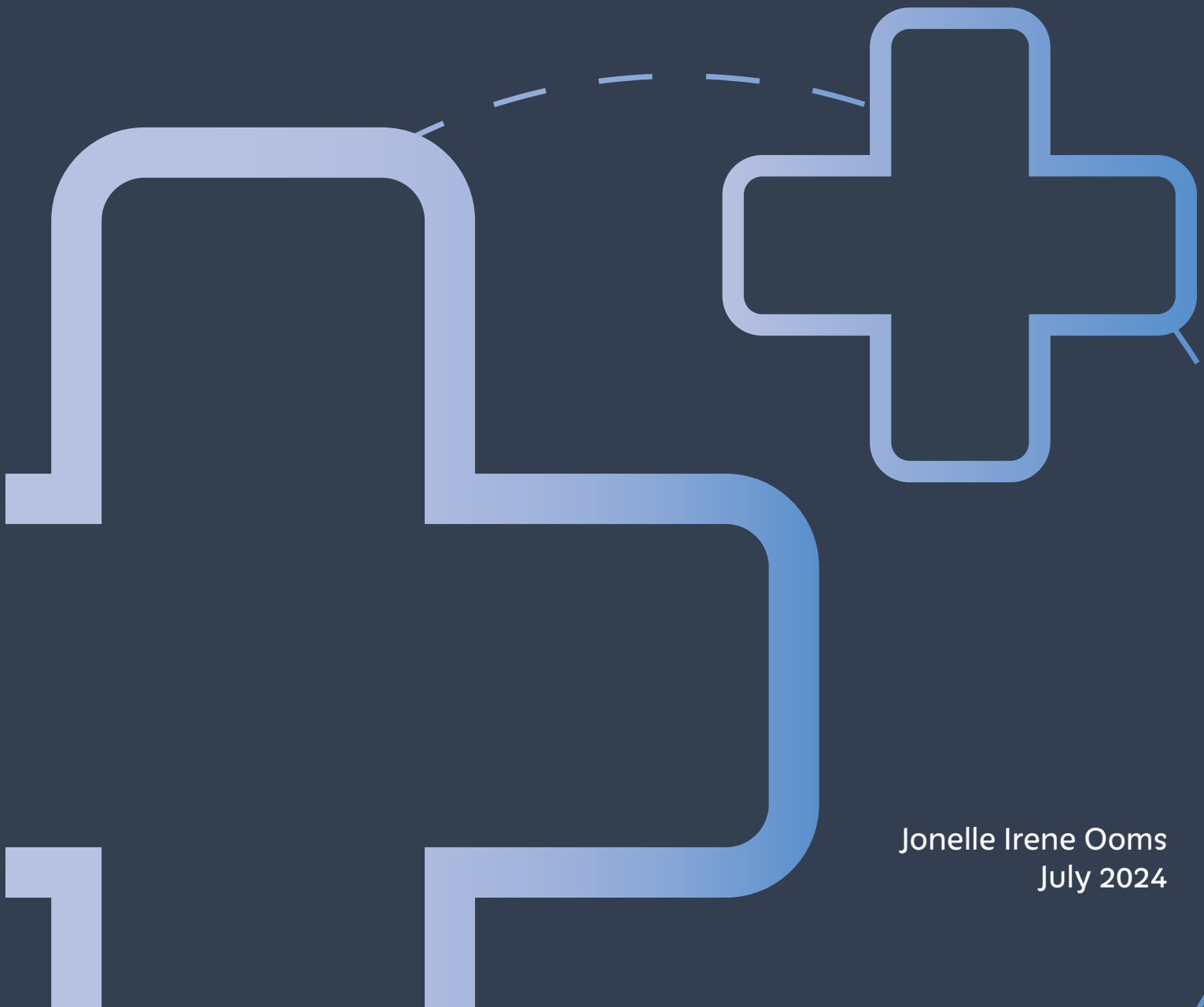
MASTER'S THESIS

Connected Care

A Strategy for the Digital Transition of Patient - Care Provider Interaction During Transmural Health Journeys



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July 2024

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A Strategy for the Digital Transition of Patient - Care Provider Interaction During Transmural Health Journeys

Master Thesis
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Strategic Product Design
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Acknowledgements

Dear reader,

Thank you for taking the time to read through my graduation thesis. This is by far the biggest project that I have worked on during my studies in the last five years, and I'm proud to be presenting it to you now. When I started this project, I had no idea where it would lead me and what the outcomes would be, so I'm glad to say that I am proud of the work I have managed to do in the last six months. I have learned a relatively new design method and found it to be very useful in this project.

