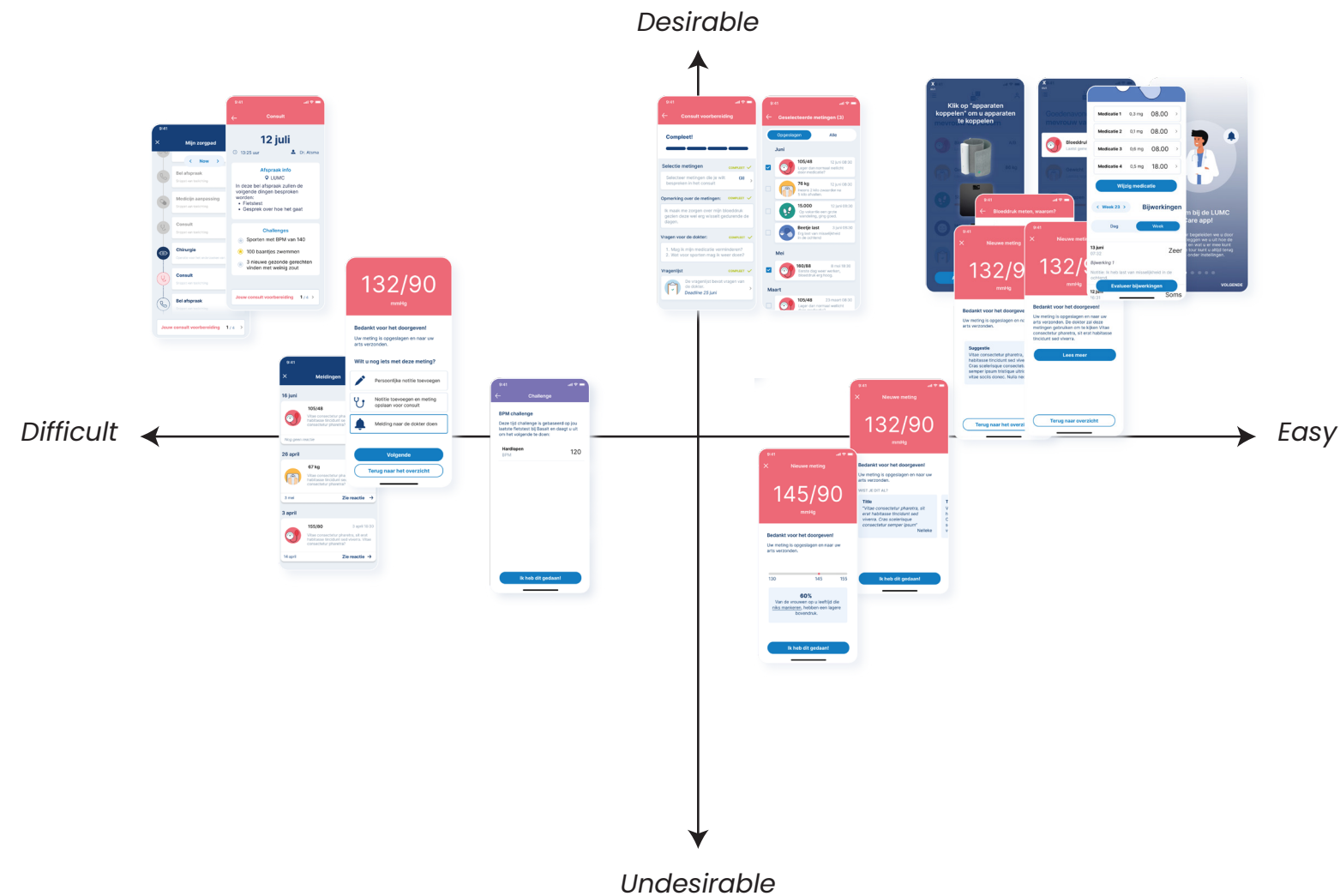
The outcomes of the co-creation sessions are visualised in a graph presented in Figure 52 (on the next page). From this graph, it becomes clear the elements of the “Unboxing Experience” concept are most desirable and easy to implement. Besides, “Medication Monitoring” and the consult preparation element of the “Care Overview & Preparation” are also highly appreciated. Medication support is something patients currently miss. Although it becomes clear this feature would increase the value of the LUMC Care app, it is only increasing guidance and involvement on a specific part of the journey. Furthermore, most problems that currently arise during the use of the MI Box are due to the bad onboarding offered. To ensure the

product supports the shift towards coaching, an important first step is to ensure the user understands how to use the product to its full potential. Lastly, the consult preparation element of the concept “Care Overview & Preparation” is also evaluated as very desirable. However, implementation of this concept element is more difficult.

Comparison Interaction vision

It can be noted that the intended interactions of the “Unboxing Experience” concept are similar to the envisioned interaction of Chapter 9. The different introductions ensure that patients learn how to use the MI Box the same way people learn to use a toothbrush in the interaction vision. In the interaction vision, supplemented tools (e.g. toothpicks) can be

Figure 52: Graph desirability & feasibility



used next to the toothbrush that provide extra support to one's dental care. To also realise supporting tools after familiarisation

with the MI Box, the support that is offered during the introduction should be repeated throughout the app.

### 13.3. Conclusions

After thoroughly analysing the co-creation sessions it has been decided to work further on the “Unboxing Experience” concept. Namely, this concept appeared to be the most desirable and effective concept that is yet easy to implement. Also, information about the introduction will be repeated throughout the app by means of using the background info element of the “Value Activation” concept. Moreover, in this background info, more elaborate information of the self-care purposes introduced during the introduction will be provided. This way, supportive tools are also provided after the introduction. Before finalising this concept, it is valuable to consider the input of users concerning the provision of explanations in a visual manner. Within these explanations, extra attention should be paid to the connection to bluetooth as this has been acknowledged as something difficult. Lastly, it has been noted it is better to let people experience the use of the product than show how the product should be used. Therefore, in the final concept, it is necessary to seek an interactive way of introducing the use of the different features in the app.



# 14

## FINAL CONCEPT

The result of this thesis is the concept proposal called "UnBoxing the MI Box". This concept will be explained in this chapter.

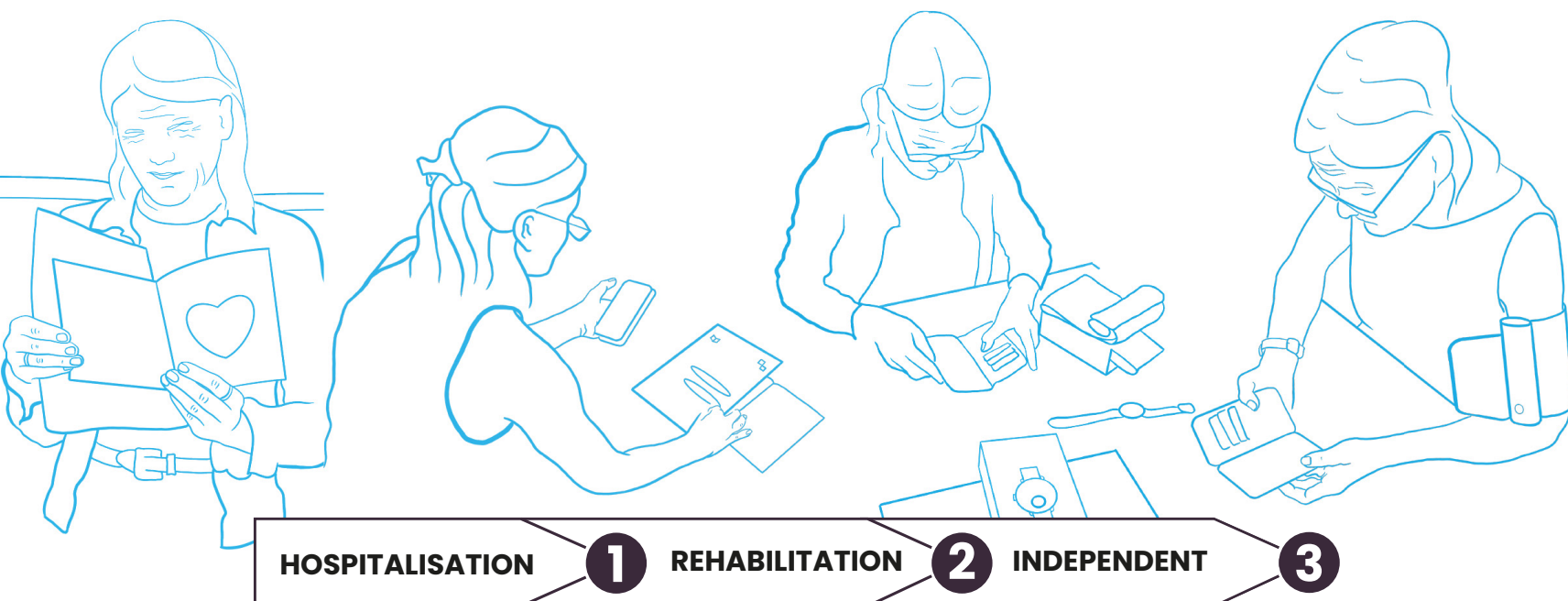


Figure 53: Final concept through the care phases

To explain the final concept, the different elements are explained with the use of the simplified care process that is used throughout this thesis (see Figure 53). Furthermore, the concept elements will be reflected on by showing what **barriers** and **facilitators** of SDM, which are explained in Chapter 3.6, are related to a certain concept element.

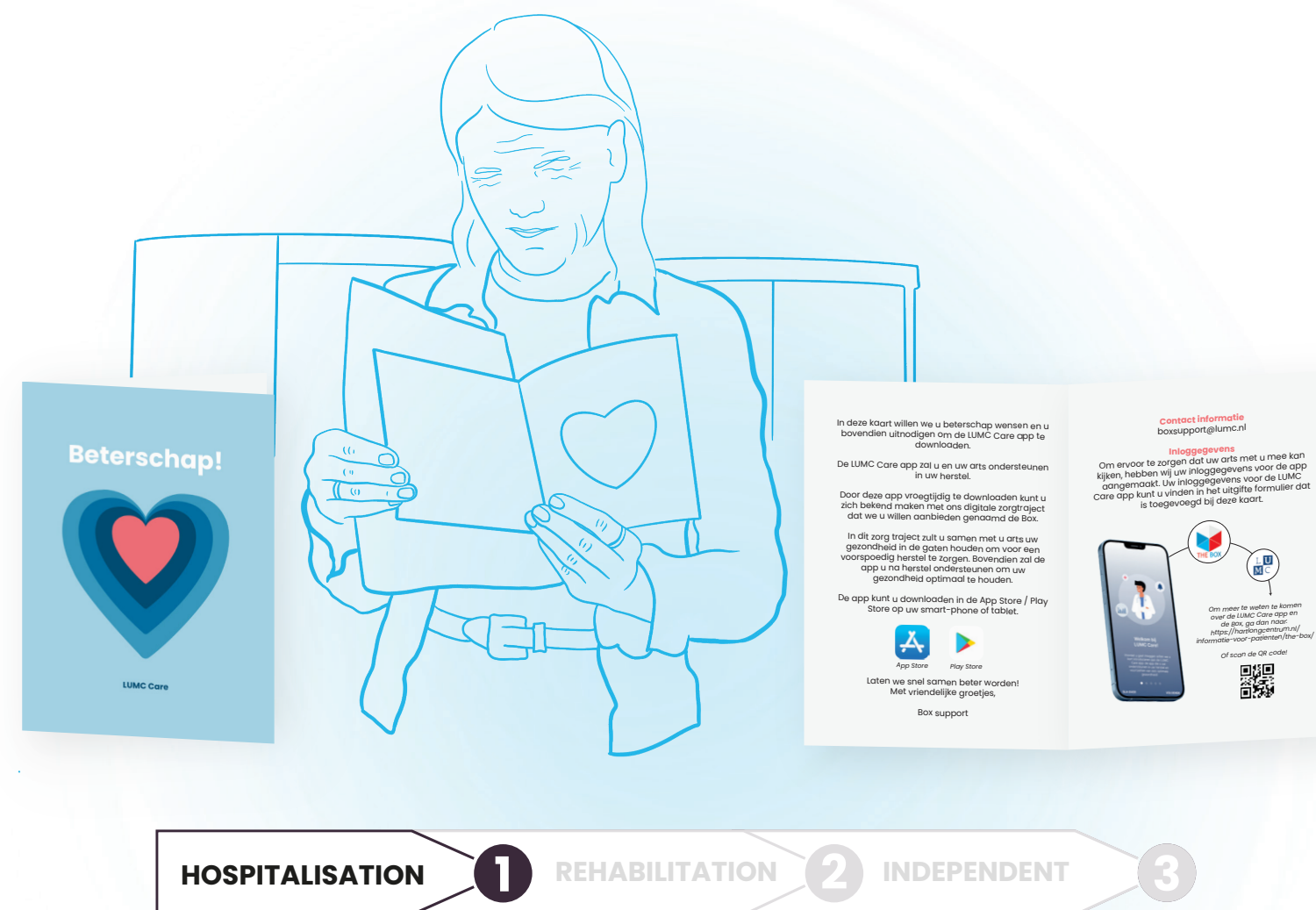


Figure 54: Card

Around discharge, patients will receive a physical card (see Figure 54) that invites patients to already download the LUMC Care app. Information on the card entails explanation about the purpose of the app, downloading the app, log in information, contact information, and a QR code that refers the patients to more information online. Downloading the app enables patients to make themselves comfortable with the

digital care trajectory provided. In other words, “**more time**” is offered to look into the decision to use the MI Box. Furthermore, it increases the value of the LUMC care app and avoids the app being overlooked. In Appendix S a bigger version of the card is shown. The patient issue form (see Chapter 3.2) with the account information is provided alongside this card.





Figure 55: App purpose introduction

When a patient arrives home, the LUMC Care app can be downloaded. Directly after downloading the app, an introduction to the app and Box purposes appears (see Figure 55). This helps people understand why this trajectory is offered and what to expect from it. In other words, the SDM barrier “**lack of knowledge**” is more likely to be overcome. Furthermore, the introduction explains a patient can use the MI Box for personal use and not only to be used for monitoring by

the hospital. This feature contributes to the SDM facilitator “**patient empowerment**”. Lastly, it tries to overcome the barrier of “**overtrust**” on the HCPs by mentioning that the care professional is not always watching the monitored values and thus the user is also responsible for monitoring themselves. All designed introduction screens can be found in Appendix T.



Figure 56: App use introduction

After a patient is logged into the app with the information from the patient issue form, the patient is invited to explore the app. While exploring, information about the use of the app is shown (see Figure 56). The content of this information shows what certain values contain, what HCPs do with the monitored values, how users can use the monitoring activities for self-care, and what would be a suitable manner to monitor. With this information, the aim is to contribute to the

“**patient empowerment**”. Furthermore, the interactive introduction ensures patients already experience how the app could be used for personal purposes. This feature tries to overcome the barrier of “**lack of self-efficacy**”. Most importantly, this concept element aims to ensure a patient knows what to expect and to do before the MI Box arrives. All designed screens of this part of the concept can be found in Appendix U.



HOSPITALISATION 1 REHABILITATION 2 INDEPENDENT 3

Figure 57: Connecting instructions

Once the MI Box is received, patients are guided in the app on how to connect the devices to the LUMC Care app (see Figure 57). Unfortunately, it was not possible in the LUMC Care app to offer a first-time user experience to connect the devices as the connection of the devices needs to be performed via the Withings Health Mate app. However, before the user is sent to the Withings Health Mate app, extra guidance is

provided. This guidance is provided visually as this was mentioned to be valuable during the co-creation sessions with patients. In other words, this visual manner ensures explanation in an “**understandable language**”. Appendix V shows all the screens presented.



HOSPITALISATION 1 REHABILITATION 2 INDEPENDENT 3

Figure 58: Information repetition

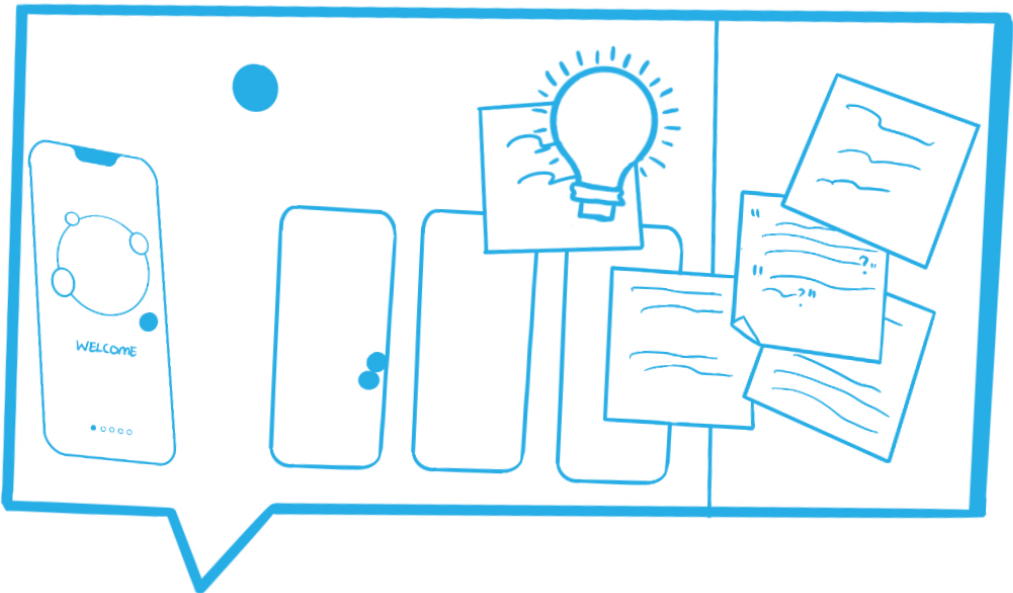
To ensure support and guidance after the rehabilitation, information of the introduction is repeated throughout the app (see Figure 58). With this, the “**lack of knowledge**” is avoided throughout the whole care journey. After a new measurement, patients are referred to this information. The same information will also be present below the measurement overview. Furthermore, if patients would like to see the introductions

again or find more information about connecting the devices, they can always find this in the settings of the app. HCPs can always refer to these means if a patient experiences difficulty. In other words, the tools presented in the introduction can be called upon throughout the journey to function as coaching means. In Appendix W more screens can be found of this concept element.

# GENERAL DISCUSSION

In this chapter, it will be critically evaluated in what manner this thesis has managed to answer the main research question. First, the conclusions of this thesis on the main research question are provided and

reflected on. This is followed by a reflection on the design goal. After that, the limitations of this thesis will be acknowledged and recommendations about further research and developments will be provided.





15.1. How to change from monitoring to coaching?

From the literature research, it could already be concluded that lack of involvement of the patient during the MI care trajectory can cause a lack of understanding and decreases the opportunity to grasp the MI (Qin et al., 2022). This is causing fear and anxiety (Fålund et al., 2016; Hildingh et al., 2006; Qin et al., 2022). These insights are confirmed by the MI patients interviewed in this thesis (Chapter 5). Although the MI Box shows potential to involve patients more after hospitalisation, results from interviews with MI Box users (Chapter 6) show that still in the MI Box care trajectory, there is lack of involvement. Therefore, it was deemed essential to ensure more involvement through the MI Box and to reassure patients about coping with an MI’s aftermath. Although the MI Box already offers some reassurance because of the feeling of connection to the hospital, little instruction means are provided to ensure patient engagement and involvement with the digital care trajectory provided. In other words, there is a lack of guidance around the onboarding of the MI Box. Besides, self-care is an important part of the recovery after an MI and the risk reduction to avoid a recurring MI. However, little attention is often paid to self-care (Riegel et al., 2017). The MI Box shows potential to increase self-care as

self-monitoring is an important part of self-care. However, it appears patients do not fully understand the monitored values which hinders the MI Box to be used for self-care activities. These insights confirmed that the current MI Box concept can only be used for monitoring by the hospital but not for coaching to increase self-care activities. Based on the aforementioned problems the design goal that aims to answer how to change towards monitoring is stated as:

The goal is to increase patients’ confidence to perform self-care activities by increasing patients’ involvement and guidance with the use of the MI Box.

A reflection on what way this design goal aims to support the change towards coaching is provided in section 15.2.

The paper of Riegel et al. (2017) informed that time should be spent to inform patients about their health status and provide them with appropriate sources of information before other self-care steps can be performed. Therefore, the proposed final concept in Chapter 14 seems to be a suitable first step to increase self-care as it focusses on the informative elements of self-care. Figure 59 shows what elements of self-care

are aimed for with the final concept. The final concept aims to reach the highlighted self-care elements in Figure 59 by, among other things, offering more guidance. Also, it ensures increasement in involvement as it shows more transparently what is and could be done with the monitored values. In the co-creation sessions, it has become clear that in all concepts presented in Chapter 11 the design goal has the potential to be satisfied. However, validation of the final concept is lacking in this thesis. Furthermore, for a sufficient involvement of patients in their care trajectory, the attitude of HCPs towards the MI Box should change. Namely, it is important to give the rights to patients to be involved in decisions to really ensure a coaching approach. This is an important

first step in SDM as well (Bunn et al., 2018). In the interviews with HCPs (Chapter 4), it appears this is a step that is difficult for HCPs to embrace as they lack trust in a patient’s ability to be involved. This is contributing to the fact patients are rarely involved in their care trajectory. Therefore, as explained in Chapter 1.4, it would have been too big of a goal for this thesis to reach for SDM. It is decided to focus on the provision of more guidance and involvement by means of a more transparent approach with the MI Box. This is an important step before SDM can be implemented. In the limitations and recommendations, it will be explained what should be done after this thesis to ensure increasement in SDM.

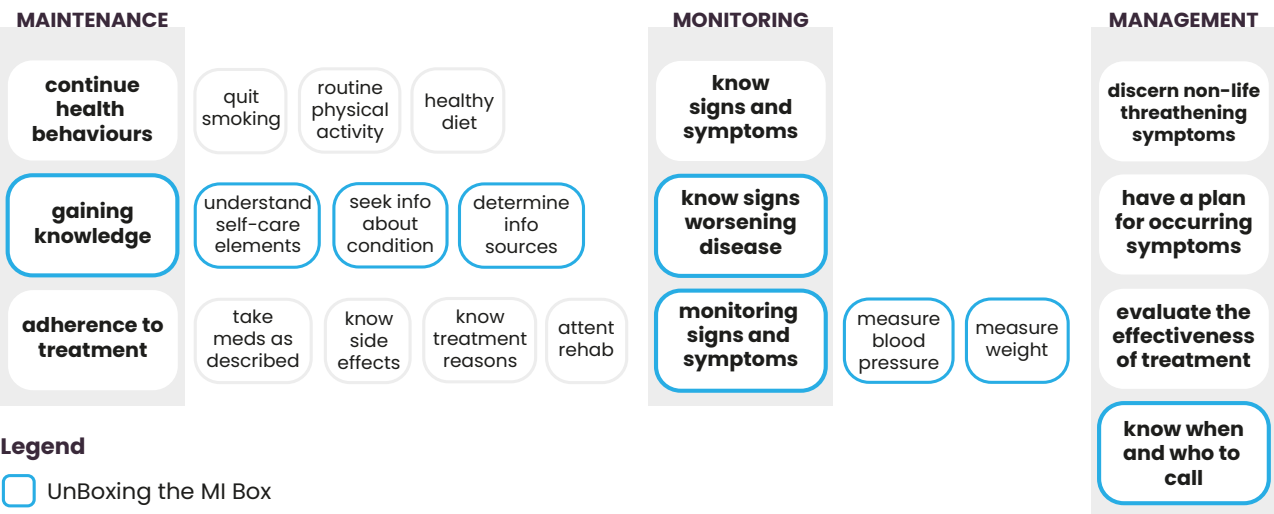


Figure 59: Self-care analysis final concept



## 15.2. Reflection on the Design Goal

The change towards coaching has been translated into the design goal as an aim to increase self-care activities. Namely, before a change towards coaching can happen, patients should be enabled to perform self-care activities. In other words, the increase of self-care activities and the change towards coaching are two versions of the same goal. “Increasing self-care” is the goal stated from the patient’s perspective, and “change towards coaching” is the goal stated from

the HCPs’ perspective. In this thesis, the focus has been on changing the interaction with the MI Box from a patient perspective. That is why the design goal uses the goal stated from a patient perspective. However, as already explained in the previous section, to really change towards coaching the HCPs’ perspective should also be considered. This is therefore a recommendation for further research.