First and foremost, I want to thank everyone that took part in this project. I would not have been able to make it as far as I did without your help.

I want to thank my supervisors Armagan, Lianne and Petra for your support during this process. Armagan and Petra, thank you for your weekly support and enthusiasm, you made it possible to continue working on this project and helped me recognise my value. Lianne, thank you for your academic insights during each stage of the process. I firmly believe that your suggestions elevated the quality of this report, improving it's clarity and making sure every explanation made sense.

Thank you to the employees at the Reinier de Graaf for your help during this project, our talks gave me valuable insights and helped my understanding of the complex system that is healthcare in the Netherlands.

To my parents, thank you for providing a safe space to escape to sometimes and taking the time to test the readability of my report. To Britt, thank you for all your help thinking through my problems with me and for helping me understand the principles of synthesis mapping. My synthesis map became what it is today with your valuable help. To Thymen, thank you for grounding me, bringing me back to reality when I was making things more complicated than they had to be. Your support aided me to get across the finish line.

My time as a student has come to an end with the completion of this thesis. I hope it inspires you as much as it inspires me!

Kind regards,

Jonelle

Executive Summary

Digitalisation is something most people have encountered in the last 20 years. People have gotten used to most of their life being digital, using phones every day, and working on computers. However, the healthcare system is falling behind in the field of digitalisation. The system does not work efficiently enough to facilitate the provision of care, hindering it instead. Patient - care provider interaction during transmural healthcare journeys can be improved to place the person once more at the centre of their own health care journey.

This project aims to create a strategy for the digital transition of patient – health care provider interaction during transmural health journeys. This is done by first completing a literature review and context analysis of the current system, followed by observations and interviews. The insights from this research were then summarised in a synthesis map, which highlights the interconnecting relations within the complex socio-technical system. Three system levels were analysed, splitting the system into macro, meso and micro influences. Macro influences come from legislation, meso influences from organisational strategy, and micro influences come from person-specific interactions.

The synthesis map identified six leverage points that can be used to improve the barriers for digitalisation at the Reinier de Graaf hospital:

1. Improve system interoperability
2. Improve system connections
3. Streamline the number of systems used in healthcare
4. Take ownership/ responsibility surrounding digitalisation at the RdGG
5. Make more space in the budget to spend time facilitating the digital interaction transition
6. Improve digital literacy

Using these points the following future vision was set up:

In the future, the RdGG simplifies patient - care provider interaction by using a shared data space for care plans, allowing patients to play an equitable part in their health journey.

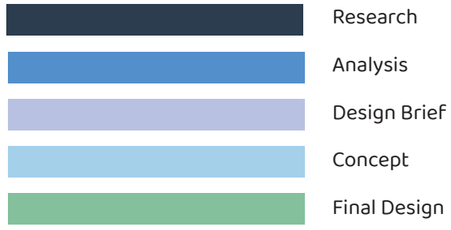
Finally, a strategy was made for the digital transition of patient – care provider interaction at the hospital, visualised in a strategic roadmap and a tactical roadmap. The three main pillars of the future vision – patient clarity, time for care, and shared administrative burden – form the basis for the envisioned future of healthcare in the Netherlands.

To finalise the applicability of the digital transition strategy, it was tested with various involved stakeholders, including a director of the hospital, ICT staff, and care professionals. The thesis concludes with implementation recommendations, limitations and possibilities for future research.