## 15.3. Thesis Limitations

In the interview chapters (Chapter 4-6) some limitations are already mentioned. These are elaborated on in this section. Furthermore, the limitations of the performed co-creation activity will also be summarised.

### 15.3.1. Interviews

The participant numbers in the different research activities have been relatively low. Only one MI Box user (B1) is interviewed in an elaborate manner due to the strict protocols of LUMC around contacting patients within their network. This limitation has been attempted to balance out by means of contacting other MI patients that do not

use the MI Box. Information from other MI patients helped to gain an understanding of the common problems and needs of MI patients. However, to ensure the final concept is suitable for most of the MI Box users, further research should be performed that involves more MI Box users.

### 15.3.2. MI (Box) Context

Although the actual context mapping activities were planned with MI Box users, more information has been gained about the context of other MI patients that do not use the MI Box. One reason for this is the difference in the number of participants.

Another reason is the different focus of the participants in the interviews. Namely, the MI Box users interviewed tended to answer the interview questions focused around the practical use of the MI Box, instead of the implementation of the MI Box in one’s home context. The MI patients talked more about the impact of the MI on their home context as they were not familiar with the MI Box. As a result, in-depth insights about how the MI Box is implemented in different home contexts of MI patients is lacking. Therefore, it is important to find out during user tests if the final concept is facilitating or conflicting with the implementation of the MI Box in the home context of most of the MI Box users.

### 15.3.3. Support After Rehabilitation

From the six MI patients interviewed (including MI Box users), three experienced their MI recently. Because these participants were in the middle of rehabilitation, only a few insights are gained about what support needs to be provided after rehabilitation. These limited insights are used for developing the final concept. It is therefore important to evaluate whether the support offered by the final concept is sufficient enough to also coach patients after rehabilitation.

### 15.3.4. Co-Creation

During the co-creation sessions the participant number of the actual MI Box user was relatively low. This gave a limited user perspective on the concept directions which could have caused a segmented view of what concept is most desired. This is why it can be interesting to still evaluate the different concepts with more MI Box users. Also, the age of the participants in the co-creation sessions caused difficulties to involve them in the design process. Namely, it is difficult for older participants to imagine a digital concept as a whole which caused these participants to focus on specific screens. This led to their vote on a certain concept to be unreliable. Therefore, during the co-creation evaluation, there was a bigger focus on the input provided by the MI patients than on their final vote dot placed on the concepts.

### 15.3.5. Validation

Although during the co-creation sessions the design goal is evaluated, the final concept is not validated. Therefore, it can not be concluded whether the final concept is increasing a patient’s confidence to perform self-care activities. This should be performed in further research that will be explained in the next section.

## 15.4. Recommendations

During this thesis the project required to be narrowed down to enable the project to be finished in 100 days. However, throughout the project, other interesting research topics and developments are noted. These will be summarised in this section. Besides, further research will be suggested to solve the research limitations of this thesis.

### 15.4.1. Further Research

#### *Evaluation of the final concept*

In this thesis no time was available for validation of the final concept as the difficulties around MI Box user recruitment caused a delay in the design process. Therefore, this section will provide a recommendation for further evaluation of the final concept. To check in detail if the desired effect is obtained with the final concept, it is recommended to employ user tests and use the evaluation format composed in Chapter 13. Furthermore, as part of this user test, it is recommended to use an evaluative questionnaire with the suggested questions from the table in Appendix Q. To ensure a high validity evaluation, it is recommended to use all questions from the validated questionnaires that are referred to. In Appendix Q a selection is made in the TUS, TSUQ, and PESaM questionnaire to make

it more compact. However, this decreases the validity. A questionnaire should be able to be done in 30 minutes and consist of 25 to 30 questions to keep the interest and attention of the participants (Sharma, 2022). The table in Appendix Q already consists of 41 questions, which suggests it would be necessary to remove certain questions that feel repetitive. Before a final selection of questions is made, it is recommended to look into the psychometric properties of the questions within the validated questionnaires as these show the amount of validity and reliability of certain questions.

#### *Inclusivity of the MI Box*

The aim in this thesis is to shift towards coaching and enable patients to perform self-care activities. Something that has not been researched is whether this aim of the hospital is actually suitable: Can it be expected of patients to do it on their own? What happens if patients are not able to understand the technology? These questions have not been critically reflected on in this thesis as the low number of interviewed MI Box users did not allow this. However, in further research, it is necessary to gain more insights about what can and cannot be expected from patients. Especially because the aforementioned

research from van der Voorde (2020) already shows that not every Box user is familiar with working digitally. In other words, it should be researched how to make the MI Box concept as inclusive as possible.

#### *Metro Map*

The suggested format of the Metro Map tool for digital care trajectories is explained in Chapter 2. Something that would be interesting to further explore is how HCPs would use this format. For example, the aforementioned suggestion in Chapter 2 was to use pictures for the environment layer if visualisation skills are not present. Besides, it should be investigated if it is clear how the context factors could be used. It could be valuable to look into how context factors can be defined easily by HCPs. Elaborating on this, the use of senses to cluster the context factors can be an interesting approach. Currently, too little data is gathered around the senses in the MI care trajectory to propose something about this.

#### *HCPs Change of Interaction With the MI Box*

If a change towards coaching is aimed, the change of interaction from an HCPs' perspective should also be researched. This thesis focussed on the interaction of the

patients with the MI Box. To really change towards coaching one should also research the change of interaction of the HCPs with the MI Box.

#### *Increase SDM*

This thesis aimed to increase patient involvement and engagement. The next step is to look into how to increase SDM. Concept elements of the different concepts presented in this thesis can be used for research into this SDM increasement. More about this will be explained in the next section.

### 15.4.2. Further Developments

Although the “Unboxing Experience” concept has been chosen as it fits best within the scope of this thesis, the other concepts presented in Chapter 11 would still be interesting for further research and development. Especially the “Medication Monitoring” concept seems very valuable as medication has been the biggest topic during the interviews. Therefore, to increase the value of the LUMC Care app it would be advisable to implement this feature. Furthermore, this concept can help to increase SDM around treatment decisions. Namely, it can help people to evaluate their medication and be involved in decisions

around their treatment. Most importantly, this concept also focuses on other self-care elements than the final concept which means it can help to further increase self-care of patients (see Figure 60).

The “consult preparation” element of the “Care Overview & Preparation” concept has the opportunity to increase SDM as it can prepare patients for decisions that will be taken during consultations. Something to consider if this element will be further realised, is that HCPs and the MI Box should make clear to patients that a decision needs to be made and a patient’s opinion is important (see Figure 28). This SDM step is

currently lacking which negatively affects the aim to change from monitoring to coaching as patients do not feel their opinion and knowledge matters.

Besides, an addition to the “UnBoxing the MI Box” concept can be a redesign of the box of the MI Box. Namely, the box itself can also guide people through the installation of the MI Box to avoid problems. This can be done if the box itself consists of smaller boxes that can be opened step by step. This is shown in the idea 1 of Chapter 10. Besides, to increase SDM around the choice of the MI Box, patients could be offered a return label to enable patients to send the MI Box

back in case they do not feel comfortable with the digital care trajectory (see Figure 61). However, more research should be performed on how a return label could be implemented.

Lastly, as the MI Box is full of Withings devices it is understandable that patients can get confused about what app to use. To ensure it feels more logical to use the LUMC Care app, it could be better to call it the Box app. This change can also be valuable if the MI Box concept will be expanded to other hospitals.

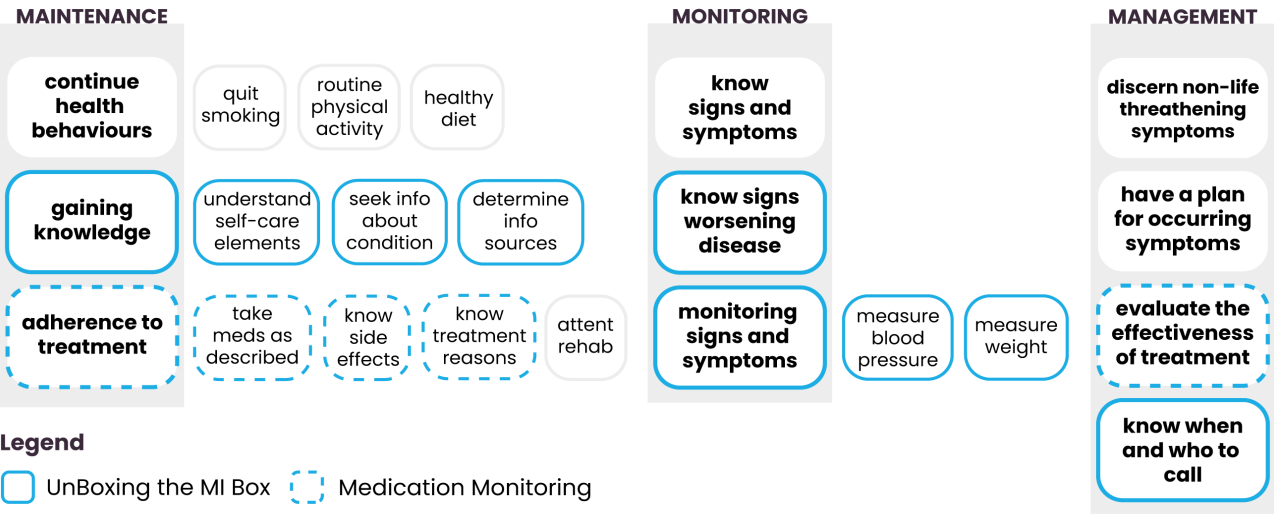


Figure 60: Further increase self-care

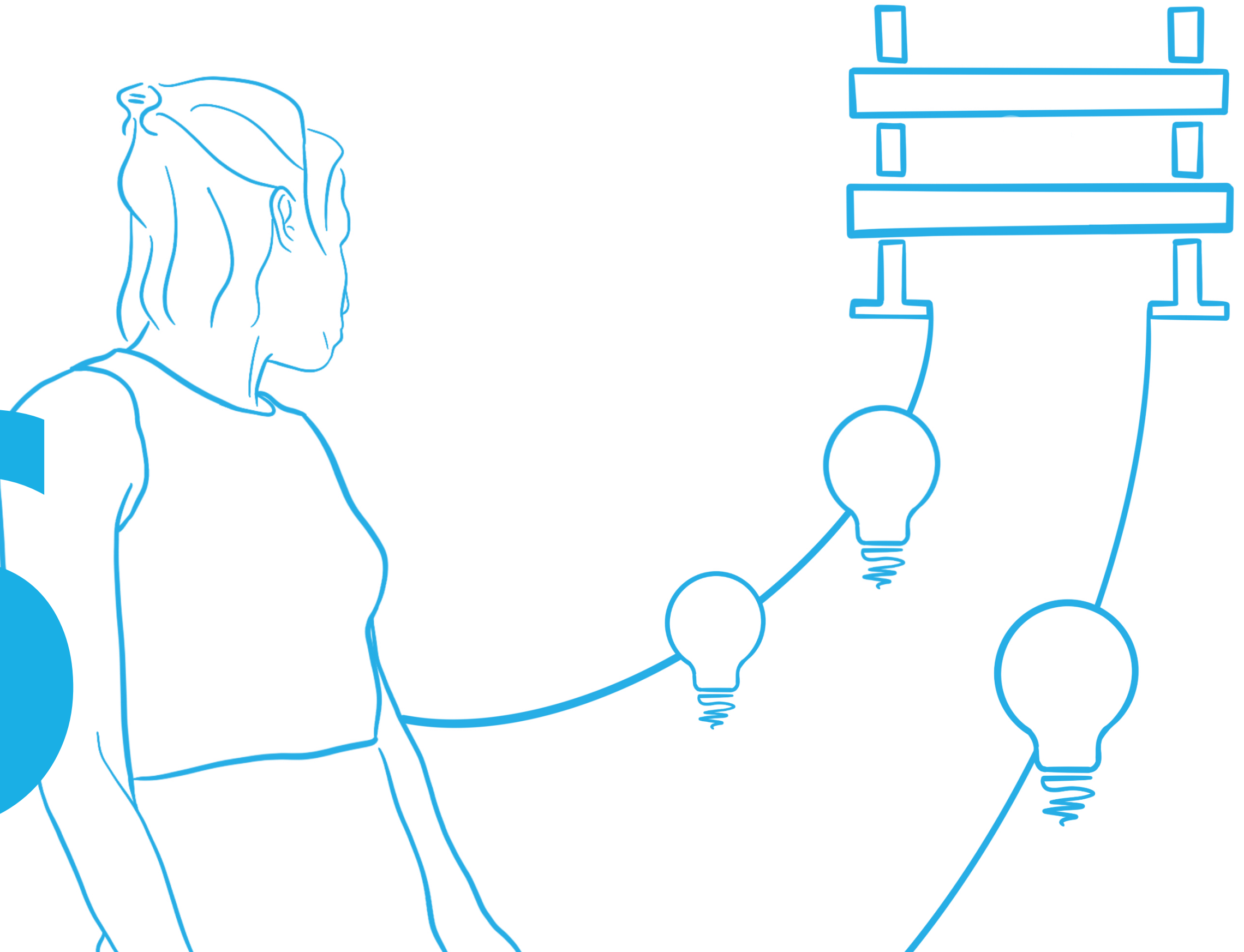


Figure 61: Return label

## THESIS REFLECTION

As this thesis has been a big journey for me I would like to share a personal reflection on this journey with you, my reader. Hopefully, it can offer you some reassurance or guidance in your own design projects.

# 16





## 16.1. Main Challenges

Because of strict protocols around contacting patients at the LUMC it was more difficult than anticipated to reach out to MI Box users. This resulted in a change in strategy to contact patients and a delay in research activities.

Besides, due to the fact that the client of this thesis has a tight working schedule, only a few contact moments were possible throughout this thesis. Working with an occupied client can be challenging as risks of miscommunication are increased. Namely,

in an iterative design process, a lot of changes happen. Although these changes are communicated and discussed as much as possible throughout this thesis, the little time availability of the client still caused moments of confusement. Furthermore, the wishes of the client are always important to satisfy. When there are few contact moments, it is needed to make decisions without the input of the client. Luckily, the client has shown appreciation for the work delivered in this thesis.

## 16.2. Biggest Learning Points

Although the preferred communication manners towards the LUMC are asked before the start of my thesis, I have learned a lot throughout my thesis about approaching hospital stakeholders. Namely, my enthusiasm around the thesis project has been a bit overwhelming for these stakeholders. As I (of course) never had bad intentions with my enthusiasm, I have learned how to use my enthusiasm in a more formal manner.

Secondly, I learned more about how to combine a scientific research approach with

an iterative design approach. It is especially valuable to strictly document the research questions you are tackling and also document when these questions change and why.

Thirdly, I have learned more about Metro Mapping and SDM. These were new topics for me and I feel lucky I had the chance to get more comfortable around them before the end of my master’s degree.

Lastly, I learned more about how to compose co-creation sessions that involve elderly.

Namely, as mentioned in the limitations, it can be difficult for elderly to see the broader context of a digital concept. With the

knowledge gained from this experience, I feel confident I know how to compose a more suitable co-creation session for elderly.

## 16.3. If I can do it all over again I would...

**... use the sensitize booklets in a different manner.**

As the original research plan of this thesis was to only interview MI Box users, the sensitize booklets were made for these users while waiting for the approval to recruit them. However, due to the difficulties around this recruitment, only two MI Box users received the sensitize booklet. Therefore, if I could do it all over again, I would have made the sensitize booklets more general so they could have been used by MI Box users as well as other MI patients.

**... have approached LUMC stakeholders in a different manner.**

As explained in my learnings, I would have used my enthusiasm in a more formal manner to avoid stakeholders being overwhelmed.

**... documented my research questions more strictly.**

Although I already tried to write down the research questions as much as possible, I now have a better idea about the importance of this documentation. As a design process is iterative, it is logical the research questions also change a bit throughout the process. If I can do it over again, I would have ensured that I strictly documented these changes. Namely, this would have made the writing of my thesis (in a scientific manner) easier.

## 16.4. If I had extra time I would have...

... involved more MI Box users in the process to get a better understanding of how the MI Box is implemented in their home context.

More importantly, I would have liked to perform user tests. Performing user tests is one of my personal strengths. Although I

tried to show this strength in the co-creation sessions, I still would have liked to employ user tests with MI Box patients. Also, as designers are rarely the target group, I think user tests with the actual users are crucial to check if your design and intended interaction is suitable. During user tests I always like to be wrong as mistakes in the design help me to get a better understanding of my target audience.

## 16.5. The last thing I would like to mention is...

Something I am passionate about is trying to make an impact on the digitalisation of care by designing new interactions. Therefore, it has been a pleasure and honour to work on this thesis assignment as it already offered me the chance to make this impact. In the future, I am motivated to use my enthusiasm, although in a formal manner, to further pursue this passion.



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0. Original Graduation Brief

DESIGN  
FOR our  
future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according to the format "IDE Master Graduation Project Brief\_familyname\_firstname\_studentnumber\_dd-mm-yyyy". Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name

de Haan

initials

J.J.

given name

Jolijn

student number

4646010

street & no.

zipcode & city

country

phone

email

Your master programme (only select the options that apply to you):

IDE master(s):

☐ IPD

☒ Dfl

☐ SPD

2<sup>nd</sup> non-IDE master:

individual programme:

- - (give date of approval)

honours programme:

☐ Honours Programme Master

specialisation / annotation:

☒ Medisign

☐ Tech. in Sustainable Design

☐ Entrepreneurship

SUPERVISORY TEAM \*\*

Fill in the required data for the supervisory team members. Please check the instructions on the right !

\*\* chair

Judith Rietjens

dept. / section:

DOS

\*\* mentor

Hosana Morales Ornelas

dept. / section:

SDE

2<sup>nd</sup> mentor

Rémon van den Bergh

organisation:

Online Department

city:

Rotterdam

country:

The Netherlands

comments (optional)

:

:

:

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v.

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30

Page 1 of 7

Procedural Checks - IDE Master Graduation

TU Delft

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair

Judith Rietjens

date

21 - feb - 2023

signature

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total:

30

EC

Of which, taking the conditional requirements into account, can be part of the exam programme

30

EC

List of electives obtained before the third semester without approval of the BoE

☒ YES

all 1<sup>st</sup> year master courses passed

☐ NO

missing 1<sup>st</sup> year master courses are:

name

Robin den Braber

date

23 - 02 - 2023

signature

Rob  
in  
den  
Braber

Digitaal ondertekend door Robin den Braber  
Datum: 2023.02.23 15:27:53 +01:00

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked \*\*. Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?

Is the level of the project challenging enough for a MSc IDE graduating student?

Is the project expected to be doable within 100 working days/20 weeks ?

Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content:

☒ APPROVED

☐ NOT APPROVED

Procedure:

☒ APPROVED

☐ NOT APPROVED

- also approved for Medisign

- signature chair is missing

comments

name

Monique von Morgen

date

06 - 03 - 2023

signature

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30

Page 2 of 7

Initials & Name

J.J. de Haan

Student number

4646010

Title of Project

Influence of the context on Shared Decision Making in digital care



Influence of the context on Shared Decision Making in digital care project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 16 - 02 - 2023 14 - 07 - 2023 end date

INTRODUCTION \*\*

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Cardiovascular Disease  
Cardiovascular disease (CVD) is the leading cause of death worldwide (Cardiovascular Diseases, 2019). While a person's susceptibility to CVD can be caused because it runs in the family, the lifestyle and health behaviors of a person have a bigger influence on risk for CVD (Haskell, 2003). Factors that can increase the risk of CVD are: high blood pressure (stress), high low-density lipoprotein (LDL) cholesterol, diabetes, smoking and secondhand smoke exposure, obesity, unhealthy diet, and physical inactivity (Heart Disease and Stroke | CDC, n.d.). Therefore, lifestyle change for these people can lower the risk for myocardial infarction (MI).

Digital Care: The Box  
Digital care has gained recognition in the past decade because of its potential to save time, and therefore, release some pressure from the health care system which is pressured by the big amount of CVD cases (Kaushik et al., 2020). With this in mind Leiden University Medical Center (LUMC) has developed a concept called "The Box" where they lend self-monitoring devices to patients who have had a myocardial infarction (MI) or who are at risk for having a myocardial infarction (The Box, 2021). These devices are able to track step count, weight, blood pressure and pulse. The main purpose of this is for doctors to remotely be able to track the patients' vital parameters and invite them for an online appointment if they see that the parameters are reaching a certain threshold. Currently, there is potential of using this concept for more than only remote monitoring of patients as self-monitoring (if used in a sufficient manner) can increase self-regulation and patient empowerment (Suls et al., 2019).

Shared decision making  
Patient empowerment is important for shared decision-making (SDM). SDM is the process in which a doctor and a patient jointly make a health decision. SDM, has been recommended as a key feature of good clinical care by the World Health Organization as it enhances patient autonomy (Butterworth & Campbell, 2014). In SDM the patient's values and preferences are considered (Kambhampati et al., 2016). This consideration is important as the care and lifestyle plans suggested by clinicians of The MI Box must be implemented by the patient. Therefore, to make sure this implementation will go successfully, it is needed that the care is minimally disrupting the patients life and their interactions with their family and social context (Kunneman et al., 2021). In other words: context is important to acknowledge in SDM.

Metro Mapping  
Metro Mapping is a tool that can be used to map out how shared decision making is influenced by the care path, information streams, the environment, the patient, and their care community (Metro Mapping, n.d.). This tool will be a starting point to improve the care path of a patient so it will be more suitable for that certain patient. It is a tool that is developed, as an initiative of Ingeborg Griffioen, to support shared decision making in oncology (Metro Mapping, n.d.). Because it has shown great potential there is interest in elaborating the use of this tool into other care paths like the care paths of CVD patients and digital care paths.

Project Stakeholders  
During this project different stakeholders are involved: LUMC (The Box), Online Department, and TU Delft. How the network of stakeholders is built up is explained in Figure 1.