Glossary

AVG:	General data protection regulation *Algemeen verordening gegevensbescherming*
BgZ:	Basic patient dataset *Basisgegevensset zorg*
ENT:	Ear, Nose and Throat *KNO: Keel, Neus, Oren*
GP:	General Practitioner *Huisarts*
HiS:	GP information system *Huisarts informatie systeem*
HiX:	RdGG hospital information system, developed by Chipsoft *RdGG ziekenhuissysteem, ontwikkeld door Chipsoft*
MS:	Medical Specialist *Medische Specialist*
PGO:	Personal health environment *Persoonlijke Gezondheidsomgeving*
RdGG:	Reinier de Graaf Hospital *Reinier de Graaf Gasthuis*
VWS:	Ministry of public health *Ministerie van Volksgezondheid, Welzijn en Sport*
Wegiz:	Act of electronic data exchange in healthcare *Wet elektronische gegevensuitwisseling in de zorg*
ZiS:	Hospital information system *Ziekenhuis informatie systeem*

This report is divided into five secionts, which follow the part of the process each chapter is in. This is based on the double diamond model, explained in Chapter 1.2. Each chapter has it's own corresponding colour.



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01
Introduction

Within this chapter, the assignment is explained. This contains context, project scope and focus, and the relevant stakeholders and actors are discussed. Finally, the project approach is explained, including a short description of the methods used.

1. 1 Project Assignment

1.1.1 Context

Digitalisation is something everyone has encountered in the last 20 years. Each person has gotten used to most of their life being digital, using phones every day, and working on computers. However, the healthcare system is falling behind in the field of digitalisation. While computers are used in the daily workflow, the digital system in healthcare is more outdated than patients and professionals can expect (Kraus, et al., 2021). Patients are surprised when during a consultation that the medical specialist (MS) does not have up to date information, or even the same information that their general practitioner (GP) has. In the Netherlands, each healthcare institution has free reign over which system they choose to use as their electronic patient file, and the systems tend not to interact well, if at all with one another. GPs and medical professionals spend half their time retyping information from one database to another (H. Hafkamp, personal communication, 28th February 2024; W. Hallmann, personal communication, 5th March 2024). This increases the margin of error, which is not an ideal situation when dealing with someone's health care. Yet as Kraus et al. (2021) found, digital technology improves clinicians' reaction time and accelerates work processes. The implementation of digital technologies can simplify the administration process in healthcare, aid the medical specialists in the consultation room and facilitate personalised care (Berry, 2019; Konttila, et al., 2019).

According to Berry (2019), healthcare is a 'high-emotion service', where patients experience heightened emotions such as fear and anxiety. Patients often must manage several different information and communication platforms and methods, which can become very overwhelming in addition to heightened emotions.
In turn, if patients are more active in the decision-making process, there is larger treatment adherence (Kraus, et al., 2021). Digitalisation enables constant access to information when a patient or their support system need it, while still ensuring accessibility for users with low digital literacy or access to technology (Berry, 2019; Moen, et al., 2022). From a patients' perspective, digitalisation can facilitate empowerment (Kraus et al., 2021) and improve health literacy when discussing treatment plans with their clinicians (Lu & Zhang, 2021). New technology has the potential to ease patients' care. It is therefore interesting to investigate the current state of digitalisation in healthcare and how changes can be implemented to facilitate care.

1.1.2 Scope & Focus

As the resources for healthcare are limited, the need for a digital transition is essential to be able to provide good care, especially when taking population growth into consideration. The Reinier de Graaf Gasthuis (RdGG) will need to make these steps towards transitioning to digital healthcare as well (Figure 1). As the healthcare system is complex, this will require strategic, operational, and behavioural changes (Reinier de Graaf, 2023). Within this graduation project, the digital interaction during the transition patients make from their GP to the Reinier de Graaf will be studied. This will include the patient's role in using digital tools, such as the online environment of the Reinier de Graaf and the (forms of) communication the patient has with their care professionals.

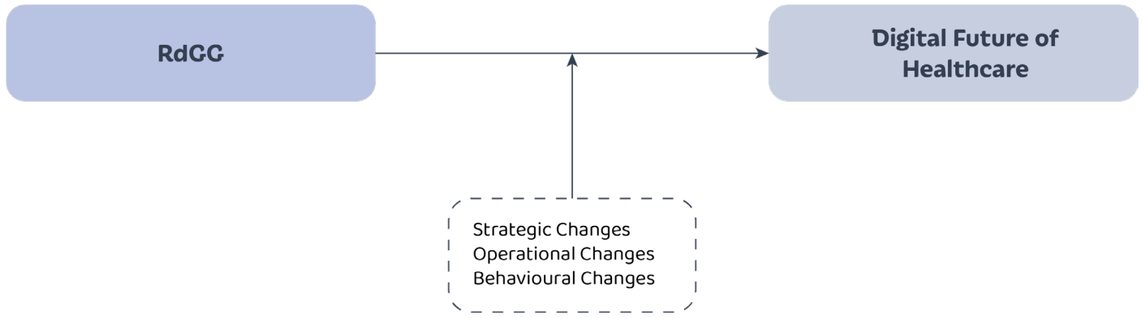


Figure 1: Project scope

The transition a patient makes from their GP to the hospital is the first encounter the patient has with 'second line care'. Second line care is care conducted at hospitals, often with medical specialists (MSs), when a patient's medical concern is too complicated for their GP to treat. This transition from first line care to second line care is called a transmural health journey, as a patient encounters multiple care organisations during their care. If this process is too complicated for a patient, it can create additional stress alongside their worries about their health condition (Berry, 2019). It is therefore important to make this transition as easy for the patient as possible.

The main actors in this project are the patient, their GP, and the outpatient clinic team at the RdGG within the ear, nose, and throat clinic (ENT). By creating a strategic design where all parties can view the patient's care path, a holistic overview is created of the patients' care journey. The goal of this holistic overview is to identify problems and in turn function as an aid to find possible solutions that will integrally address the strategic, operational, and behavioural challenges.

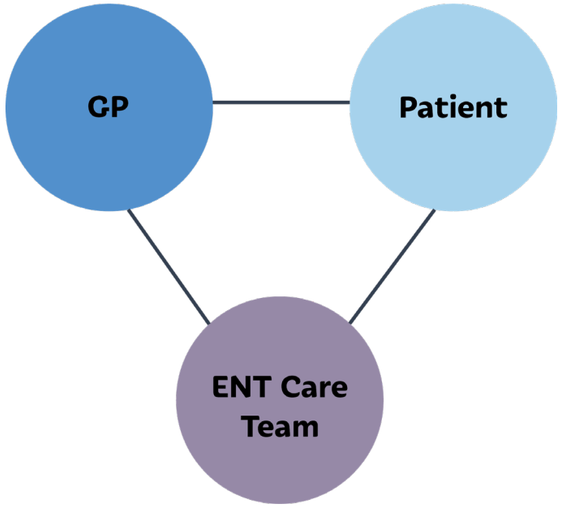


Figure 2: Main project actors

1.1.3 Relevance

While research on the topic of digitalisation in hospitals is not limited, the relation and application to reality is absent. A holistic overview of the current situation of the digital transition of patient- care professional interaction and how previous literature relates to it is needed. This exploratory research therefore provides a strategic analysis of the complexity of implementing digitalisation in a hospital, which can then be used to create a strategic plan for digitalisation of care professional-patient interaction, including stakeholder requirements and preferences.

1.1.4 Stakeholders and Actors

As mentioned in the previous paragraph, the main actors in this project are the people with an ENT health condition, their GP, and the care team at the ENT outpatient clinic at the RdGG. These actors form a three-way interaction stream, with lines of communication and information sharing which will be analysed (Figure 2).

However, there are more stakeholders involved in the process of digitalisation of healthcare, which are shown in Figure 3. The patient stands in the middle of the stakeholder map, as each health journey is centred around the patient. In the next level up, actors are depicted that come into direct contact with the patient during their health journey. This includes for example their GP and ENT specialist, but also other actors they may encounter during treatment.

In the next circle, policy makers from the RdGG are included, who indirectly influence the patient's digital journey by setting and implementing policies and technology hospital wide.

In the outer level of this stakeholder map, stakeholders such as the ministry for public health, welfare, and sports (VWS), health insurance companies and medical software development companies are included. These parties are not considered as part of this study.