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introduction (continued): space for images

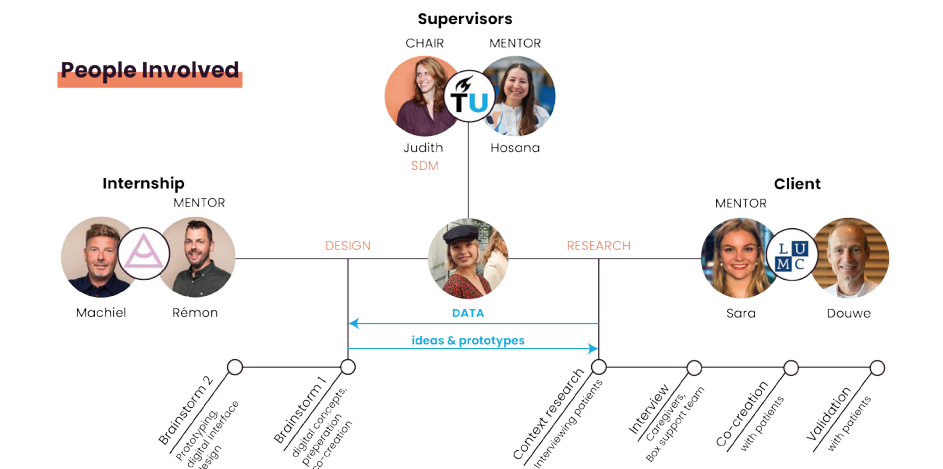


image / figure 1: Project Stakeholders

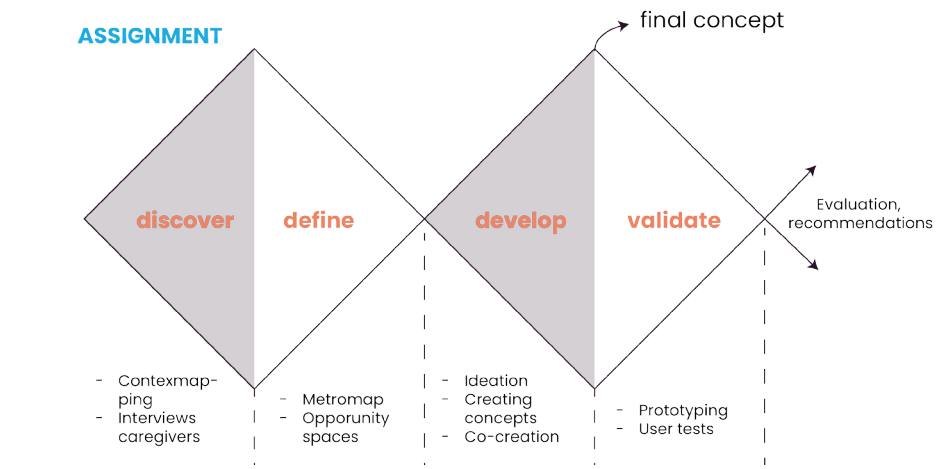


image / figure 2: Assignment Process

PROBLEM DEFINITION \*\*

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

Digital health innovations, like the MI Box, face challenges in involving the family and social context of the patient (Shen et al., 2021). This makes it also more difficult to consider the family and the social context of patients during decision making moments in the care path. However, as mentioned in the introduction, the context is important to acknowledge in SDM. Moreover, research has shown that trust and empathy are needed for SDM (Lown et al., 2009). Empathy can increase by understanding the context of a patient (Klapwijk & Van Doorn, 2014). Currently, little is known about the patient's context during the use of The MI Box. In a previous graduation project of Julian Houwen the support of patients' loved ones was researched. However, as this research focused solely on the support of the partner, still little is known about other factors from the patient's context that are involved during the use of The MI Box. This is also because the focus on shared-decision making is lacking behind in the current Box used by CVD patients. Therefore, more insights in the role of the patient's context in these decision making moments, and how we are able to increase SDM by acknowledging and leveraging the role of this context, is needed.

LITERATURE  
The reference list can be found via this google drive link:  
[https://docs.google.com/document/d/17Wt50sCcpH0s9g3sRHNTHC-6hrgfYx0m9fYUR\\_RalBY/edit?usp=sharing](https://docs.google.com/document/d/17Wt50sCcpH0s9g3sRHNTHC-6hrgfYx0m9fYUR_RalBY/edit?usp=sharing)

ASSIGNMENT \*\*

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... . In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

A context mapping research will be performed alongside interviews with healthcare professionals and Box specialists. By means of Metro Mapping this data will be synthesized and evaluated to define opportunity spaces that aim to make patients feel more empowered during SDM moments in the care path of The MI Box. The data evaluation, together with co-creation and validation sessions, will be used to compose design interventions for the application of The MI Box.

The process of how this assignment is build up can be explained by using the double diamond. This is visualized in Figure 2.

The research activities depicted in this assignment aim to answer certain research questions. In the first diamond of Figure 2, the following research questions are asked:

- What factors of the context of a patient influence SDM? And how?
- What factors are already considered by healthcare professionals? And how?

These answers are tried to be answered by performing context mapping activities and interviews with healthcare professionals and Box specialists. Moreover, Metro Mapping is used as a tool to evaluate the SDM by means of the data retrieved from these first research activities.

In the second diamond of Figure 2, the following research question is asked:

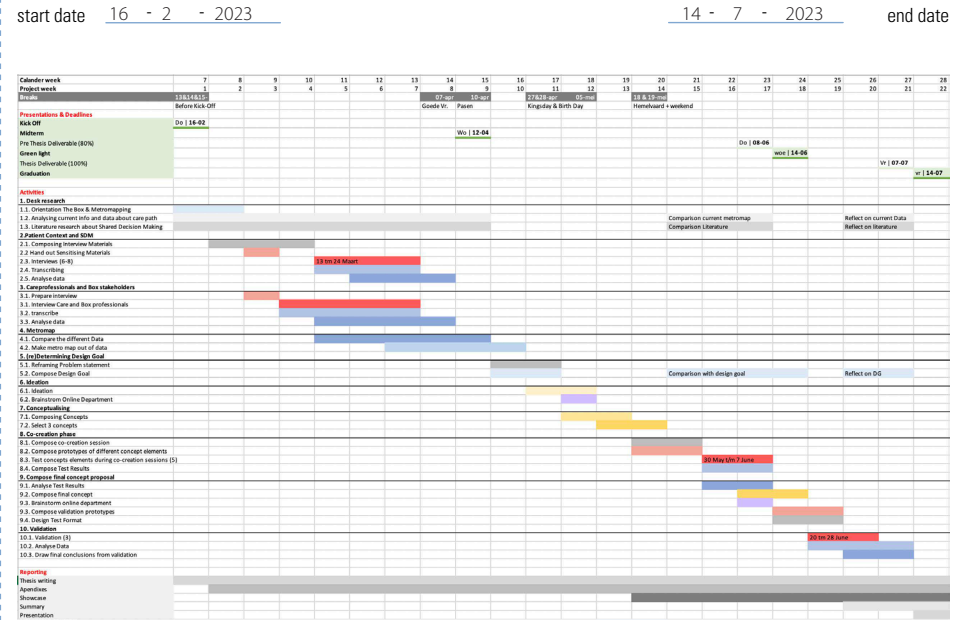
- What kind of design interventions are needed to increase patient empowerment during SDM?

The envisioned results for this graduation project are:

1. A Metro Map that informs about SDM moments and the influence of the context.
2. Digital design interventions for the current MI Box applications.

PLANNING AND APPROACH \*\*

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.



As research inside a hospital is challenging because of the sensitivity of reaching for patients and the workload of care professionals, the planning of research activities should be flexible to move along with the availability of participants. Therefore, in the planning you can see different research activities happening at the same time, as this will give space to choose (based on the participants availability) what activities should be performed first. Moreover, since both activities are part of the discovery phase (see Figure 2) of my project, there can be flexibility in when these activities take place in comparison to each other. The research activities are elaborately discussed with the LUMC and for the first research activities an HREC application is already sent, to avoid risks of delay due to unavailable research means.

As 10 vacation days are included in the planning, a total of 22 weeks is reserved in this project (100 days).

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... . Stick to no more than five ambitions.

- Contribute to the process of digitalisation of care.  
During my masters I found out I am passionate about 2 things: digital design and Medesign. Therefore, in this project I wanted to combine these two passions. Moreover, I dream about a career in which I will contribute to the digitalisation of care. With this project I hope to make the first steps in this contribution. I hope in this project to already design new interactions that can be implemented in digital care. During my masters I really did great on the course "Exploring Interactions", which is why I want to use this competence in exploring new interactions with digital care systems.
- Get a better understanding about shared decision making (SDM) in care.  
I did know some things about the term "shared decision making", however, I never got the chance to do a project that would have a great focus on this. Since I know SDM is gaining more and more acknowledgement, I feel it is valuable to learn more about this as it can also help me in the contribution to digitalisation of care. Furthermore, I am also excited to see a bigger focus on SDM as it also shows the increasing interest in patient centred design. During my graduation I hope to also show to LUMC how valuable patient centred design can be and inspire them to focus more on this in further developments of The Box.
- Learn about the expertise in digital design from Online Department.  
As mentioned before, I have a passion for digital design. However, during my masters I couldn't fully explore this passion yet. Therefore, I hope to learn more about it by doing an internship at Online Department. As they are a digital design agency, I am excited to learn from their expertise. Moreover, I already know Online Department for a long time and really like the things they do. Therefore, I am also eager to learn more about how it would be to work at their company as a means to explore career possibilities for after my graduation.
- Get more familiar with the metro mapping tool and look how we can broaden the use of this tool.  
During my education I have always liked to work with design methodologies. This is also why I am always eager to learn more about methodologies. Moreover, I always seek ways to use methodologies in a personalised manner. Therefore, I am excited to help with the further development of the metro mapping tool.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

A. Sensitize Booklet



Sensitize booklet, page 1

Leuk je te ontmoeten! Ik ben **Jolijn de Haan!**



### Dank voor uw deelname!

Met dit onderzoek willen we graag meer leren over de context waarin De Box gebruikt wordt. We zijn daarbij benieuwd naar de keuzes en veranderingen die door het infarct hebben moeten plaatsvinden. Het betrekken van uw perspectief is hierbij noodzakelijk. Immers, als ervaringsdeskundige op het gebied van uw context, ziekte en Box-gebruik kunnen wij erg veel van u leren.

Met behulp van dit boekje willen we u en onszelf voorbereiden op het interview dat binnenkort gaat plaatsvinden.

Graag willen we u vragen dit boekje in te vullen en uiterlijk **1 dag voor het interview op te sturen** naar:

J.J.deHaan

Dit onderzoek komt voort uit een samenwerking tussen LUMC, TU Delft en Online Department. Het onderzoek wordt uitgevoerd door Jolijn de Haan (TU Delft) en Sara Hondmann (LUMC).

De uitkomsten van dit onderzoek worden gebruikt om de zorg met betrekking tot De Box te verbeteren en te kijken hoe de gebruiker meer ondersteund kan worden tijdens beslissingen doormiddel van de LUMC-care app. Bovendien is dit onderzoek onderdeel van het afstudeerproject van Jolijn de Haan en is ze u daarom extra dankbaar voor uw deelname!

**ONLINE**  
DEPARTMENT  
DIGITAL HEALTH INNOVATION



**THE BOX**  
THE BOX FOR DIGITAL HEALTH INNOVATION



Sensitize booklet, page 2

### Contactinformatie

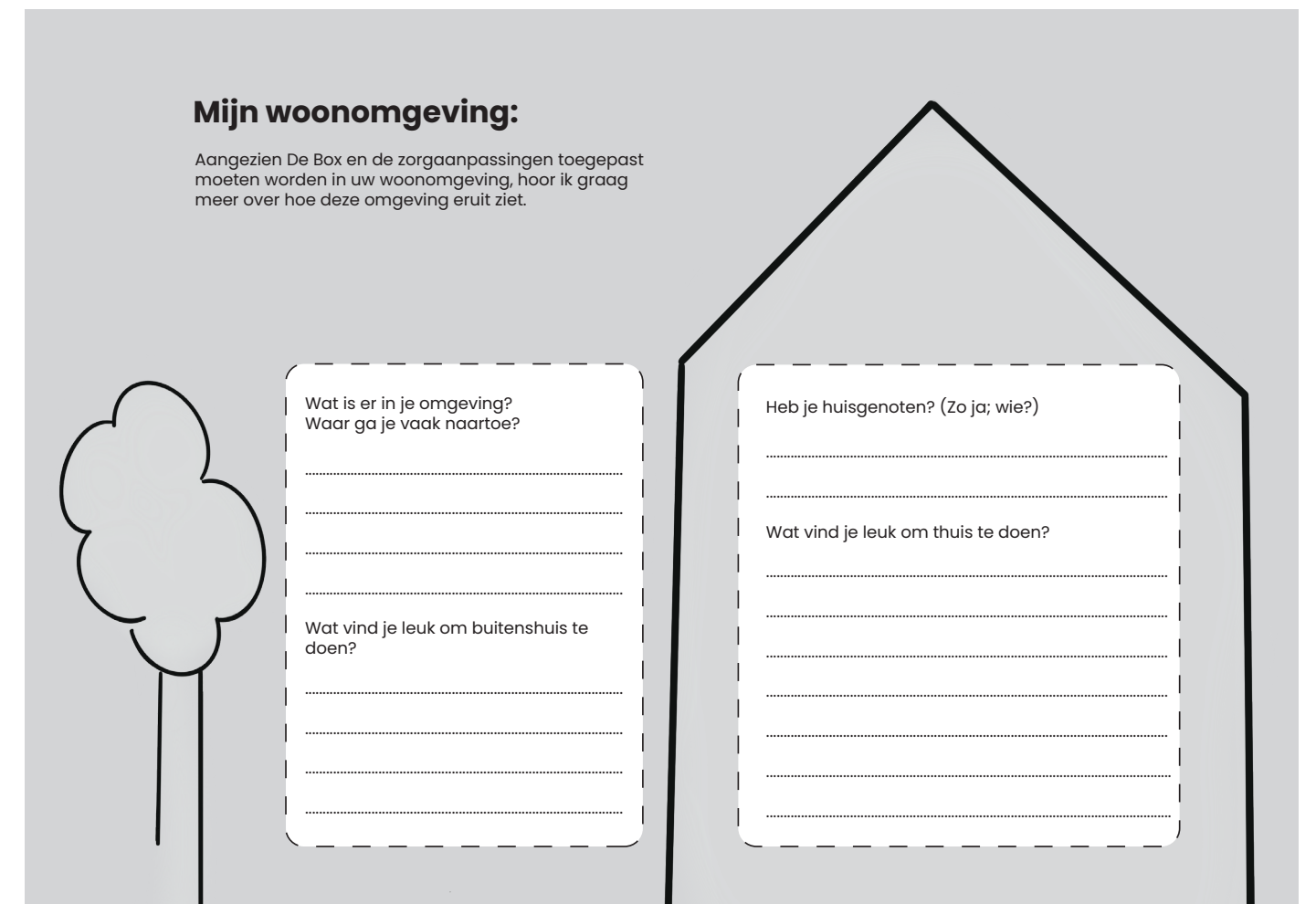
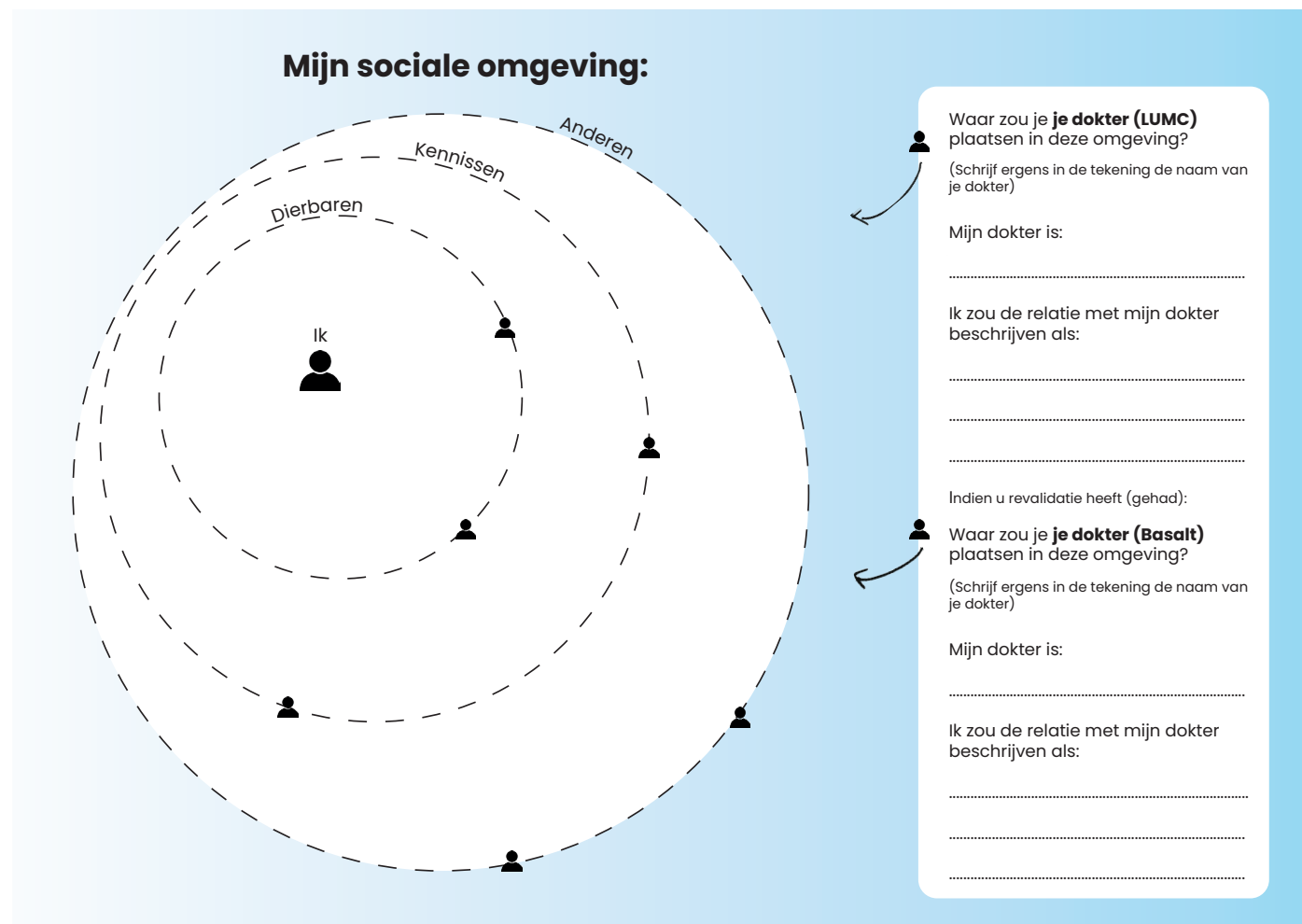
Jolijn de Haan  
Technische Universiteit Delft (TU Delft)  
Master Design for Interaction

Sara Hondmann  
Leids Universitair Medisch Centrum (LUMC)  
Hart Long Centrum  
Albinusdreef 2 2333 ZA Leiden

Namens Prof. Dr. Douwe Atsma en het Boxonderzoeksteam

Sensitize booklet, page 3





Dit waren mijn  
zorgstappen:

Infarct

Introductie van De Box

Naar huis

|                                     |                                                                                                  |                                                                                                  |                                                                                                  |
|-------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Beschrijving van de<br>gebeurtenis: | Wat gebeurde er tijdens het incident?                                                            | Wanneer / hoe werd De Box geïntroduceerd?<br>Was er iemand anders bij u?                         | Wat was het eerste dat u deed toen u thuis kwam?                                                 |
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Sensitize booklet, page 6

Eerste periode thuis

Revalidatie

Online consult

|                                                                                                  |                                                                                                  |                                                                                                  |                                     |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------|
| Hoe heeft u de dagen na thuiskomst ervaren?                                                      | Indien u revalidatie heeft (gehad):<br>Wanneer / hoe begon de revalidatie?                       | Hoe heeft u het eerste online consult ervaren?<br>Wat werd er besproken?                         | Beschrijving van de<br>gebeurtenis: |
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Sensitize booklet, page 7

# Mijn medicatie

Medicatie:



Tijd(en) inname(s):

Medicatie:



Tijd(en) inname(s):

Medicatie:



Tijd(en) inname(s):

Medicatie:



Tijd(en) inname(s):

Kruis een rondje op de schalen aan:

Ik snap wat dit medicijn doet:

Nee geen idee

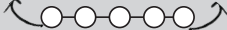
Ja helemaal



Ik ken de andere opties voor dit medicijn:

Nee geen idee

Ja helemaal



Wat vind je van dit medicijn?

Kruis een rondje op de schalen aan:

Ik snap wat dit medicijn doet:

Nee geen idee

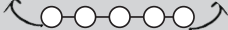
Ja helemaal



Ik ken de andere opties voor dit medicijn:

Nee geen idee

Ja helemaal



Wat vind je van dit medicijn?

Kruis een rondje op de schalen aan:

Ik snap wat dit medicijn doet:

Nee geen idee

Ja helemaal



Ik ken de andere opties voor dit medicijn:

Nee geen idee

Ja helemaal



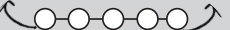
Wat vind je van dit medicijn?

Kruis een rondje op de schalen aan:

Ik snap wat dit medicijn doet:

Nee geen idee

Ja helemaal



Ik ken de andere opties voor dit medicijn:

Nee geen idee

Ja helemaal



Wat vind je van dit medicijn?

Ik maak beslissingen over mijn medicatie



Mijn dokter maakt beslissingen over mijn medicatie

## Mijn Box metingen

Tijdens het gebruik van De Box is er aan u gevraagd om metingen te doen.

Omdat ik benieuwd ben hoe deze metingen worden uitgevoerd in u thuis omgeving hoor ik daar graag meer over.

Tijdstip: .....



Wat doe je **na** de metingen?

.....

.....

.....

.....

.....

.....

**Kijk** je naar de metingen?

Kruis een rondje op de schaal aan:

Altijd ☐ ☐ ☐ ☐ ☐ Nooit

**Begrijp** je de metingen?

Kruis een rondje op de schaal aan:

Altijd ☐ ☐ ☐ ☐ ☐ Nooit

Is er een moment geweest dat je **trots** was op je metingen?

.....

.....

Is er een moment geweest dat je metingen **gek** waren?

.....

.....

Wat doe je **voor** de metingen?

.....

.....

.....

.....

.....

.....

**Hoe** doe je de metingen?

.....

.....

.....

.....

.....

.....

.....

.....

.....

Is er iemand in de buurt als je de metingen doet?

Kruis een antwoord aan:

☐ Nee    ☐ Soms    ☐ Ja

namelijk: .....

**Plaats van De Box in uw huis:**

.....

**Frequentie metingen:**

Ik meet ..... keer per .....  
(dag/week/maand)



### De impact van mijn infarct:



Hoe zou je je leven omschrijven **voor het infarct?**  
(activiteiten, hobbies, dromen, doelen, etc.)

.....

.....

.....

.....

.....

.....

.....

Wat zijn de grootste **veranderingen?**

.....

.....

.....

.....

.....

.....

.....

Hoe zou je je leven omschrijven **na het infarct?**  
(activiteiten, hobbies, dromen, doelen, etc.)

.....

.....

.....

.....

.....

.....

.....

### Mijn dagelijkse activiteiten:

Hoe ziet een alledaags dag er bij u uit?

Opstaan



Tijd: .....

.....

.....

.....

.....

.....

.....

.....