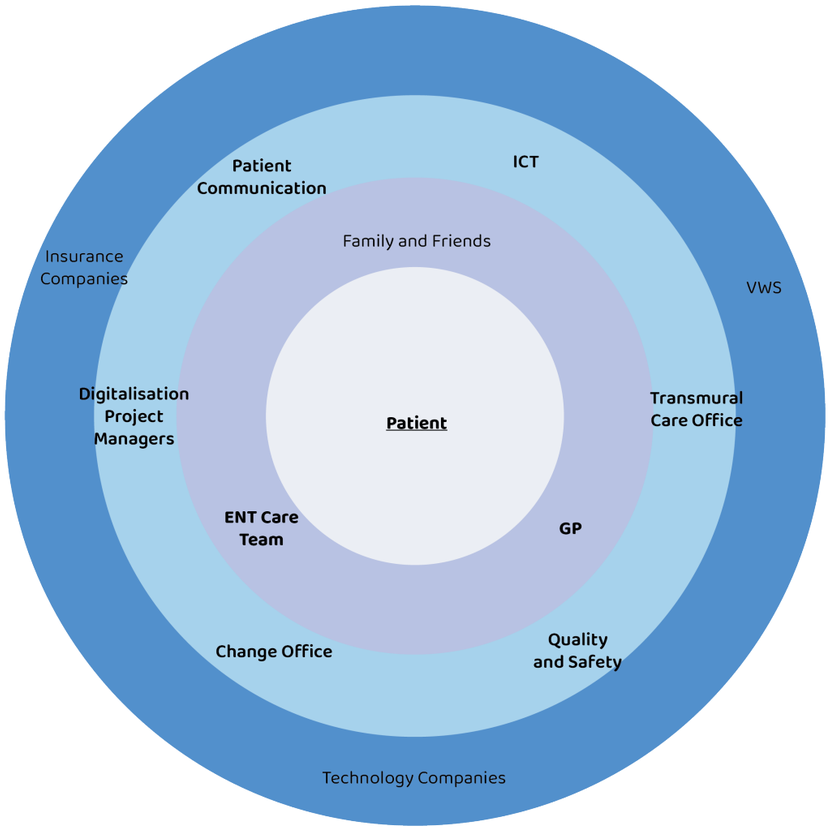


Figure 3: Stakeholder map

1.1.5 Research Questions

To facilitate the research on digitalisation of transmural health journeys within the ENT care path, the following research question was defined:

How does digitalisation affect patient and care professional interaction during transmural ENT health journeys?

This research question was further split into the following sub-questions to facilitate research specified to each facet of this project: digitalisation in healthcare, the digitalisation strategy within the Reinier de Graaf Gasthuis and the digitalisation of patient interaction in transmural ENT health journeys.

1) What is the current state of digitalisation in healthcare?

2) What are the current forms of interaction that a patient encounters during their transmural ENT health journey between a GP the hospital?

3) What are bottlenecks in the implementation of the digitalisation strategy at the RdGG?

A model was made (Figure 4) to demonstrate the relations between the main research question and the sub-questions.

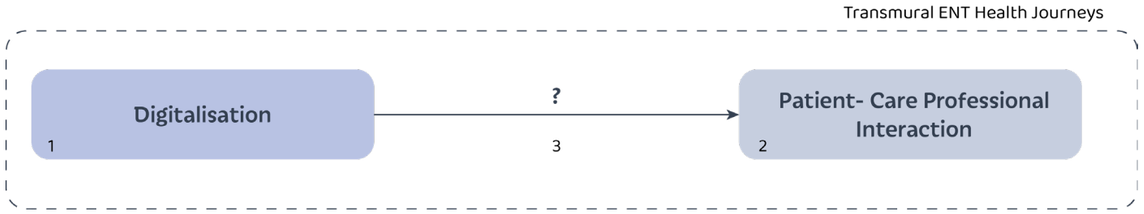


Figure 4: Research question model

1. 2 Project Approach and Methods

This project is split into two design phases, following the double diamond model (Figure 5). The double diamond model (based on the Design Council model (2024)), contains four stages of design: Discover, Define, Design, and Validate. In the first diamond, which includes the phases discover and define, initial research is done surrounding the context and problem statement. This makes it possible for a designer to re-frame their problem to address the root problem in the context, rather than the surface-level problem. Following re-framing, a designer enters the second diamond, where they create and validate the design with relevant stakeholders or users. In each diamond, the designer starts with 'diverging' their knowledge, then streamlining it and organising it in a 'converging' stage. This process ensures a design is made that fits the underlying problems, to create a design that fits both the user and their surrounding context.