Slapen

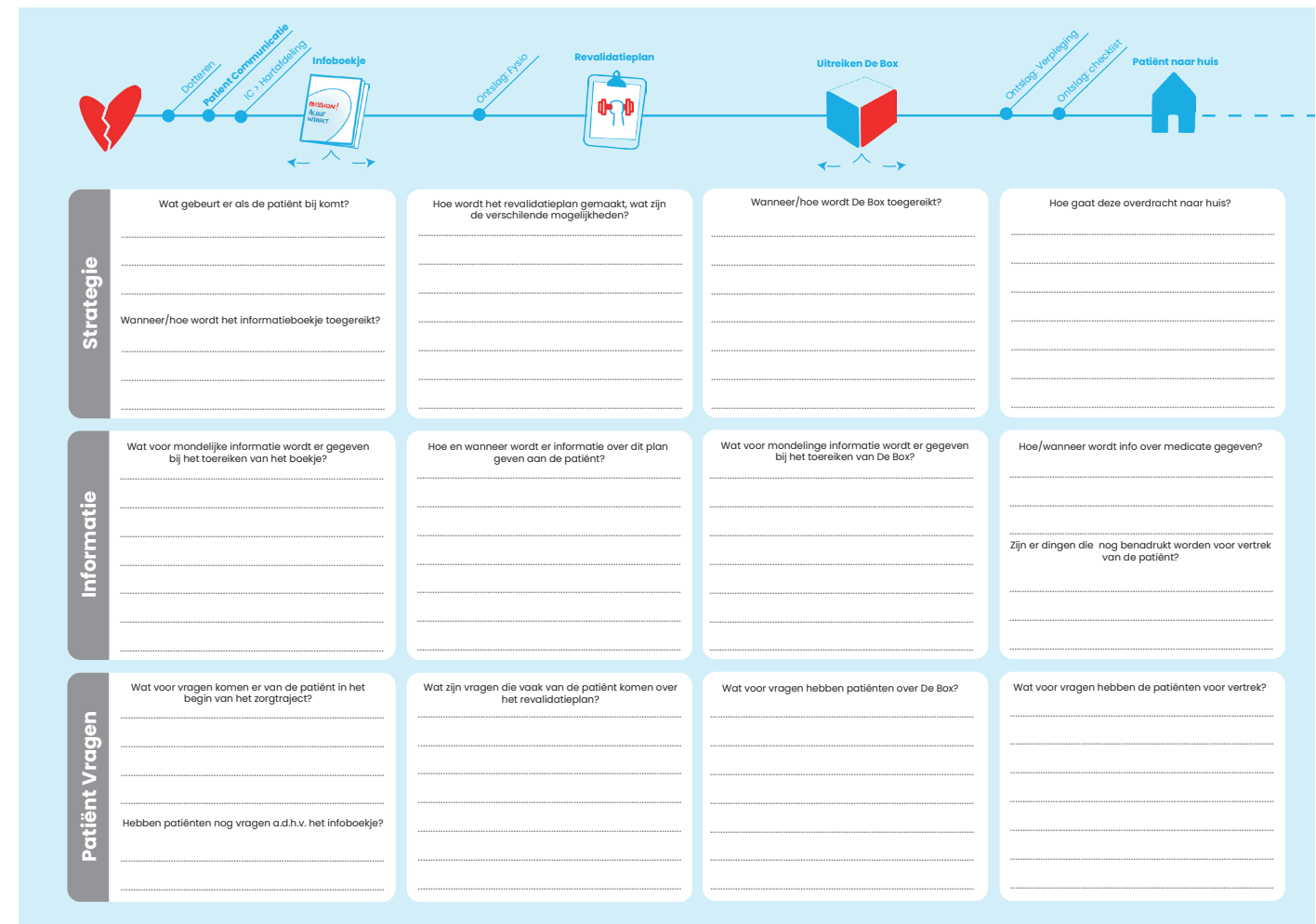


Tijd: .....

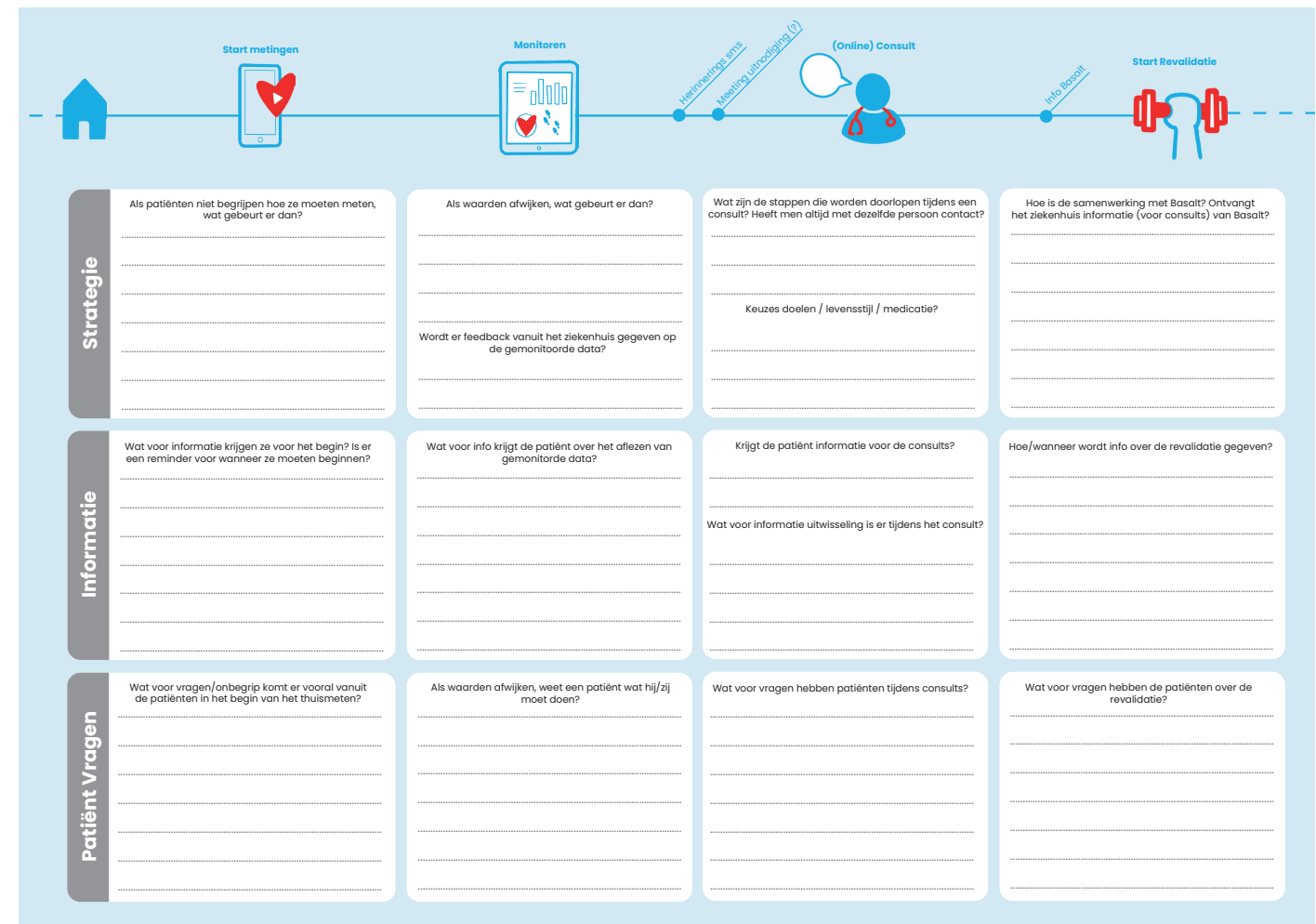
[illegible]



B. Timeline Templates



LUMC timeline 1/2



LUMC timeline 2/2

### C. Stakeholder Map Templates

|                                 | <br>Intake                                                                                                      | <br>Revalidatiedoelen opstellen                                                                                                       | <br>Revalidatie programma                                                          | <br>Tussentijds overleg                                                                                                                                                                                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategie</b>                | Betrekken van de omgeving en wensen van de patiënt?<br><br><br><br><br><br><br><br>                             | Hoe worden de doelen opgesteld?<br>•————•————•<br>Advies arts      Samen beslissen      Keuze patiënt<br><br><br><br><br><br><br><br> | Hoe vaak moet men naar Basalt komen?<br><br><br><br><br><br><br><br>               | Hoe is de samenwerking met LUMC?<br><br><br><br><br><br><br><br>Hoe wordt de patiënt betrokken bij dit gesprek?<br>Hoe worden de beslissingen gedeelt met de patiënt?<br>•————•————•<br>Advies arts      Samen beslissen      Keuze patiënt<br><br><br><br><br><br><br><br> |
| <b>Informatie</b>               | <br><br><br><br><br><br><br>                                                                                    | <br><br><br><br><br><br><br>                                                                                                          | <br><br><br><br><br><br><br>                                                       | <br><br><br><br><br><br><br>                                                                                                                                                                                                                                                |
| <b>Betrokkenen</b>              | <br><br><br><br><br><br><br>Famile / vrienden?                                                                  | <br><br><br><br><br><br><br>Famile / vrienden?                                                                                        | <br><br><br><br><br><br><br>Arts?   Andere revaliderende patiënten?                | <br><br><br><br><br><br><br>                                                                                                                                                                                                                                                |
| <b>Patiënt Problemen/vragen</b> | Zien jullie angst bij de patiënt?<br>Wat voor vragen komen er vanaf de patiënt?<br><br><br><br><br><br><br><br> | Snappen patiënten waarom (levensstijl) aanpassingen moeten worden gedaan?<br><br><br><br><br><br><br><br>                             | Wat vinden patiënten het lastigst aan revalideren?<br><br><br><br><br><br><br><br> | Kunnen patiënten goed overweg met de gemonitorde data van De Box?<br><br><br><br><br><br><br><br>                                                                                                                                                                           |

### Basalt timeline

Familie en vrienden:

.....

.....

.....

.....

.....

Kennissen:

.....

.....

.....

Ziekenhuis:

.....

.....

.....

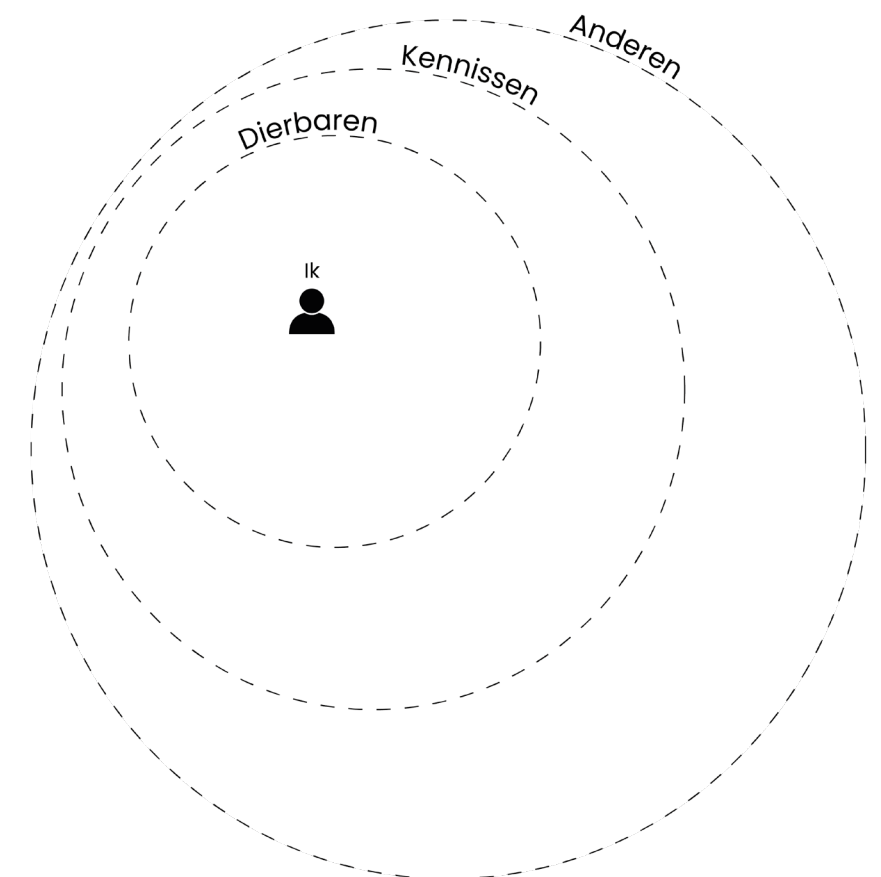
Anderen:

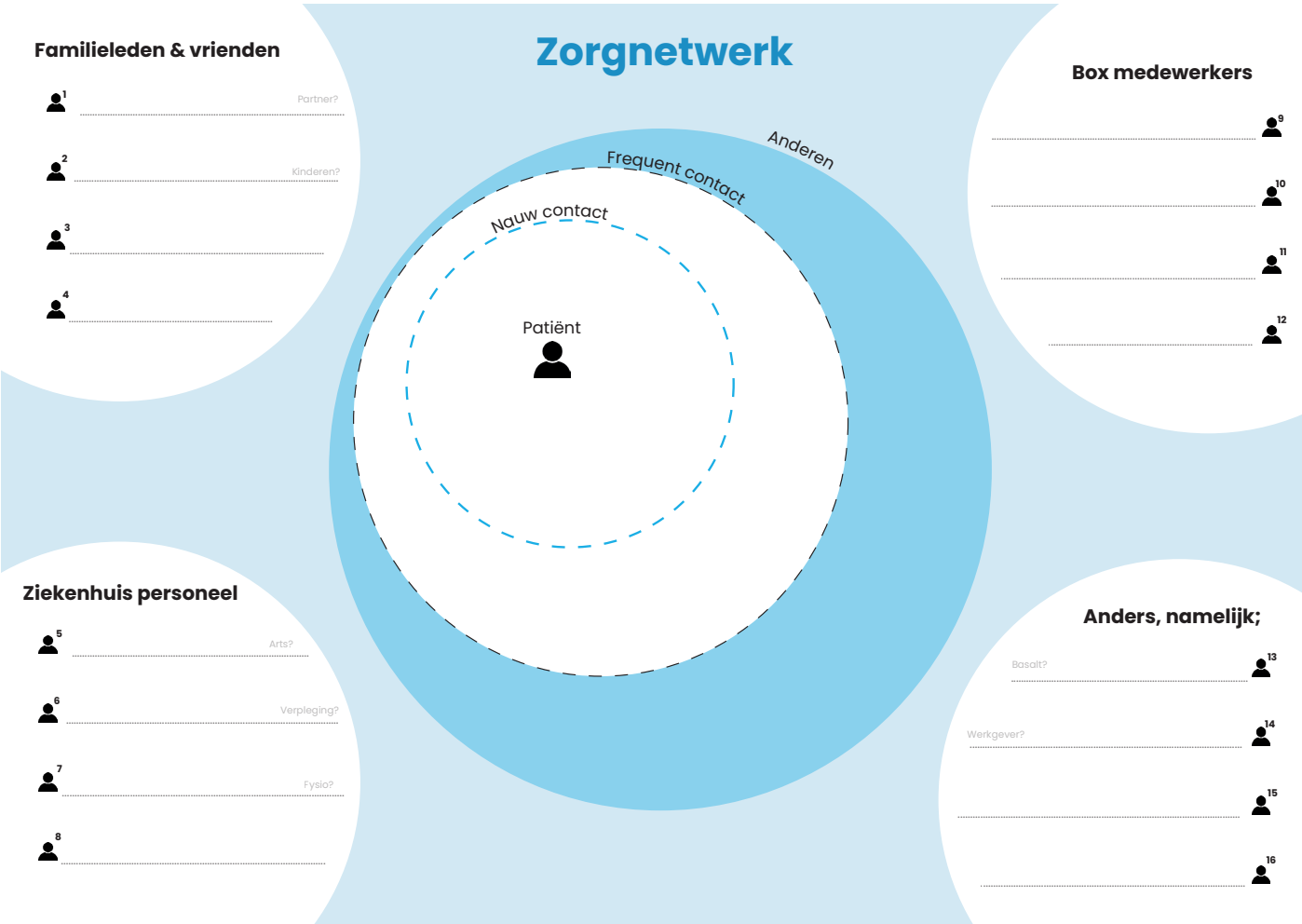
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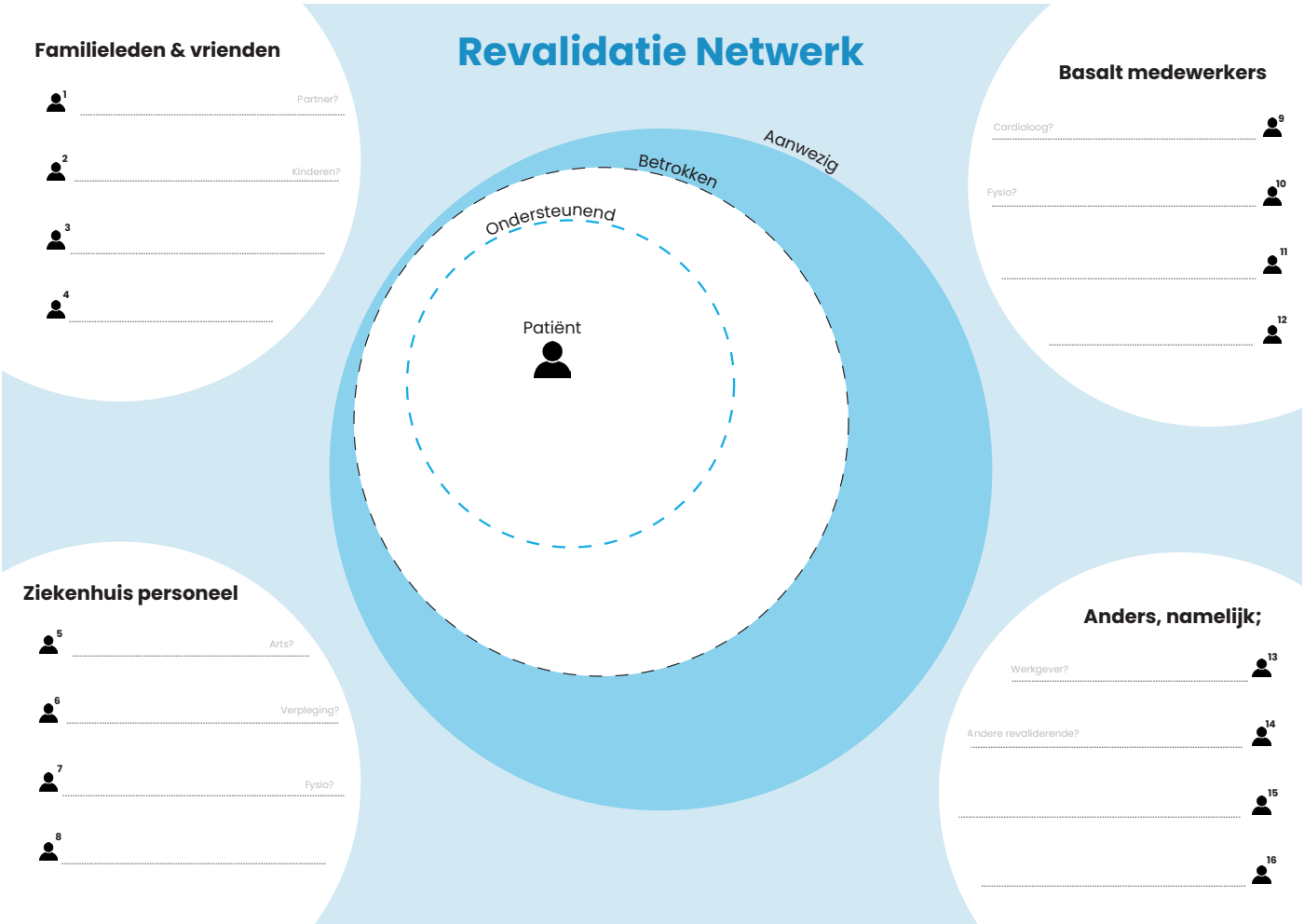
.....

*Stakeholder Map, MI patients*





Stakeholder Map, LUMC

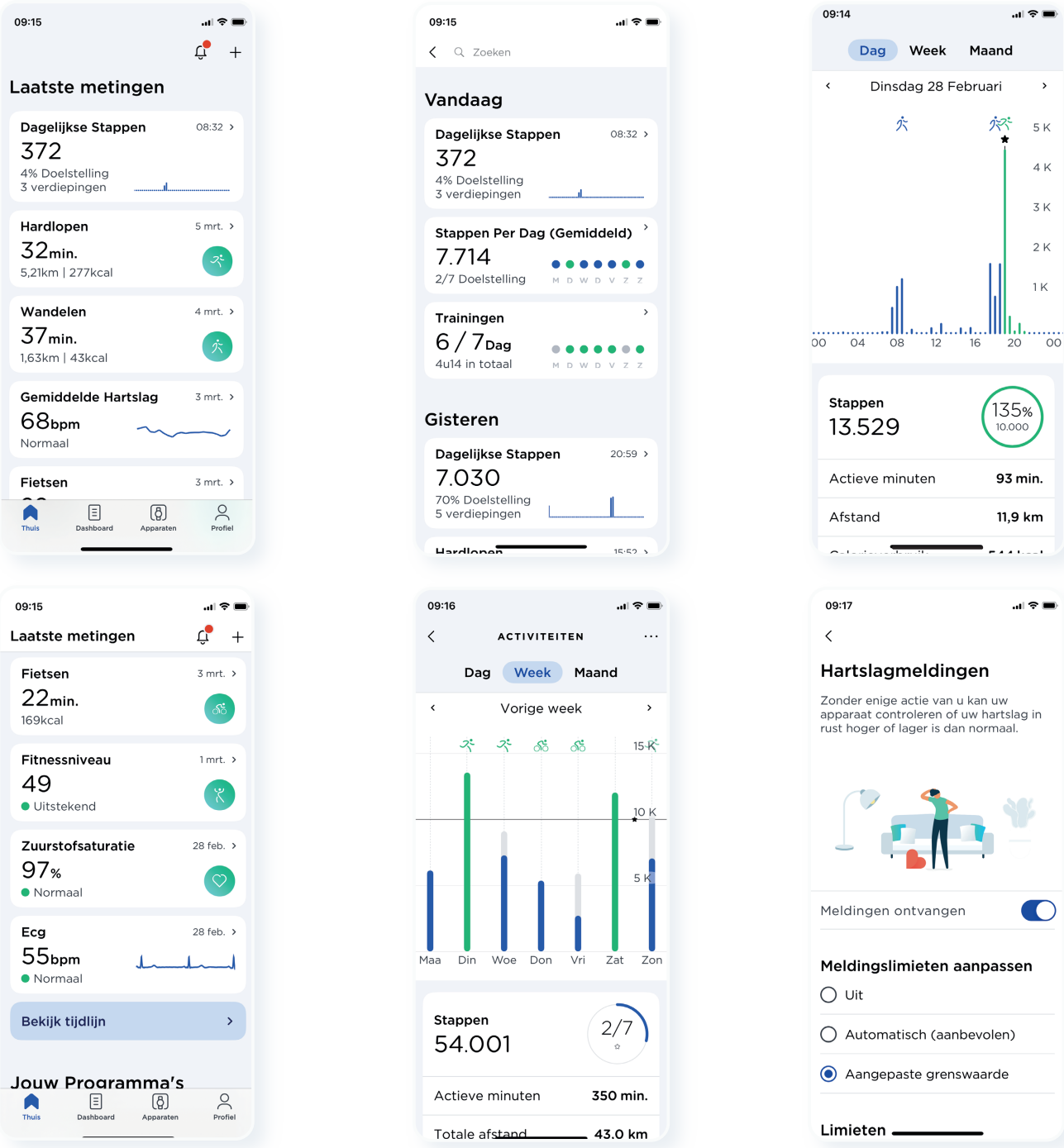


Stakeholder Map, Basalt

D. Difficulty Scale Template

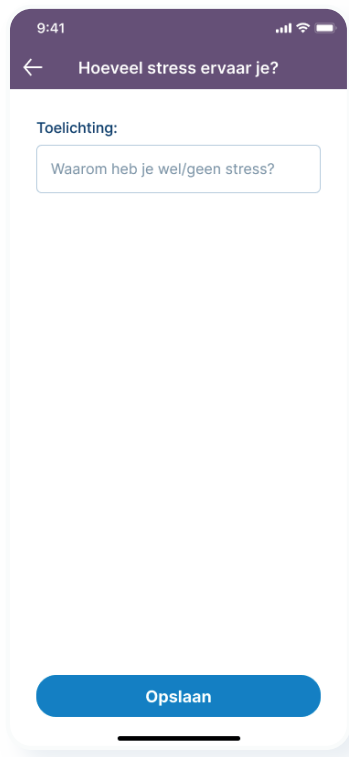
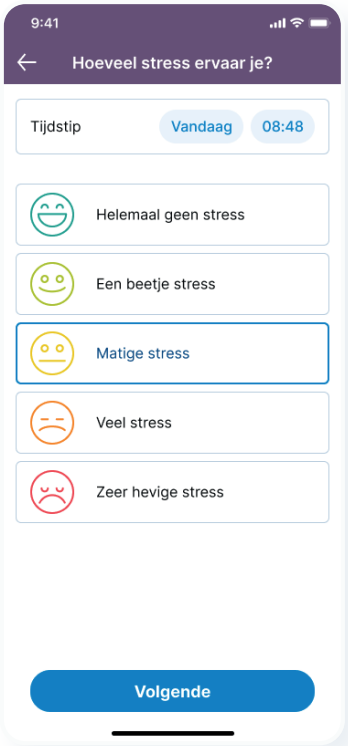
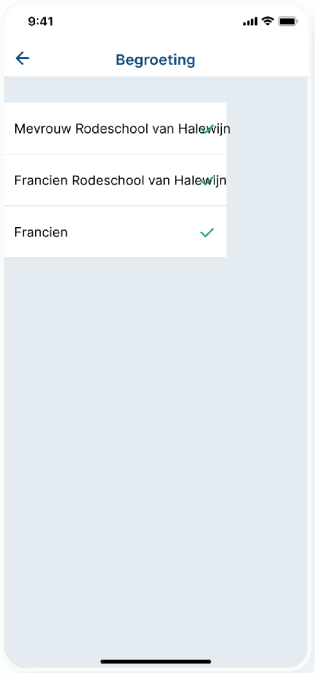
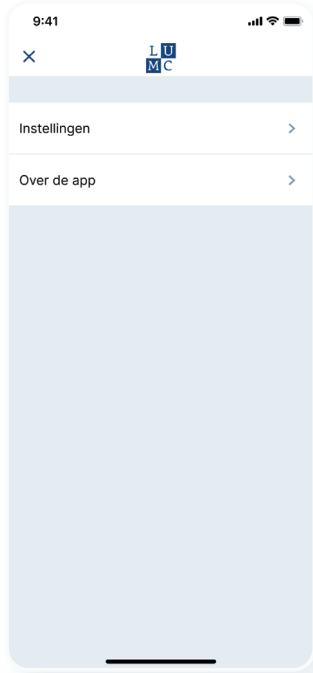
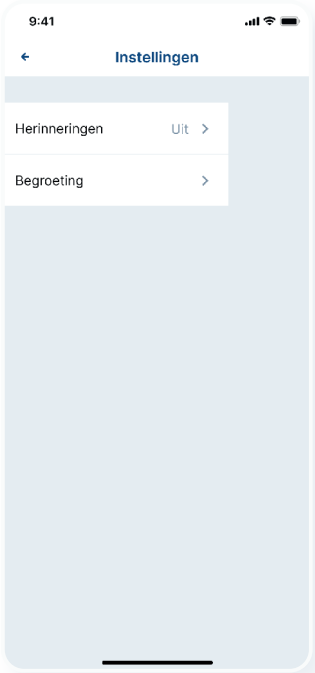


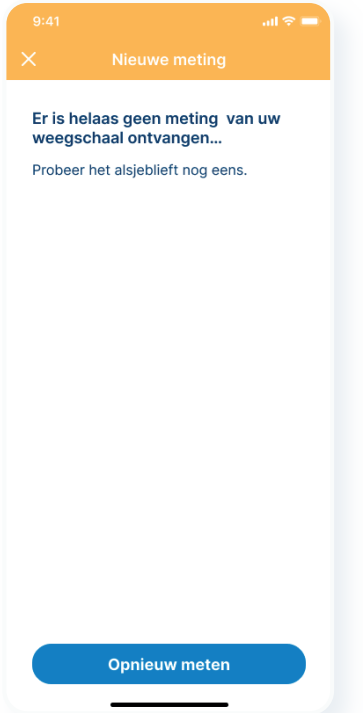
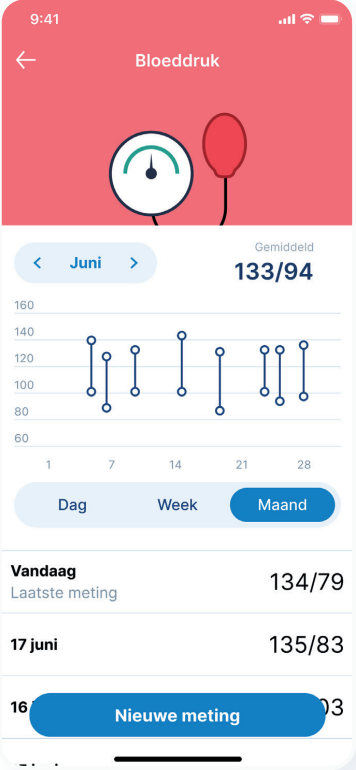
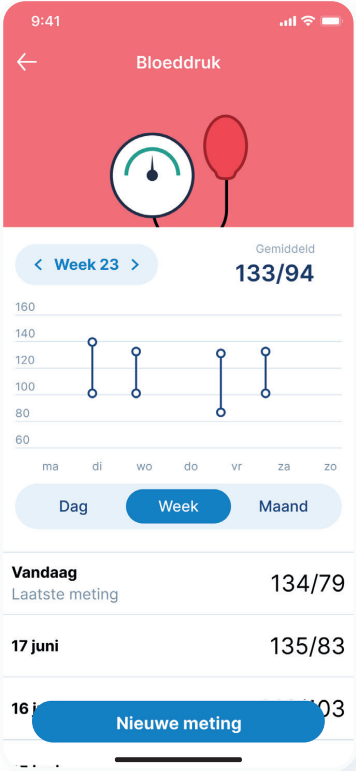
E. Withings Health Mate App

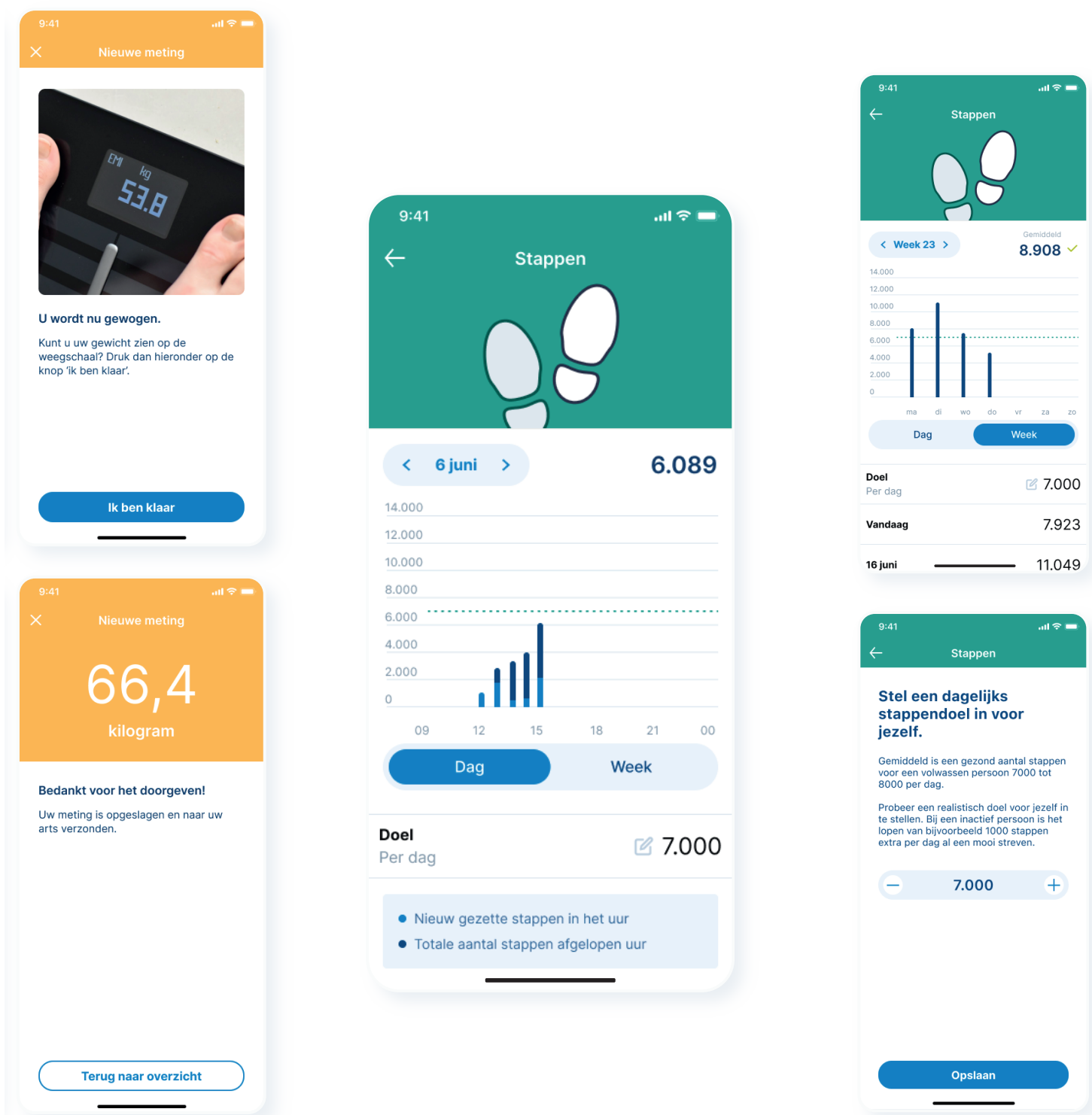




F. LUMC Care App







## G. Additional Patient Materials

### Mission booklet

The booklet consists of 37 pages and provides the following information:

- Information about a myocardial infarction;
- Summary of what happened during hospitalisation;
- Information about medication;
- In the booklet, a QR code can be found that refers to a movie about different types of medication. In Figure 71 the 8 medications that are mentioned in this movie can be found. Apart from that a written list of the medication is provided alongside an explanation of how it should be used;
- Short notion of the MI Box. The MI box is

only mentioned once in this booklet;

- Information about the consult appointments (see Figure 72).

|                        |                                                              |
|------------------------|--------------------------------------------------------------|
| <b>After 1 month</b>   | Digital consult                                              |
| <b>After 3 months</b>  | 24-hour ECG<br>Stress echo<br>Blood tests<br>Consult at LUMC |
| <b>After 6 months</b>  | Digital consult                                              |
| <b>After 12 months</b> | Echo<br>Blood tests<br>Consult at LUMC                       |

Figure 63: Consult appointments

| Function                | Name                                       | Action                                                                                     |
|-------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------|
| Anticoagulation         | Acetylsalicylic acid / carbasalate calcium | Inhibit the action of platelets; less clotting                                             |
| ACE inhibitor           | Perindopril                                | Lowers blood pressure, reduces decrease of heart function                                  |
| Beta blocker            | Metoprolol                                 | Decreasing heart beats; lower blood pressure and reduces risk of heart rhythm disturbances |
| Cholesterol lowering    | Atorvastatin                               | Reduced cholesterol, prevent the development of abnormalities in the blood vessel;         |
| Stomach protector       | Pantoprazole                               | Reducing stomach acid that can be caused by anticoagulants.                                |
| Anticoagulation (stent) | Clopidogrel / prasugrel                    | inhibits platelet activity; inhibits risk of clot in the stent                             |
| Emergency spray         | Nitroglycerin spray                        | dilates blood vessels; complaints such as pain in the chest are reduced                    |

Figure 62: Medication overview

- Information about rehabilitation;
- Information about lifestyle modifications;
- Information about psychosocial impacts;
- Short notion about symptom recognition;
- Practical information (driving, working, vacations, contact information).

**Manual**

A small manual is provided alongside the MI Box. This small manual already shows the instructions for the Health Mate app. The manual contains a QR code which refers the patients to a website with elaborate installation manuals of all different Boxes and some installation movies. It is noted several times, and really explicitly, that the MI Box is not a replacement for emergency care. Thus, patients are still responsible to monitor and call 112 when emergency symptoms arise.

**Patient issue form**

This form is given alongside the MI Box. It shows the frequency of measurements and the threshold values which are different per patient.

**H. Data Analysis**

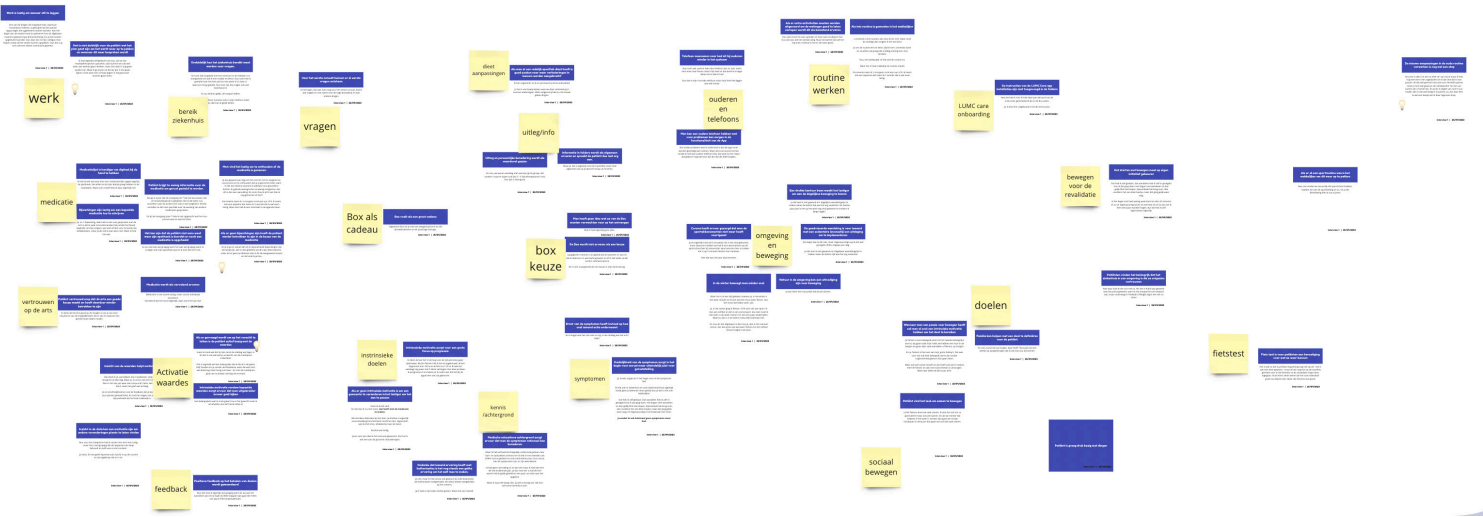
A Miro board is used for the data analysis. The Miro board can be found by scanning the QR code on the right or via the following link:  
[https://miro.com/app/board/uXjVM6eB7kl=/?share\\_link\\_id=240808022162](https://miro.com/app/board/uXjVM6eB7kl=/?share_link_id=240808022162)

The elements that can be found within this Miro board are shortly explained in this Appendix.



Figure 64: QR code to Miro board

Clustered interview statement cards

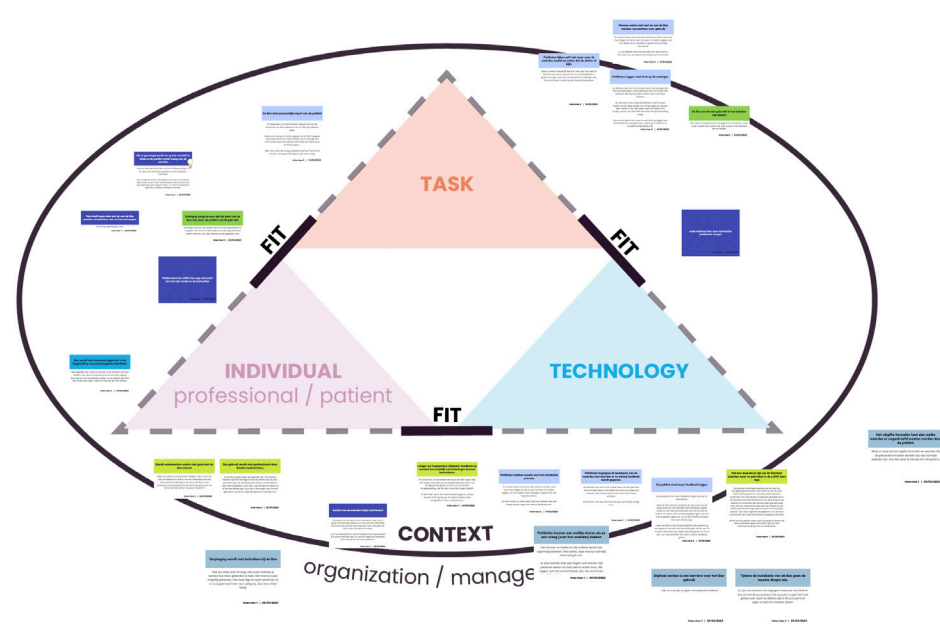




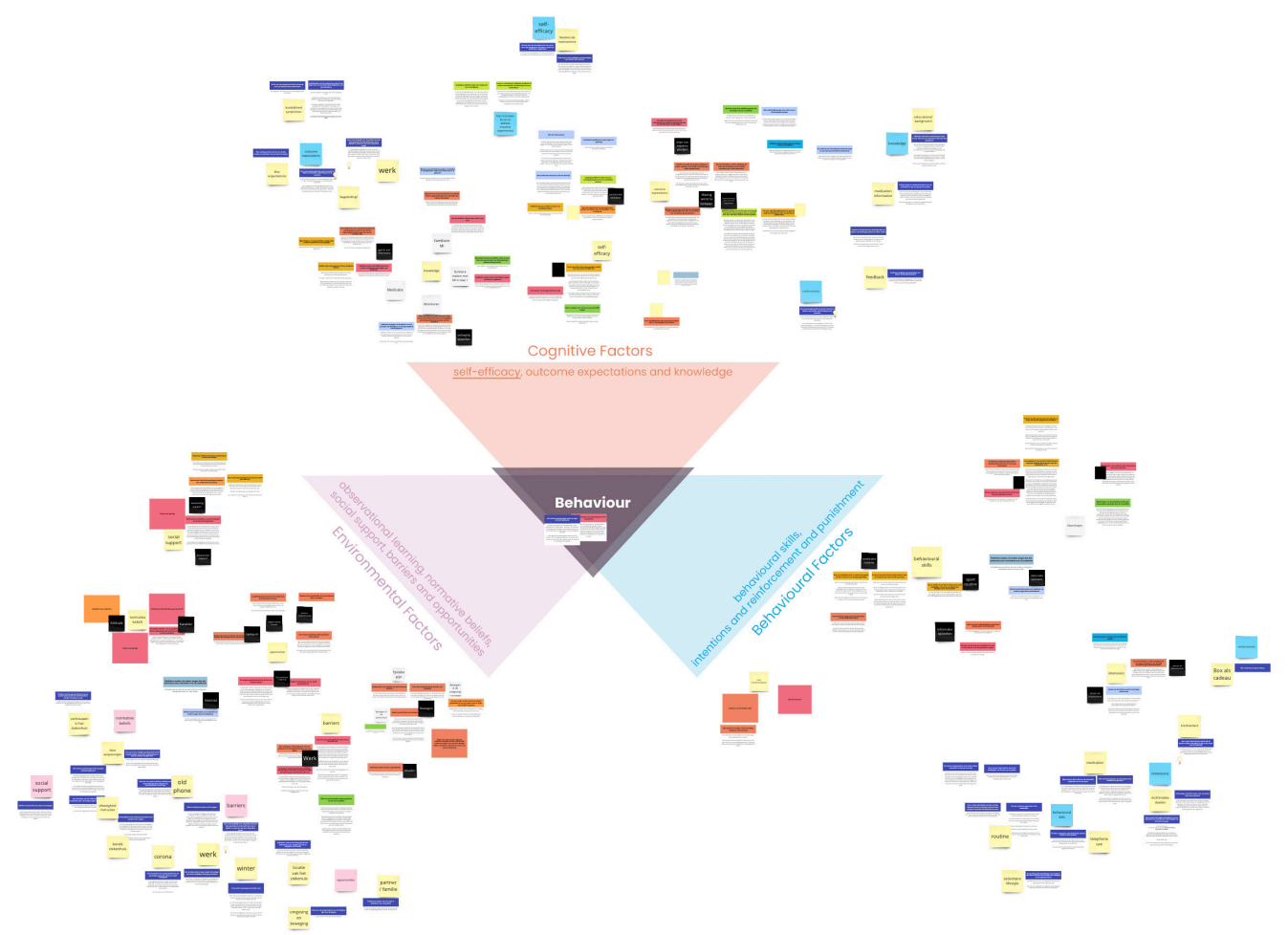
Clusters of the statement cards of all interviews



Statment cards placed next to the FITT Framework



Statement cards places next to the SCT model



Self-care elements evaluation with statement cards





I. Comparison After MI Patient Interview

| Overlapping insights HCPs                                                                                                | NEW                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Work is an important influencer on the behaviour of people during recovery.                                              | Employers can show little empathy for MI patients as they are more worried about the costs of their employee's illnesses.                                                                           |
| People have different beliefs about the medication and it is difficult for HCPs to cope with different beliefs.          | Patients fear that if they do not listen to the HCP it will decrease their health                                                                                                                   |
| Some people are more proactive and advanced in searching for extra information                                           | Implementation of the new medication routine is difficult. Extra means are needed to support the implementation of this new routine.                                                                |
| Familial MI patients need different information.                                                                         | Familial MI can act as a barrier for behavioural change as risk management seems less relevant for familial MI patients.                                                                            |
| Fear can be a barrier for patients to perform behavioural change as they first need to regain trust in their body again. | Fear can be a barrier for patients to perform behavioural change as they first need to regain trust in their body again.<br>The environment of a patient can be more or less inviting for movement. |
| The costs of a gym can be a barrier to move more.                                                                        | Patients have difficulty to distinguish cardiac symptoms from non-life threatening symptoms                                                                                                         |
| Emotional support comes after physical support.                                                                          | Side effects of the medication makes it more difficult to filter unimportant symptoms.                                                                                                              |
|                                                                                                                          | A clear action plan for recurring symptoms can be reassuring.                                                                                                                                       |

= Overlapping with literature

J. Comparison After MI Box User Interview

| Overlapping insights HCPs                                                           | Overlapping with other MI patients                            | NEW                                                                                                                                            |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Work is important context factor                                                    | Work is important context factor                              | Clear experienced symptoms during the MI can be reassuringly later in the recovery as a patient knows better what bodily signals to listen to. |
| The biking test shows a patient's ability and vitality which can work reassuringly. | Patients do not know what to expect around going back to work | The involvement of family members when rehabilitation goals are set can increase SDM.                                                          |
| Difficult to implement the new movement routine in the old working routine          | The weather can be inviting or demotivating to move.          | Working in a routine can cause easy implementation of measurements and medication intake.                                                      |
|                                                                                     | Side effects of the medication are difficult to grasp.        | Motivational messages and insights in data can work motivating.                                                                                |
|                                                                                     | Changes in (medication) routine can be difficult              | Trust in HCPs can cause less active search for extra info.                                                                                     |
|                                                                                     |                                                               | Giving assignments for monitoring can activate patients to actively look into their data.                                                      |
|                                                                                     |                                                               | The LUMC Care app is not known by the patient as it is not mentioned clearly in the manual.                                                    |

= Overlapping with literature

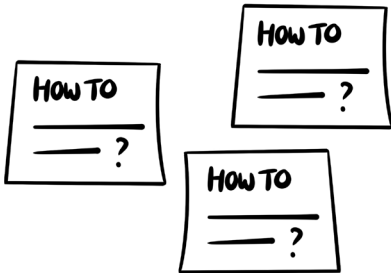
K. Ideation Session Format

Step 1: Present an Project Update

- Present some insights
- Present and explain problem statement
- Present and explain design goal
- Present and explain interaction vision
- Present and explain solution spaces

Step 2: Define HOW-TOs

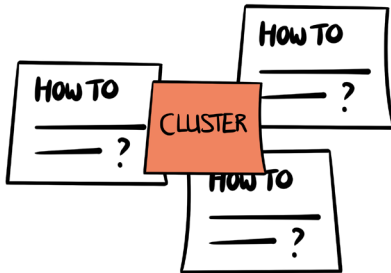
The HOW-TO method (Van Boeijen et al., 2014) is used to define questions about how to satisfy the defined opportunity spaces. The participants in the ideation got 8 min to write down as many questions they had in their minds.