In the first diamond, research is conducted to understand the current situation regarding digitalisation in healthcare. This is done through a combination of a literature review, observations, and interviews. Based on these exploratory methods, a system map and communication map are combined into a synthesis map illustrating the communication and relations between actors in a patient's health journey. This synthesis map (further explained in section 1.2.2) will be used to analyse the current context surrounding the implementation of digitalisation in healthcare, digitalisation of patient interaction in transmural ENT health journeys, and the state of the digitalisation strategy at the RDGG. By doing so bottlenecks and possible design opportunities can be identified. Following this analysis a design brief is defined.

In the second phase, design solutions are identified and developed into concepts based on the synthesis map. This evolves through an iterative cycle to the final concept, with which a tactical roadmap is designed to define the strategy for the digital transition of interaction. Finally, to further detail the roadmap and strategic design, a focus group is used for feedback.

As so many methods are used in this project, each chapter consists of a short introduction to the method, followed by the results and discussion. This was done to increase clarity on the conclusions made from the application of each method. A brief description of the most important design methods used is included in this chapter.

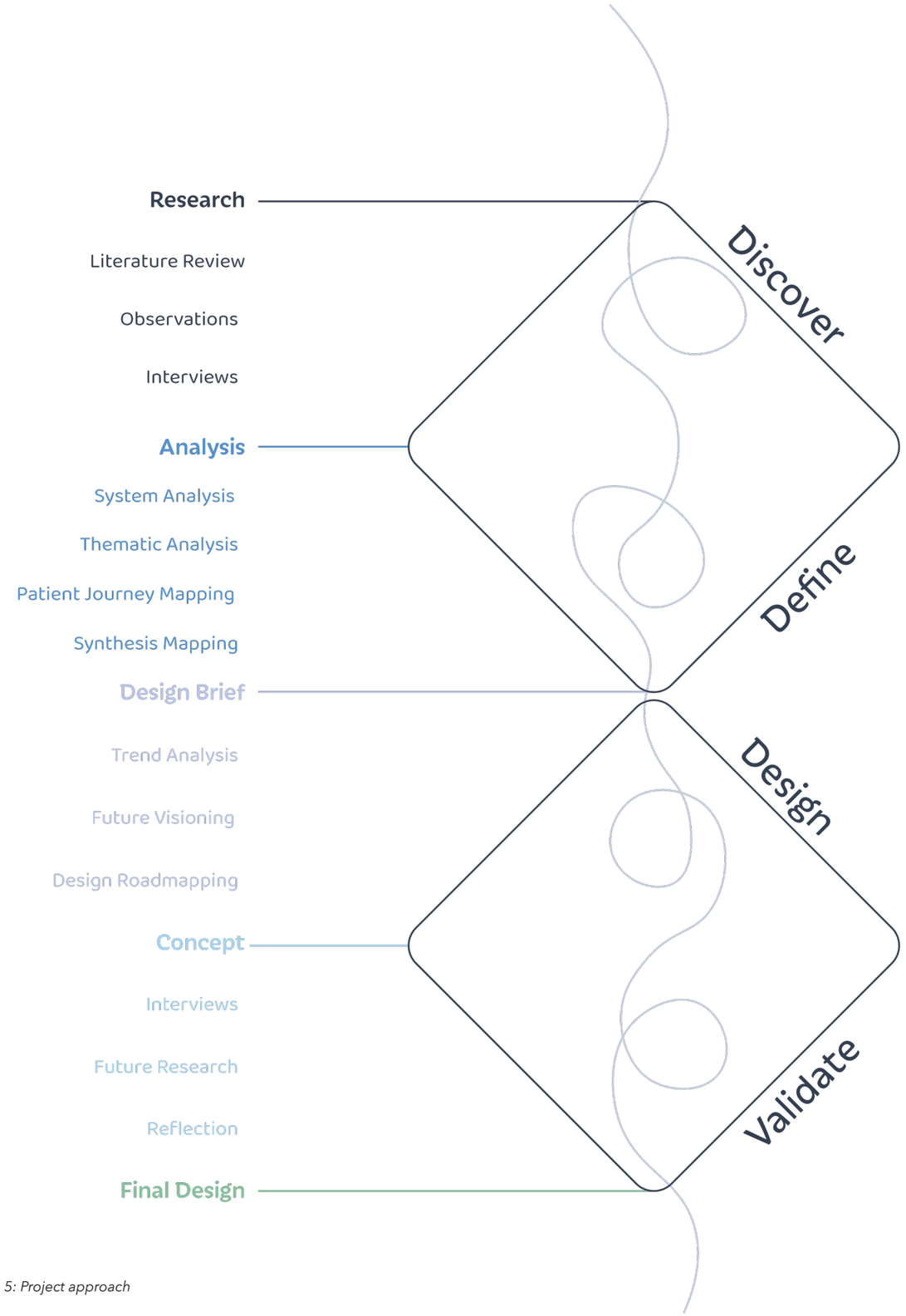


Figure 5: Project approach

1.2.1 Context Exploration- Systemic Approach

To explore the context of digitalisation in healthcare during transmural care journeys, observations and interviews were conducted with four different stakeholder groups. Observations were conducted with three medical specialists at the RdGG to understand the use of digital and physical elements, such as the hospital information system HiX, in the workflow of outpatient clinics. A more detailed description of the observation procedure is in Chapter 3.2.

The three main actors of this project were interviewed, to collect their perspectives on digitalisation in healthcare services. Digitalisation policy makers at the RdGG were also interviewed as a fourth actor, to create a broader understanding of the implementation of the digitalisation strategy. An interview guide was created to facilitate the semi-structured interviews, and participants were given an information document to read through beforehand. A more detailed description on procedure is in Chapter 3.3.

1.2.2 Thematic Analysis

Following the interviews, the transcripts were coded, then analysed using thematic analysis (Chapter 4). To ensure a replicable systematic approach (Nowell, Norris, White, & Moules, 2017), the thematic analysis was conducted following the process described by Braun & Clarke (2006). This follows six steps:

1) familiarising yourself with the data;
2) generating initial codes;
3) searching for themes;
4) reviewing themes;
5) defining and naming themes; and
6) producing the report.