Step 3: Cluster HOW-TOs

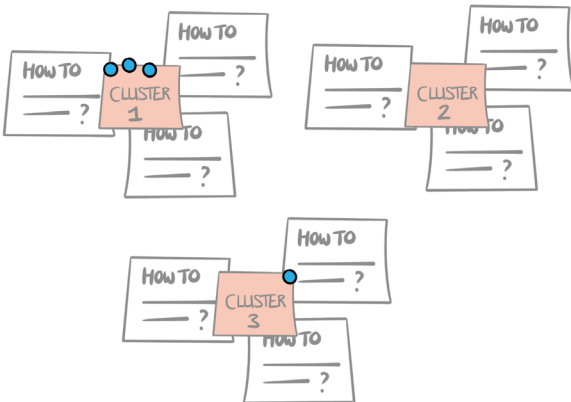
The different questions that were written down are clustered on the topic that the question is referring to. The clusters composed were: onboarding and timing, use throughout the process, measurement

communications, medication, and use of monitored values.



Step 4: Voting on Clusters

Dot stickers are used to let people vote on certain clusters that they found most interesting. Every participant was allowed to place 2 dots.



Step 5: Choosing Cluster Focus

Based on the number of clusters and the interest of exploration from the main researcher, a focus on two clusters is chosen. The chosen focus was on “onboarding and timing” and “use of monitored values.”

Step 6: Crazy 8

The participants were then asked to perform a “Crazy 8” activity in which they have to come up with 8 different ideas in 8 minutes (1 idea per minute).

|           |           |           |           |
|-----------|-----------|-----------|-----------|
| IDEA<br>1 | IDEA<br>2 | IDEA<br>3 | IDEA<br>4 |
| IDEA<br>5 | IDEA<br>6 | IDEA<br>7 | IDEA<br>8 |

Step 7: One-Minute Pitch

In the end all participants were asked to pitch their ideas in 8 minutes.

L. Harris Profiles

|                     |    |   |   |    |
|---------------------|----|---|---|----|
| #1                  | -- | - | + | ++ |
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

|                     |    |   |   |    |
|---------------------|----|---|---|----|
| #2                  | -- | - | + | ++ |
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

|                     |    |   |   |    |
|---------------------|----|---|---|----|
| #3                  | -- | - | + | ++ |
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

|                     |    |   |   |    |
|---------------------|----|---|---|----|
| #4                  | -- | - | + | ++ |
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

|                     |    |   |   |    |
|---------------------|----|---|---|----|
| #5                  | -- | - | + | ++ |
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

|                     |    |   |   |    |
|---------------------|----|---|---|----|
| #6                  | -- | - | + | ++ |
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

| #7                  | -- | - | + | ++ |
|---------------------|----|---|---|----|
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

| #8                  | -- | - | + | ++ |
|---------------------|----|---|---|----|
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

| #9                  | -- | - | + | ++ |
|---------------------|----|---|---|----|
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

| #11                 | -- | - | + | ++ |
|---------------------|----|---|---|----|
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

| #10                 | -- | - | + | ++ |
|---------------------|----|---|---|----|
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

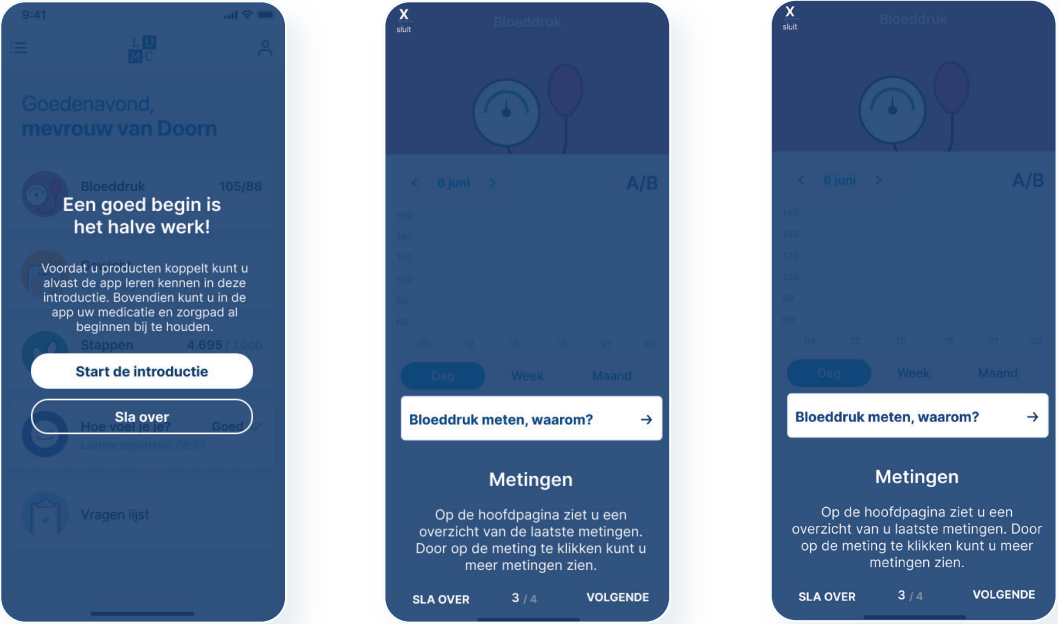
| #12                 | -- | - | + | ++ |
|---------------------|----|---|---|----|
| value guidance      |    |   |   |    |
| treatment awareness |    |   |   |    |
| value involvement   |    |   |   |    |
| value activation    |    |   |   |    |
| user guidance       |    |   |   |    |

# M. Unboxing Experience

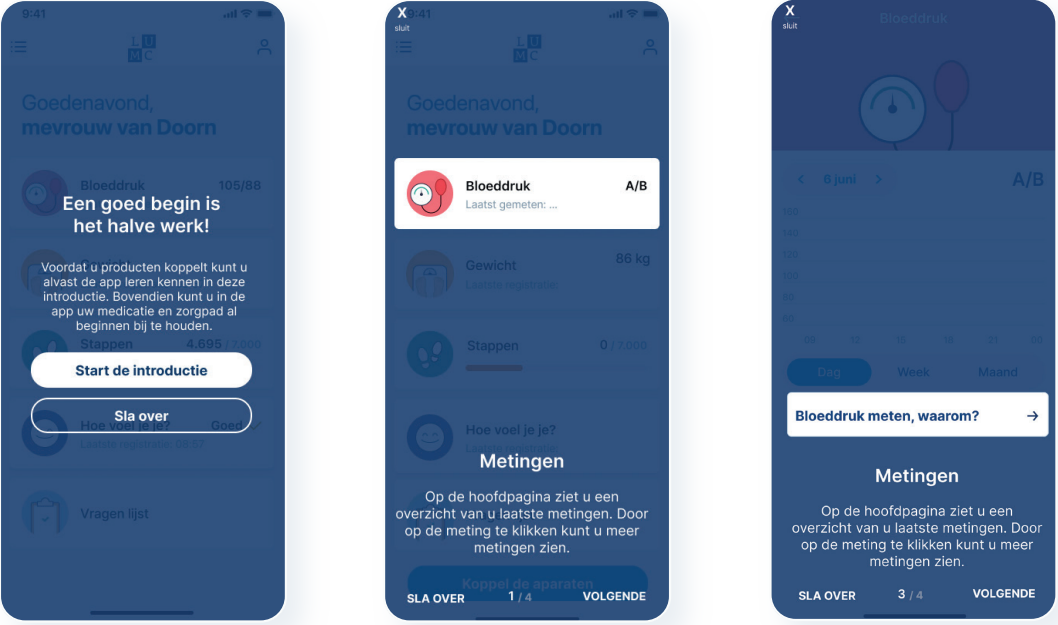
Intro 1



Intro 2

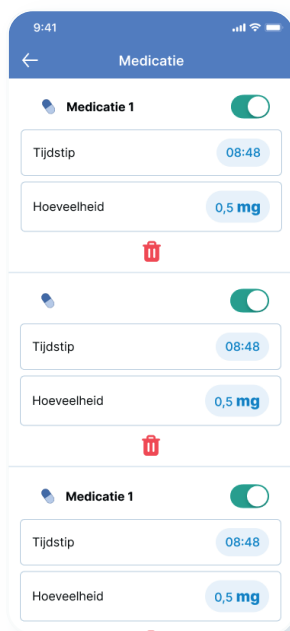
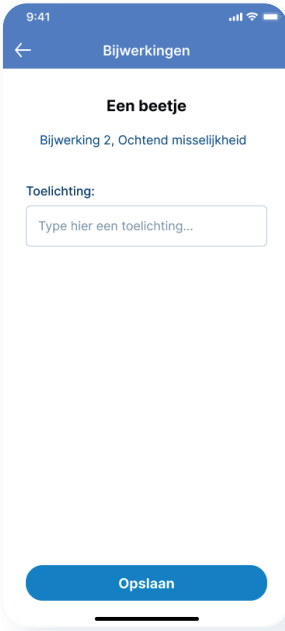
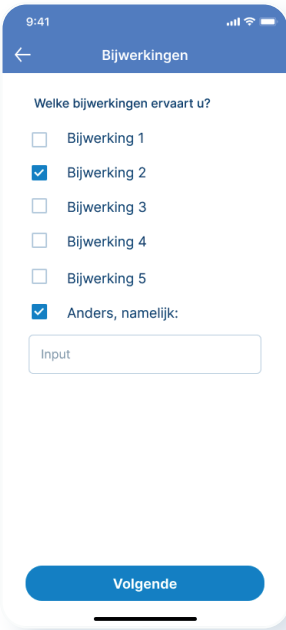
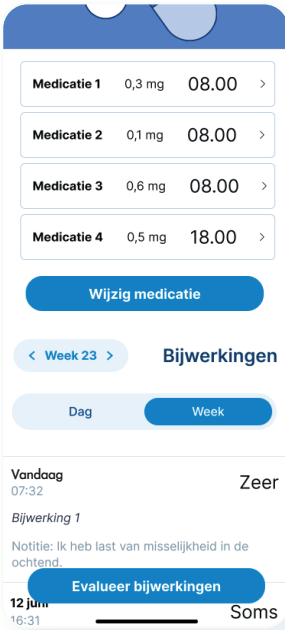


Intro 3

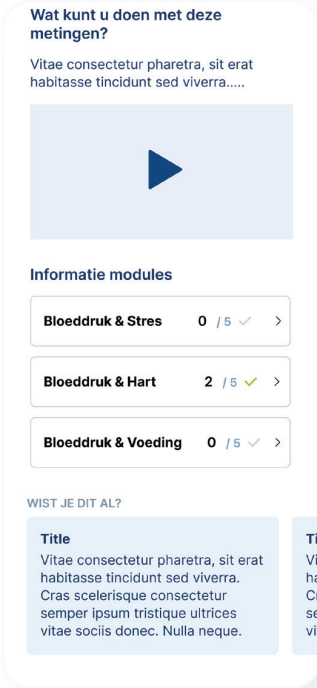




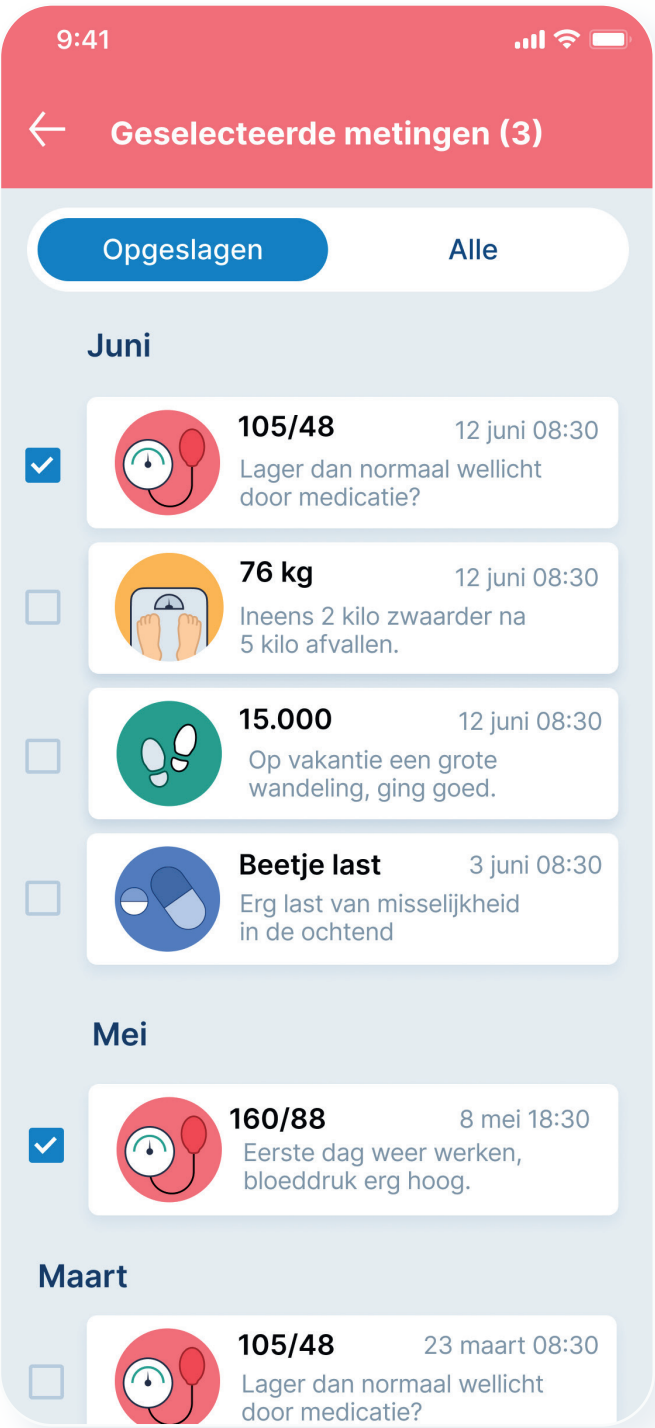
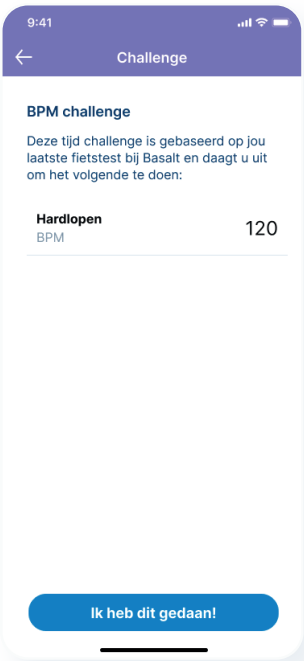
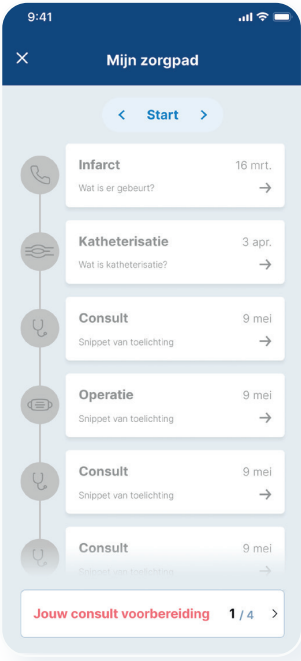
N. Medication Monitoring



O. Value Activation



P. Care Overview & Preparation



Q. Suggested Evaluation Questions

| # | Questionnaire | Questions                                                                                                                                                                                                                                       | DG topic(s)                           | Sub-goals                                                                                                                                                                                                           | Co-creation potential |
|---|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1 | PHE           | When I think about my disease:<br>- I feel blackout<br>- I am in alarm<br>- I am aware<br>- I feel positive                                                                                                                                     | Involvement<br>Confidence<br>Guidance | Increase patient engagement                                                                                                                                                                                         |                       |
|   | PHE           | When I think about my disease:<br>- I feel dazed<br>- I am in trouble<br>- I am conscious<br>- I feel serene                                                                                                                                    | Involvement<br>Confidence<br>Guidance | Increase patient engagement                                                                                                                                                                                         |                       |
| 3 | PHE           | When I think about my illness:<br>- I feel overwhelmed by emotions<br>- I feel anxious every time a new symptom arises<br>- I got used to my illness condition<br>- Despite my illness I perceive coherence and continuity in my life           | Involvement<br>Self-care              | Increase patient engagement; Increased body awareness and knowledge about risk management; Increase confidence about symptom recognition; Distinguish cardiac signs and symptoms from non-life threatening symptoms |                       |
|   | PHE           | When I think about my disease:<br>- I am very discouraged due to my illness<br>- I feel anxious every time I try to manage my illness<br>- I feel I adjusted to my illness<br>- I am generally optimist about my future and my health condition | Involvement<br>Self-care              | Increase patient engagement; Increased body awareness and knowledge about risk management                                                                                                                           |                       |

# = selected for co-creation

□ = potential co-creation question

G = extra focus after rewriting the question for co-creation

| # | Questionnaire | Questions                                                                                                                                                                                                               | DG topic(s)               | Sub-goals                                                                                                                                                                                                            | Co-creation potential                                                                                                                                    |
|---|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | PHE           | When I think about my disease:<br>- I feel totally oppressed by my illness<br>- I am upset when new symptom arises<br>- I feel I have accepted my illness<br>- I can give sense to my life despite my illness condition | Involvement<br>Self-care  | Increase patient engagement; Increase confidence about symptom recognition; Distinguish cardiac signs and symptoms from non-life threatening symptoms                                                                |                                                                                                                                                          |
|   | PAM           | When all is said and done, I am the person who is responsible for taking care of my health (disagree strongly - disagree - N/A - agree - agree strongly)                                                                | Self-care<br>Involvement  | Increased patient activation; Increase patient engagement; Increase patient involvement; Increased patient activation                                                                                                |                                                                                                                                                          |
| 7 | PAM           | Taking an active role in my own health care is the most important thing that affects my health (disagree strongly - disagree - N/A - agree - agree strongly)                                                            | Self-care<br>Involvement  | Increased patient activation; Increase patient engagement; Increase patient involvement; Increased patient activation                                                                                                |                                                                                                                                                          |
|   | PAM           | I am confident that I can take actions that will help prevent or minimize some symptoms or problems associated with my health condition (disagree strongly - disagree - N/A - agree - agree strongly)                   | Self-care<br>Condifence   | Increased patient activation; Increased body awareness and knowledge about risk management; Increase confidence about symptom recognition; Distinguish cardiac signs and symptoms from non-life threatening symptoms | This design makes me confident that I can take a ctions that will help prevent or minimize some symptoms or problems associated with my health condition |
| 9 | PAM           | I know what each of my prescribed medications do (disagree strongly - disagree - N/A - agree - agree strongly)                                                                                                          | Self-care<br>(Medication) | Increased patient activation; Create more awareness about the medication that is provided; Increased functionality                                                                                                   | This design makes me aware what each of my prescribed medications do                                                                                     |

# = selected for co-creation

□ = potential co-creation question

G = extra focus after rewriting the question for co-creation

| #  | Questionnaire | Questions                                                                                                                                                                              | DG topic(s)                                         | Sub-goals                                                                                                                                                                                       | Co-creation potential                                                                                                                 |
|----|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 10 | PAM           | I am confident that I can tell a doctor concerns I have even when he or she does not ask<br>(disagree strongly - disagree - N/A - agree - agree strongly)                              | Involvement<br>Confidence                           | Increased patient activation;<br>Increase patient involvement;<br>Increased patients confidence during the use of the MI Box;<br>Increased functionality                                        | This design makes me confident that I can tell a doctor concerns I have even when he or she does not ask                              |
|    | PAM           | I am confident that I can tell wether I need to go to the doctor or wether I can take care of a health problem myself<br>(disagree strongly - disagree - N/A - agree - agree strongly) | Self-care<br>Confidence                             | Distinguish cardiac signs and symptoms from non-life threatening symptoms;<br>Clear system for patient communication                                                                            | This design makes me confident that I can tell wether I need to go to the doctor or wether I can take care of a health problem myself |
| 12 | PAM           | I am confident that I can follow through on medical treatments I may need to do at home<br>(disagree strongly - disagree - N/A - agree - agree strongly)                               | Self-care<br>(medication)<br>Confidence<br>Guidance | Increased patient activation;<br>Establish routine for monitoring signs and symptoms;<br>Increased patients confidence during the use of the MI Box;<br>Increased functionality                 | This design makes me confident that I can follow through on medical treatments I may need to do at home                               |
| 13 | PAM           | I understand the nature and causes of my health condition<br>(disagree strongly - disagree - N/A - agree - agree strongly)                                                             | Self-care<br>Guidance                               | Increased patient activation;<br>Increased body awareness and knowledge about risk management                                                                                                   | This design helps me understand the nature and causes of my health condition                                                          |
| 14 | PAM           | I know the different medical treatment options available for my health condition.                                                                                                      | Involvement<br>Guidance                             | Increased patient activation;<br>Increased involvement;<br>Increased engagement;<br>Create more awareness about the medication that is provided;<br>Evaluate the effectiveness of the treatment | This design makes me aware about the different medical treatment options available for my health condition.                           |

# = selected for co-creation

☐ = potential co-creation question

G = extra focus after rewriting the question for co-creation

| #  | Questionnaire | Questions                                                                                                                                                                       | DG topic(s)                         | Sub-goals                                                                                                                                                                                                                                   | Co-creation potential                                                                                                           |
|----|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 15 | PAM           | I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising<br>(disagree strongly - disagree - N/A - agree - agree strongly)                 | Self-care<br>Guidance               | Continue health behaviours;<br>Increased patient activation;<br>Increased functionality                                                                                                                                                     | This design supports me to maintain (keep up with) lifestyle changes, like eating right or exercising                           |
|    | PAM           | I know how to prevent problems with my health<br>(disagree strongly - disagree - N/A - agree - agree strongly)                                                                  | Self-care<br>Guidance               | Increased patient activation;<br>Increased body awareness and knowledge about risk management;<br>Increased functionality                                                                                                                   | This design makes me aware about how to prevent problems with my health                                                         |
| 17 | PAM           | I am confident I can figure out solutions when new problems arise with my health<br>(disagree strongly - disagree - N/A - agree - agree strongly)                               | Self-care<br>Confidence<br>Guidance | Increased patient activation;<br>Increased body awareness and knowledge about risk management;<br>Increase confidence about symptom recognition;<br>Increased patients confidence during the use of the MI Box;<br>Increased functionality; | This design makes me confident that I can figure out solutions when new problems arise with my health                           |
|    | PAM           | I am confident I can maintain lifestyle changes, like eating right and exercising, even during times of stress<br>(disagree strongly - disagree - N/A - agree - agree strongly) | Self-care<br>Confidence<br>Guidance | Increased patient activation;<br>Continue health behaviours;<br>Increased patients confidence during the use of the MI Box;                                                                                                                 | This design makes me confident I can maintain I ifestyle changes, like eating right and exercising, even during times of stress |
| 19 | PESaM         | Efficacy of the medication<br>- No positive effectiveness to very positive effectiveness (5 levels)<br>- I don't know                                                           | Self-care<br>(medication)           | Create more awareness about the medication that is provided;<br>Evaluate the effectiveness of the treatment;                                                                                                                                |                                                                                                                                 |

# = selected for co-creation

☐ = potential co-creation question

G = extra focus after rewriting the question for co-creation



| #  | Questionnaire | Questions                                                                                                                                            | DG topic(s)                           | Sub-goals                                                                                                                                                | Co-creation potential                                                                                                                   |
|----|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 20 | PESaM         | Satisfaction with effectiveness<br>-5 very dissatisfied<br>+5 very satisfied                                                                         | Self-care<br>(medication)             | Increased patient activation;<br>Increase patient involvement;<br>Increased patients confidence during the use of the MI Box;<br>Increased functionality |                                                                                                                                         |
| 21 | PESaM         | Bothersomeness of side effects<br>- I did not experience side effects (skip ....)<br>- Not bothersome - very bothersome (5 levels)<br>- I don't know | Self-care<br>(medication)             | Create more awareness about the medication that is provided                                                                                              |                                                                                                                                         |
| 22 | PESaM         | Inconvenience of time table (frequency) (medication)<br>Not inconvenient - very inconvenient (5 levels)                                              | Self-care<br>(medication)<br>Guidance | Create more awareness about the medication that is provided                                                                                              |                                                                                                                                         |
| 23 | PESaM         | Inconvenience to incorporate in everyday life (medication)<br>- Not inconvenient - very inconvenient (5 levels)                                      | Self-care<br>(medication)<br>Guidance | Create more awareness about the medication that is provided                                                                                              | This design makes it easier to incorporate my medication in daily life<br>(disagree strongly - disagree - N/A - agree - agree strongly) |
| 24 | PESaM         | Satisfaction with ease of use (medication)<br>-5 very dissatisfied<br>+5 very satisfied                                                              | Self-care<br>(medication)<br>Guidance | Create more awareness about the medication that is provided                                                                                              | This design improves the ease of use of medication<br>(disagree strongly - disagree - N/A - agree - agree strongly)                     |
| 25 | SUS           | I think that I would like to use this system frequently<br>strongly disagree (1)<br>strongly agree (5)                                               | Confidence                            | Increase patient engagement;<br>Increased app use;<br>Increased usability;                                                                               | I think that I would like to use this system frequently<br>(disagree strongly - disagree - N/A - agree - agree strongly)                |

# = selected for co-creation

☐ = potential co-creation question

G = extra focus after rewriting the question for co-creation

| #  | Questionnaire | Questions                                                                                                                          | DG topic(s)               | Sub-goals                                                                                                           | Co-creation potential                                                                                                                         |
|----|---------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 26 | TSUQ          | The system is simple and easy to understand<br>- strongly disagree (1)<br>- strongly agree (5)                                     | Confidence                | Increased usability                                                                                                 | The system is simple and easy to understand<br>(disagree strongly - disagree - N/A - agree - agree strongly)                                  |
| 27 | PAM           | I would imagine that most people would learn to use this system very quickly<br>- strongly disagree (1)<br>- strongly agree (5)    | Guidance                  | Increased usability                                                                                                 | I would imagine that most people would learn to use this system very quickly<br>(disagree strongly - disagree - N/A - agree - agree strongly) |
| 28 | TSUQ          | This system is able to do everything I would want it to be able to do<br>- strongly disagree (1)<br>- strongly agree (5)           | Guidance                  | Increase patient involvement;<br>Increased functionality;<br>Increased usability                                    | This design is able to do everything I would want it to be able to do<br>(disagree strongly - disagree - N/A - agree - agree strongly)        |
| 29 | TSUQ          | I felt I was able to express myself effectively<br>- strongly disagree (1)<br>- strongly agree (5)                                 | Involvement               | Increase patient involvement;<br>Increased usability                                                                | I feel I am able to express myself effectively with this design<br>(disagree strongly - disagree - N/A - agree - agree strongly)              |
| 30 | TSUQ          | I feel comfortable communicating with the clinician using the telehealth system<br>- strongly disagree (1)<br>- strongly agree (5) | Involvement<br>Confidence | Increase patient involvement;<br>Increased patients confidence during the use of the MI Box;<br>Increased usability | I feel comfortable communicating with the clinician using this design<br>(disagree strongly - disagree - N/A - agree - agree strongly)        |
| 31 | TSUQ          | The way I interact with this system is pleasant<br>- strongly disagree (1)<br>-strongly agree (5)                                  | Confidence                | Increased patients confidence during the use of the MI Box;<br>Increased usability                                  | The way to interact with this design is pleasant<br>(disagree strongly - disagree - N/A - agree - agree strongly)                             |

# = selected for co-creation

☐ = potential co-creation question

G = extra focus after rewriting the question for co-creation

| #  | Questionnaire                                                             | Questions                                                                                                                                                              | DG topic(s)                                        | Sub-goals                                                                                                                                                    | Co-creation potential                                                                         |
|----|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 32 | SUS                                                                       | I felt very confident using the system<br>- strongly disagree (1)<br>- strongly agree (5)                                                                              | Confidence                                         | Increased patients confidence during the use of the MI Box;<br>Increased usability                                                                           |                                                                                               |
| 33 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | Using the LUMC Care app helped me to take the correct dose of my medicines every day (disagree strongly - disagree - N/A - agree - agree strongly)                     | Self-care (medicine)<br>Guidance                   | Create more awareness about the medication that is provided;<br>Increased functionality                                                                      | This design supports me to take the correct dose of my medicines every day                    |
| 34 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | Using the LUMC Care app helped me to take the my medicines at the correct time every day (disagree strongly - disagree - N/A - agree - agree strongly)                 | Self-care (medicine)<br>Guidance                   | Create more awareness about the medication that is provided;<br>Increased functionality                                                                      | This design supports me to take the my medicines at the correct time every day                |
| 35 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | Using the LUMC Care app motivated me to reach my personal exercise goal every day (disagree strongly - disagree - N/A - agree - agree strongly)                        | Self-care<br>Guidance                              | Continue health behaviours;<br>Increased functionality                                                                                                       | This design makes motivated me to reach my personal exercise goal every day                   |
| 36 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | Using the LUMC Care app gave me more confidence / a greater sense of control in managing my heart health (disagree strongly - disagree - N/A - agree - agree strongly) | Self-care<br>Involvement<br>Confidence<br>Guidance | Increase patient involvement;<br>Increased body awareness and knowledge about risk management;<br>Increased patients confidence during the use of the MI Box | This design gives me more confidence / a greater sense of control in managing my heart health |

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□ = potential co-creation question

G = extra focus after rewriting the question for co-creation

| #  | Questionnaire                                                             | Questions                                                                                                                                                                   | DG topic(s)             | Sub-goals                                                                                                                   | Co-creation potential                                                                            |
|----|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 37 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | The effect of using the LUMC care app on the impact of the MI on my well-being and daily life was...<br>- positive<br>- negative<br>- [open text field]                     | Guidance                | Increase patient engagement<br>Increased functionality                                                                      |                                                                                                  |
| 38 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | Using the LUMC Care app helped me to distinguish life threatening symptoms form non-life threatening symptoms (disagree strongly - disagree - N/A - agree - agree strongly) | Self-care<br>Guidance   | Increase confidence about symptom recognition;<br>Distinguish cardiac signs and symptoms from non-life threatening symptoms | This design helps me to distinguish life threatening symptoms form non-life threatening symptoms |
| 39 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | The use of the LUMC care app is reassuring (disagree strongly - disagree - N/A - agree - agree strongly)                                                                    | Guidance<br>Confidence  | Increased patients confidence during the use of the MI Box                                                                  | This design is reassuring                                                                        |
| 40 | Inspired on a question-naire stated in the paper of Edwards et al. (2020) | The use of the LUMC care app gave me more insights in my care trajectory / treatment (disagree strongly - disagree - N/A - agree - agree strongly)                          | Guidance<br>involvement | Increase patient involvement;<br>Increased functionality                                                                    | This design helps me to understand my care trajec-tory                                           |
| 41 | Personal input                                                            | The LUMC Care app provides me the guidan-ce I need during my care trajectory (disagree strongly - disagree - N/A - agree - agree strongly)                                  | Guidance                | Increased usability;<br>Increased patient activation;<br>Increased functionality                                            | This design offers me the guidance I need during my care trajectory.                             |

# = selected for co-creation

□ = potential co-creation question

G = extra focus after rewriting the question for co-creation

R. Co-Creation Questionnaire Results

Unboxing Experience

P4

| # | strongly disagree                             | disagree | neutral | agree | strongly agree |
|---|-----------------------------------------------|----------|---------|-------|----------------|
| 1 |                                               |          |         |       |                |
| 2 | Participant did not understand this question. |          |         |       |                |
| 3 |                                               |          |         |       |                |
| 4 |                                               |          |         |       |                |
| 5 |                                               |          |         |       |                |
| 6 |                                               |          |         |       |                |

Innovattic

| # | strongly disagree | disagree | neutral | agree | strongly agree |
|---|-------------------|----------|---------|-------|----------------|
| 1 |                   |          |         |       |                |
| 2 |                   |          |         |       |                |
| 3 |                   |          |         |       |                |
| 4 |                   |          |         |       |                |
| 5 |                   |          |         |       |                |
| 6 |                   |          |         |       |                |

B1

| # | strongly disagree | disagree | neutral | agree | strongly agree |
|---|-------------------|----------|---------|-------|----------------|
| 1 |                   |          |         |       |                |
| 2 |                   |          |         |       |                |
| 3 |                   |          |         |       |                |
| 4 |                   |          |         |       |                |
| 5 |                   |          |         |       |                |
| 6 |                   |          |         |       |                |

B2

| # | strongly disagree | disagree | neutral | agree | strongly agree |
|---|-------------------|----------|---------|-------|----------------|
| 1 |                   |          |         |       |                |
| 2 |                   |          |         |       |                |
| 3 |                   |          |         |       |                |
| 4 |                   |          |         |       |                |
| 5 |                   |          |         |       |                |
| 6 |                   |          |         |       |                |

M1

| # | strongly disagree | disagree | neutral | agree | strongly agree |
|---|-------------------|----------|---------|-------|----------------|
| 1 |                   |          |         |       |                |
| 2 |                   |          |         |       |                |
| 3 |                   |          |         |       |                |
| 4 |                   |          |         |       |                |
| 5 |                   |          |         |       |                |
| 6 |                   |          |         |       |                |

|    |   |                                               |          |         |       |                |
|----|---|-----------------------------------------------|----------|---------|-------|----------------|
| P4 | # | strongly disagree                             | disagree | neutral | agree | strongly agree |
|    | 1 |                                               |          |         |       |                |
|    | 2 | Participant did not understand this question. |          |         |       |                |
|    | 3 |                                               |          |         |       |                |
|    | 4 |                                               |          |         |       |                |
|    | 5 |                                               |          |         |       |                |
|    | 6 |                                               |          |         |       |                |

|            |   |                   |          |         |       |                |
|------------|---|-------------------|----------|---------|-------|----------------|
| Innovattic | # | strongly disagree | disagree | neutral | agree | strongly agree |
|            | 1 |                   |          |         |       |                |
|            | 2 |                   |          |         |       |                |
|            | 3 |                   |          |         |       |                |
|            | 4 |                   |          |         |       |                |
|            | 5 |                   |          |         |       |                |
|            | 6 |                   |          |         |       |                |

|    |   |                   |          |         |       |                |
|----|---|-------------------|----------|---------|-------|----------------|
| B1 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

|    |   |                   |          |         |       |                |
|----|---|-------------------|----------|---------|-------|----------------|
| B2 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

|    |   |                   |          |         |       |                |
|----|---|-------------------|----------|---------|-------|----------------|
| M1 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

Value Activation

|    |   |                                               |          |         |       |                |
|----|---|-----------------------------------------------|----------|---------|-------|----------------|
| P4 | # | strongly disagree                             | disagree | neutral | agree | strongly agree |
|    | 1 |                                               |          |         |       |                |
|    | 2 | Participant did not understand this question. |          |         |       |                |
|    | 3 |                                               |          |         |       |                |
|    | 4 |                                               |          |         |       |                |
|    | 5 |                                               |          |         |       |                |
|    | 6 |                                               |          |         |       |                |

|            |   |                   |          |         |       |                |
|------------|---|-------------------|----------|---------|-------|----------------|
| Innovattic | # | strongly disagree | disagree | neutral | agree | strongly agree |
|            | 1 |                   |          |         |       |                |
|            | 2 |                   |          |         |       |                |
|            | 3 |                   |          |         |       |                |
|            | 4 |                   |          |         |       |                |
|            | 5 |                   |          |         |       |                |
|            | 6 |                   |          |         |       |                |

|    |   |                   |          |         |       |                |
|----|---|-------------------|----------|---------|-------|----------------|
| B1 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

|    |   |                   |          |         |       |                |
|----|---|-------------------|----------|---------|-------|----------------|
| B2 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

|    |   |                   |          |         |       |                |
|----|---|-------------------|----------|---------|-------|----------------|
| M1 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |



| P4 | # | strongly disagree                             | disagree | neutral | agree | strongly agree |
|----|---|-----------------------------------------------|----------|---------|-------|----------------|
|    | 1 |                                               |          |         |       |                |
|    | 2 | Participant did not understand this question. |          |         |       |                |
|    | 3 |                                               |          |         |       |                |
|    | 4 |                                               |          |         |       |                |
|    | 5 |                                               |          |         |       |                |
|    | 6 |                                               |          |         |       |                |

| Innovattic | # | strongly disagree | disagree | neutral | agree | strongly agree |
|------------|---|-------------------|----------|---------|-------|----------------|
|            | 1 |                   |          |         |       |                |
|            | 2 |                   |          |         |       |                |
|            | 3 |                   |          |         |       |                |
|            | 4 |                   |          |         |       |                |
|            | 5 |                   |          |         |       |                |
|            | 6 |                   |          |         |       |                |

| B1 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|----|---|-------------------|----------|---------|-------|----------------|
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

| B2 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|----|---|-------------------|----------|---------|-------|----------------|
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

| M1 | # | strongly disagree | disagree | neutral | agree | strongly agree |
|----|---|-------------------|----------|---------|-------|----------------|
|    | 1 |                   |          |         |       |                |
|    | 2 |                   |          |         |       |                |
|    | 3 |                   |          |         |       |                |
|    | 4 |                   |          |         |       |                |
|    | 5 |                   |          |         |       |                |
|    | 6 |                   |          |         |       |                |

S. Final Concept | Card



**Contact informatie**  
boxsupport@lumc.nl

**Inloggegevens**  
Om ervoor te zorgen dat uw arts met u mee kan kijken, hebben wij uw inloggegevens voor de app aangemaakt. Uw inloggegevens voor de LUMC Care app kunt u vinden in het uitgifte formulier dat is toegevoegd bij deze kaart.



Om meer te weten te komen over de LUMC Care app en de Box, ga dan naar:  
<https://hartlongcentrum.nl/informatie-voor-patienten/the-box/>

Of scan de QR code!



T. Final Concept | Download Intro



**Welkom bij LUMC Care!**

Voordat u gaat inloggen willen we u kort introduceren aan de LUMC Care app, de app die u zal ondersteunen in uw herstel en voortzetten van een optimale gezondheid!

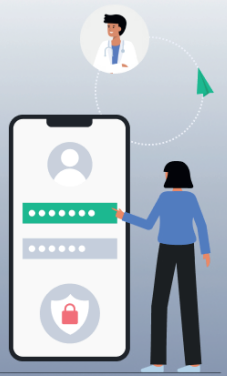
SLA OVER VOLGENDE



**Monitoren van uw gezondheid**

De LUMC Care app is gekoppeld aan The Box. Afhankelijk van het type Box dat u ontvangt zal er bepaalde data gemonitord worden die inzicht geven in uw gezondheid.

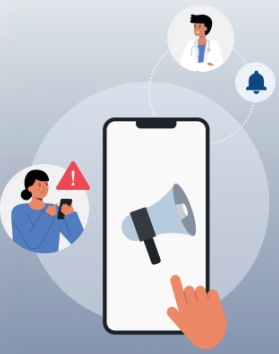
SLA OVER VOLGENDE



**Veilig monitoren**

Door in te loggen met de gegevens op het uitgifteformulier, worden de gemonitorde waarden in uw elektronische patiënten dossier verzameld die door uw arts kan worden bekeken.

SLA OVER VOLGENDE



**Samen monitoren**

Omdat de dokter niet altijd in uw dossier aan het bladeren is, willen we u vragen zelf ook actief bezig te gaan met uw gemonitorde waarden en de dokter te waarschuwen wanneer u ziet dat er iets mis is.

SLA OVER VOLGENDE

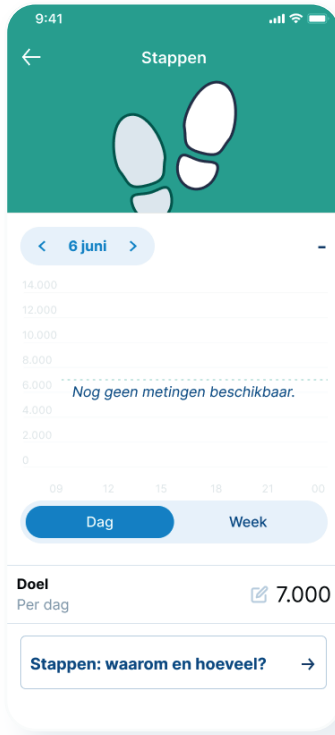
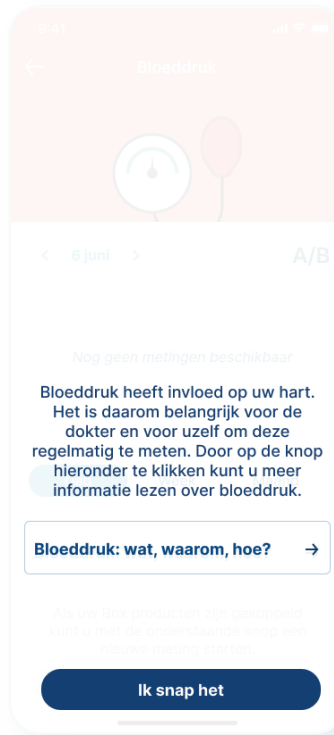
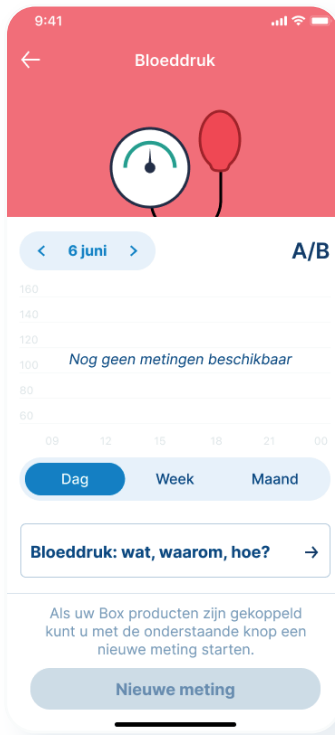
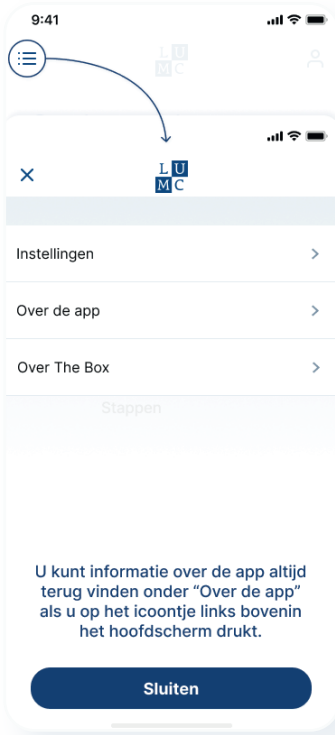
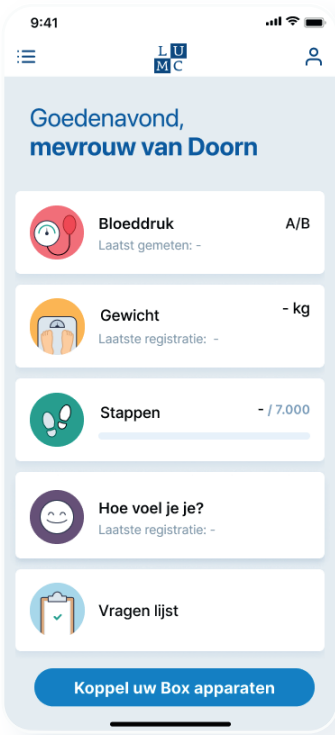


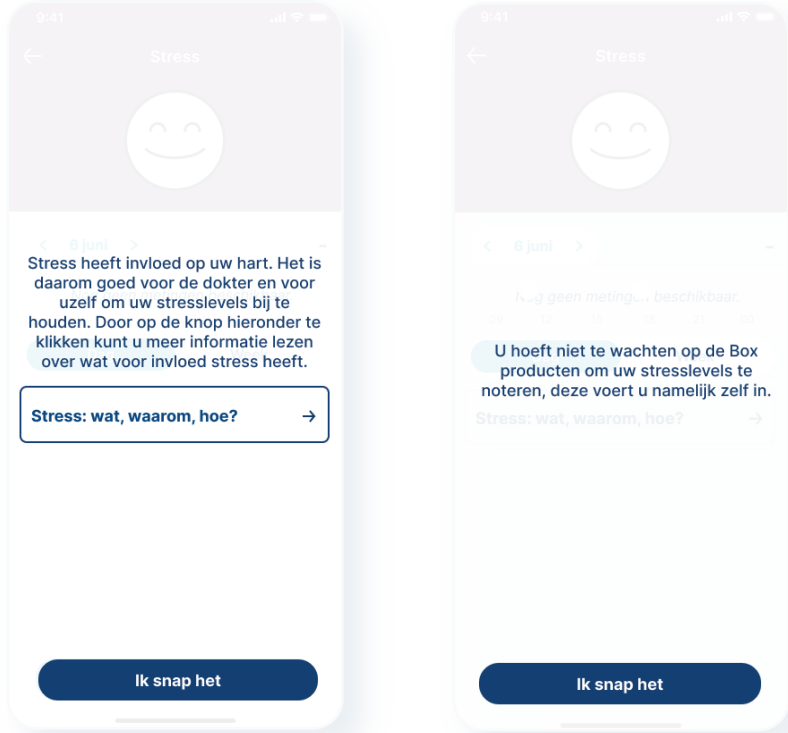
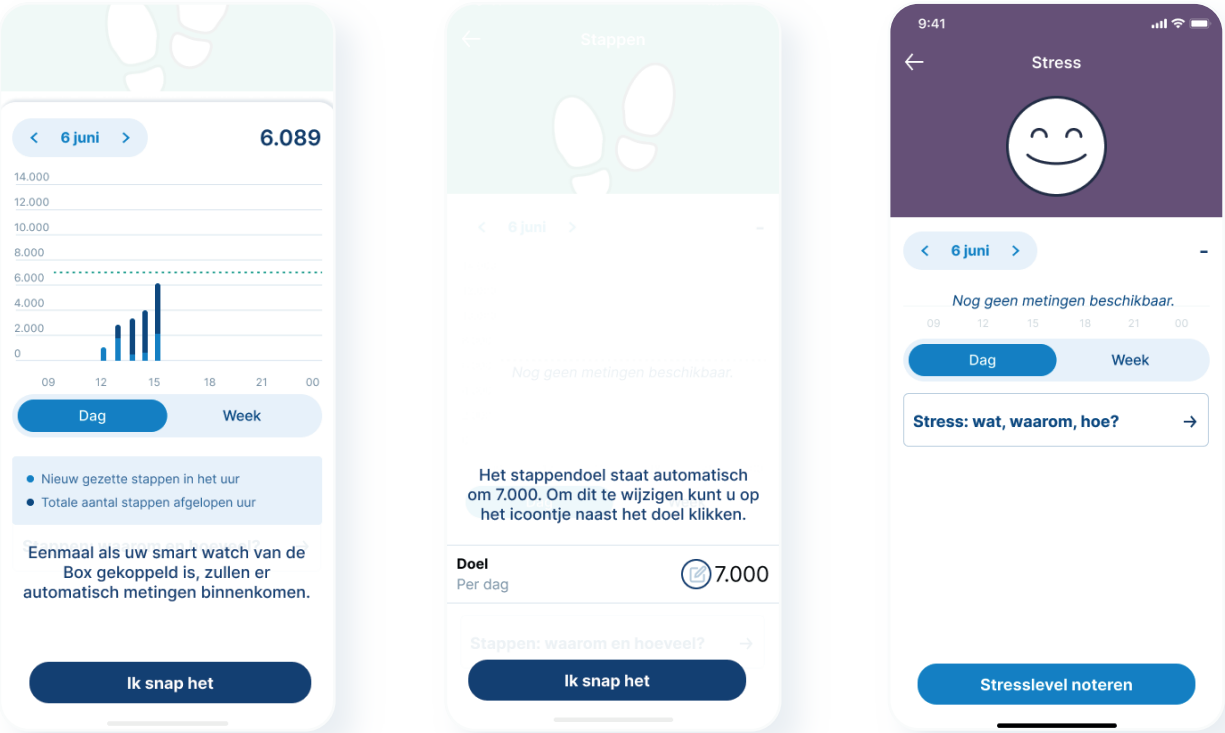
**Begrijpen van gemonitorde waarden**

De app zal u helpen de gemonitorde waarden te begrijpen zodat u er zelf ook mee aan de slag kan. Niet alleen de dokter kan er namelijk iets mee doen, u zelf ook!