Braun & Clarke (2006) structure thematic analysis as a linear process, however it will be used iteratively for this project, as a complex problem requires adaptation when necessary. Thematic analysis was performed for all four target groups from interviews separately and organised into code trees separated by current scenario and future scenario regarding the digital transition of interaction in healthcare.

1.2.3 Patient Journey Mapping

To create an overview of the journey a patient makes during their ENT health journey, a patient journey map was made, based on collected interview data (Chapter 4). During the patient interviews, a basic format patient journey map was used to facilitate the recall tacit knowledge surrounding the treatment process (Sanders & Stappers, 2012). The five maps collected from the interviews were then combined and analysed into a single basic patient journey. This was then combined with data from the interviews with GPs and ENT staff to create the full patient journey map.

Patient journey mapping integrates the patient's perspective with service design, which facilitates insights into the patient's health journey (Simonse, Albayrak, & Starre, Patient journey method for integrated service design, 2019). Using these insights, points in the map can be identified where opportunities lie to improve (parts of) a patient's journey (Ly, Runacres, & Poon, 2021). A patient journey map includes interactions with relevant stakeholders, interactions with technology and experienced emotions. Within this project, the identified points on the map will be addressed and included in the final design, to ensure that the interests of all stakeholders are encompassed.

1.2.4 Synthesis Mapping

Synthesis mapping is a technique that is used to visualise complex systems, such as in healthcare, to identify design opportunities following analysis. The principle evolved from Gigamapping, developed at the Oslo School of Architecture and Design, which expanded on a system map by including the interactions between stakeholders (Jones, 2024). Synthesis maps also include information from theory and are evidence-based, making them effective when visualising complex social- technical systems in healthcare (Jones & van Ael, 2022).

In this project, synthesis mapping is used to visualise the analysed data collected from literature review, observations, and interviews. Within this map, interactions between factors from a thematic analysis of the interview data are visualised, aiding in a visual analysis and solution finding. This aims to illustrate the complexity of the healthcare system, as well as aiding in identifying so-called leverage points (van der Bijl, 2021) which can be adjusted to make changes to the system. This form of visual analysis will lay the foundation for the future vision and roadmap. By showing the different system levels there are in healthcare and illustrating how those levels interact and influence one another, an intervention can be designed at a broader level that influences multiple stakeholders within the broader social-technical system (Melles, Albayrak, & Goossens, 2021). A more extensive explanation of synthesis mapping and its application is described in Chapter 6.