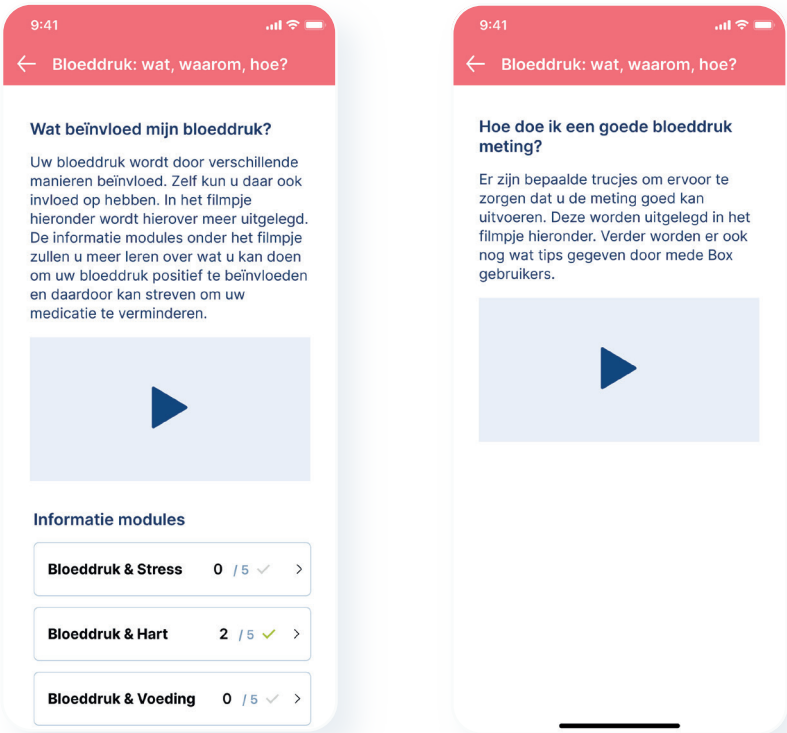
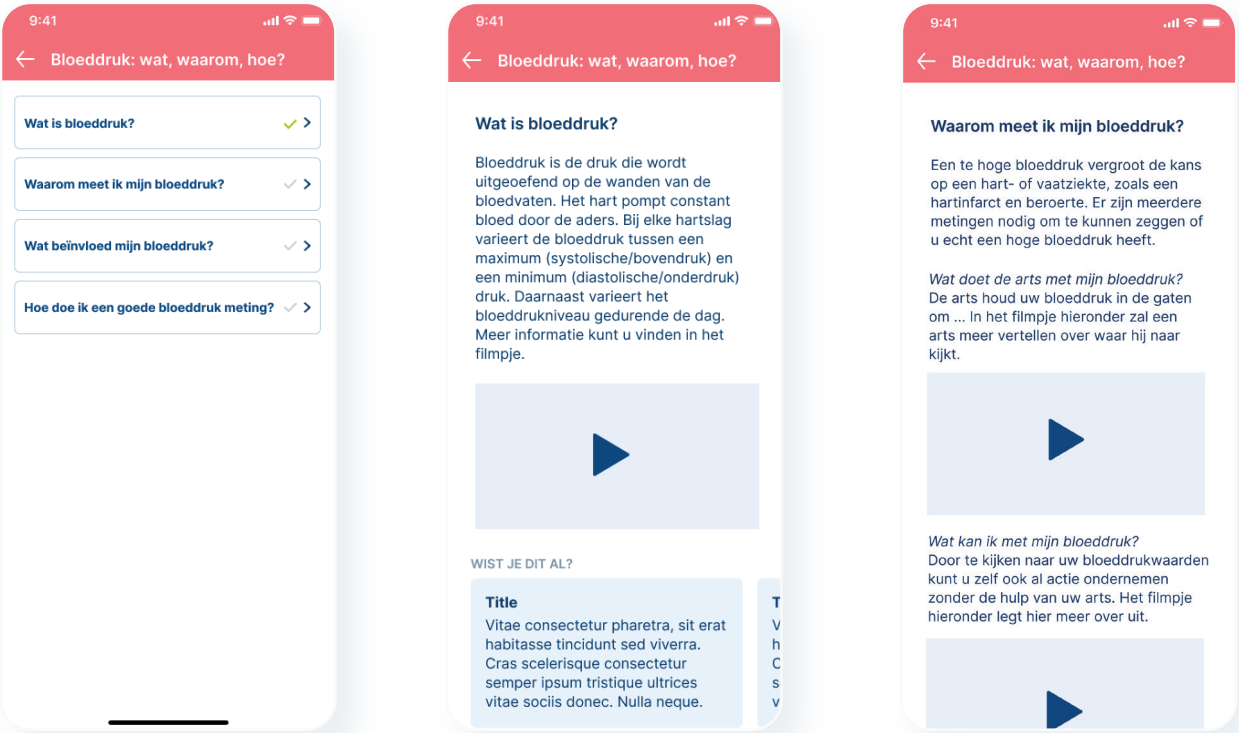
SLA OVER VOLGENDE

U. Final Concept | App Intro



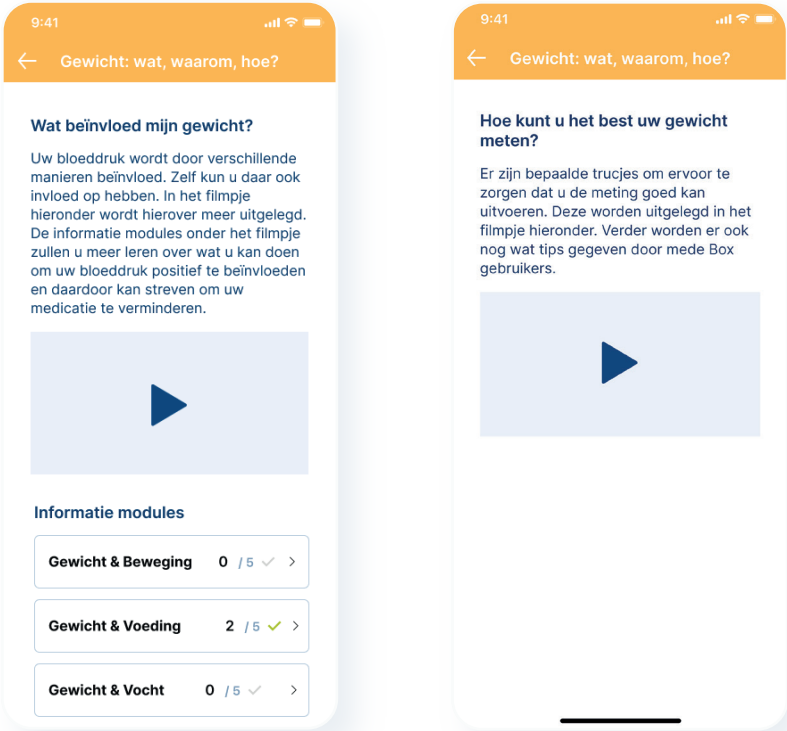
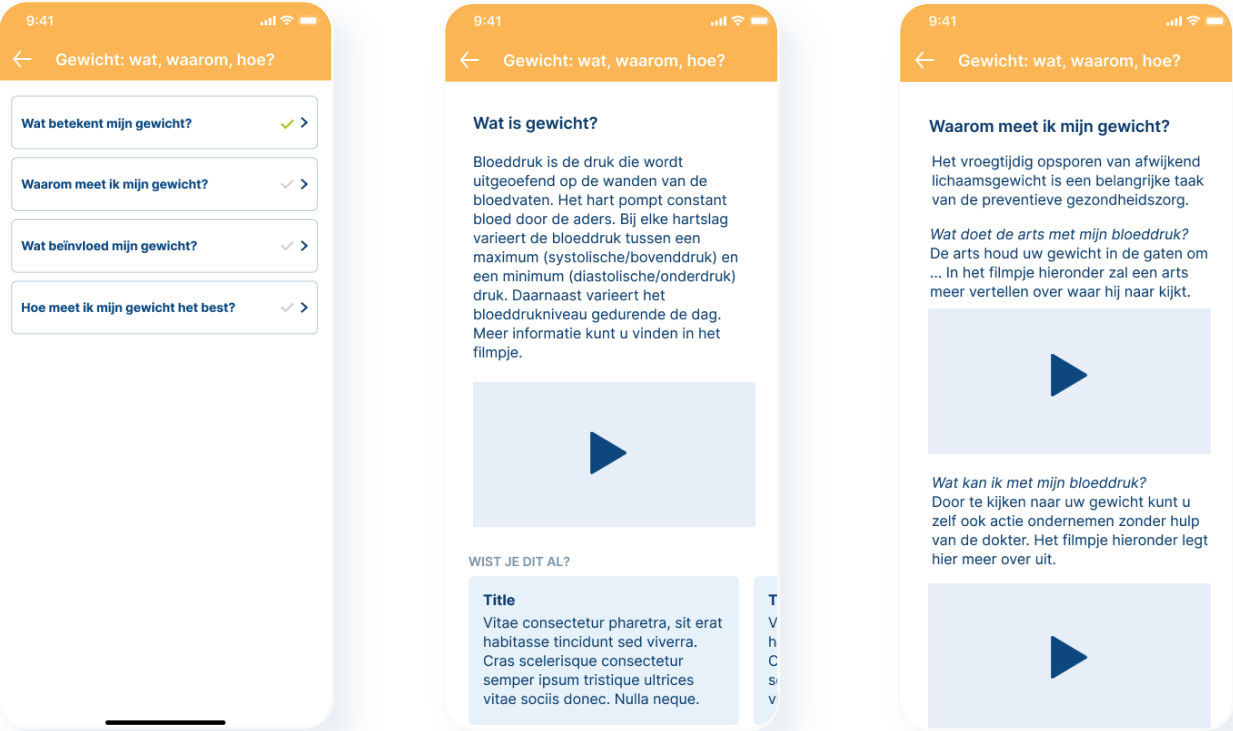


Bloodpressure background information

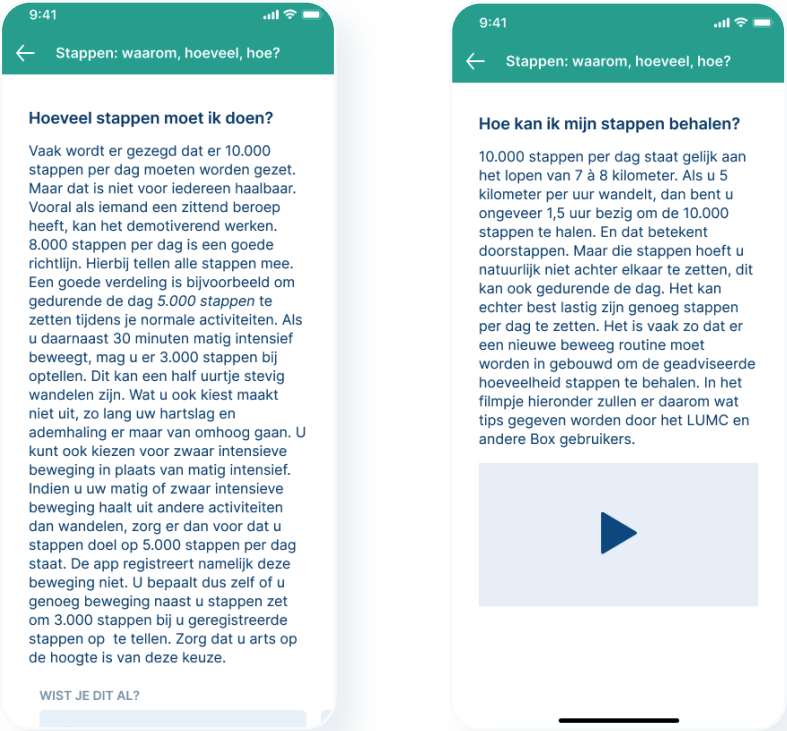
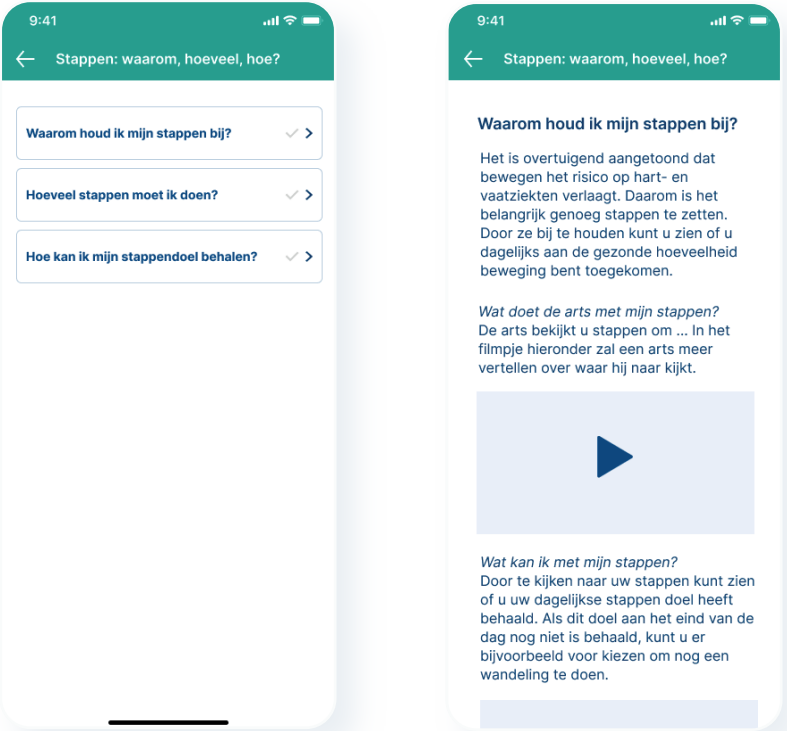


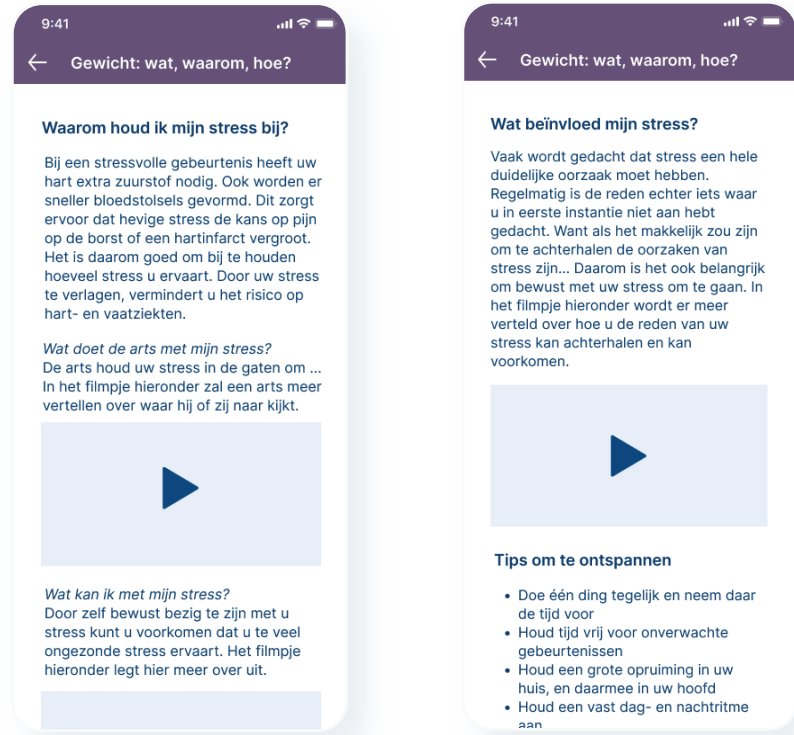
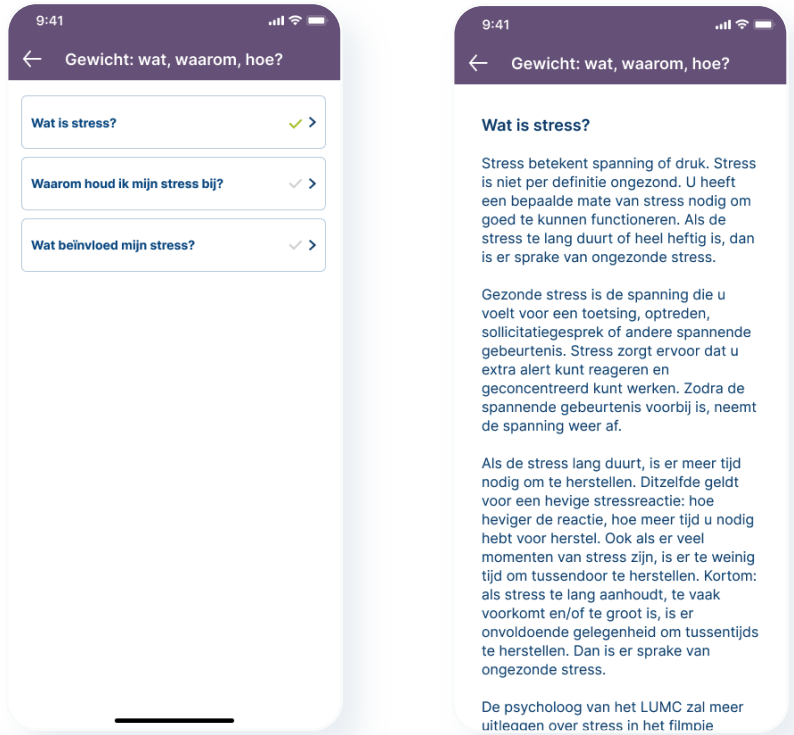


Weight background information

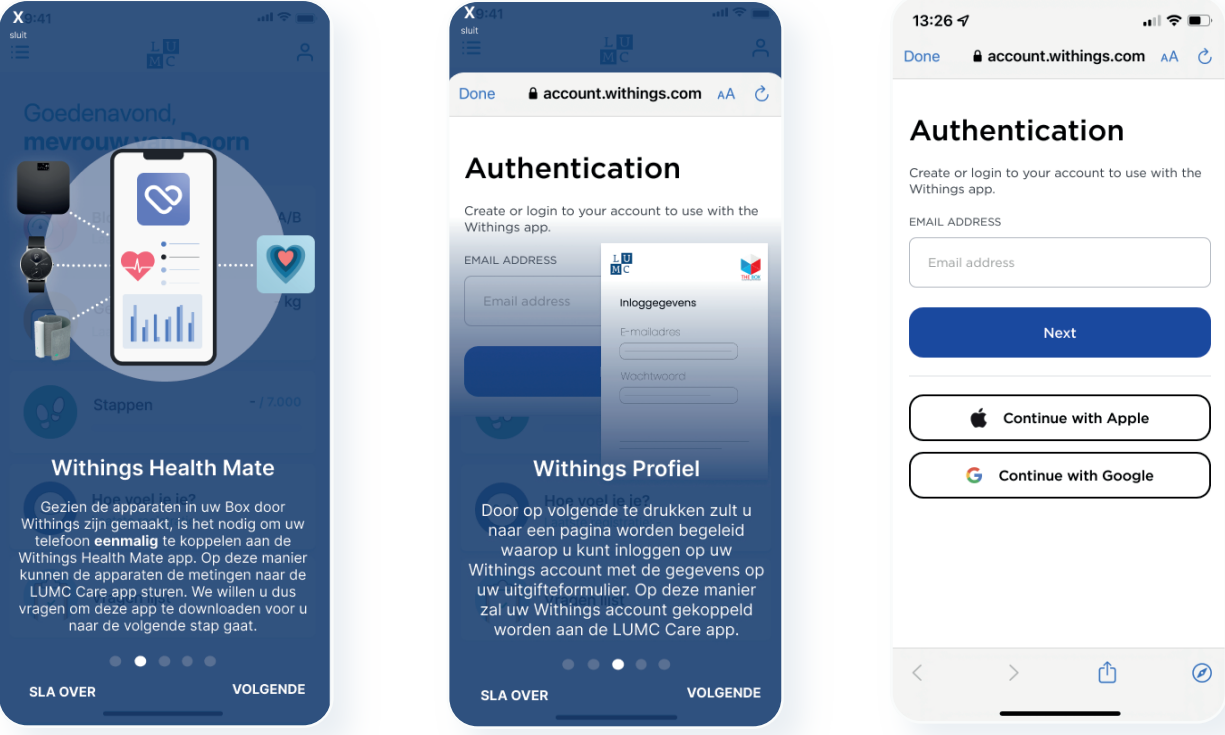
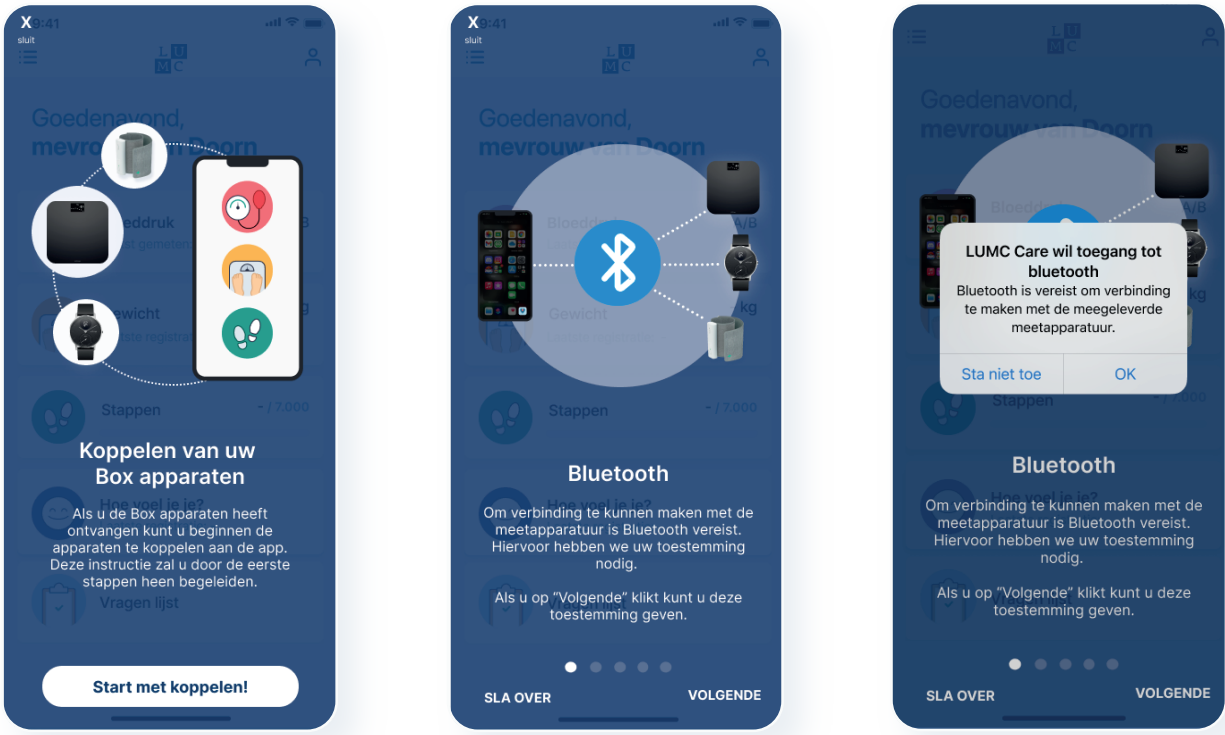


Steps background information





V. Final Concept | Connecting Instructions



W. Final Concept | Info Repetition