1.2.5 Design Roadmapping

Design roadmapping is a method that provides handholds for the communication of a design direction or strategic plan to the reader (Simonse, 2017). This ensures that multiple parties within a system understand the goal they are working towards and the steps that need to be taken to reach that goal (Simonse, Hultink, & Buijs, 2015). This is done by mapping the steps along a certain future timeline that is relevant to the envisioned goal, called a future vision. Other elements are included, such as user values, market trends, new technology or products/services.

Two types of roadmap are made, a strategic roadmap and a tactical roadmap. A strategic roadmap is a simplified version of a tactical roadmap, made to be shown to external stakeholders within a system. It is easy to read and contains the most important elements that need to be communicated. A tactical roadmap contains all elements necessary to communicate the changes needed to the internal stakeholders involved in the system, which is usually more detailed than a strategic roadmap (Simonse, 2017).

This project uses both types of roadmap to communicate the strategy to implement more digitalisation technology at the RdGG. The roadmap takes the defined leverage points from the synthesis map and uses them to demonstrate the necessary changes points to facilitate the implementation of digitalisation. A more comprehensive description of design roadmapping and its implications for this project follows in Chapter 7.

1.2.6 Ethics

This study has taken ethics into account, due to the sensitivity of the topic. Prior to the start of the research, a non-WMO research protocol was written, to submit to the Medical Ethics Review Committee (*Medisch Etische Toetsings Commissie*, METC). The material provided for approval is in Appendix A. In this research protocol, the project setup and procedure are explained. The aim of the research was to interview 5-10 people from each of the target groups. Participants were selected to be as diverse as possible in digitalisation skills and gender, with age restrictions for patients between 18-70.

02

Literature Review

In this chapter existing literature is reviewed surrounding general theory on digitalisation in healthcare. This aims to answer the first sub-research question. First, a general review of digitalisation literature is done. Then barriers and facilitators for the implementation of digitalisation in healthcare are discussed. Then, factors influencing patient information are explained, including methods of communication, digital literacy, and information retention and processing. Finally, the answer to the first research question is given.

2.1 Digitalisation in Healthcare

Diminishing healthcare resources is in part because of the growing population, but also because of the decrease of available care professionals (Langenberg, Melser, & Peters, 2023). The number of patients that are being referred to second line care (medical specialists at hospitals) has only increased in the last few years, growing from 30,6% in 2019 to 33,8% in 2022 (Vanhommerig, Hek, & Overbeek, 2023). Aside from these factors, healthcare is becoming more complex, with an increase in health issues concerning multiple conditions and ailments (Nivel, 2016; Vos, 2019; Hilderink & Verschuuren, 2018). To account for this, the necessity of the digitalisation of healthcare processes is coming to light.

Digitalisation is often referred to as the fourth industrial revolution, with a quick rise in the amount of technology used (Popov, et al., 2022). This could be new AI software or electronic medical devices, but it also includes digital communication and information sharing in healthcare. Think of digital information folders or virtual consults on the phone instead of in a doctor's office. According to Kraus et al. (2021), "digital transformation refers to a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication and connectivity technologies" (p.557).

Patients frequently look for information online to supplement their consultations to facilitate understanding of their personal medical situation, or to receive forms of support regarding their treatment from peers (Neely & Hao, 2023). Patients have also started using digital technology outside the consultation room to facilitate self-management during their treatment, so why has the healthcare system not adapted itself accordingly to fit the transition towards a digital society?

To answer this question, it is relevant to understand the ways digitalisation is relevant in healthcare. According to Popov, et al. (2022), there are seven relevant forms of digitalisation in healthcare:

- Internet of Things (IoT);
- Artificial Intelligence (AI);
- Mobile technology;
- Simulation and modelling;
- Big Data analytics (BDA)
- Augmented reality (AR); and
- Digital manufacturing.

Each form of digitalisation has its own impact on the healthcare domain, from transitioning to new technology in the operating room, to the way hospital data is stored and managed.

The main goal in healthcare is to treat patients and protect their wellbeing. Digitalisation of processes in healthcare can facilitate this, by aiding in administration processes and improving operational efficiency (Kraus et al., 2021; Konttila, et al., 2019). Digitalisation also provides a platform for care professionals to maintain contact with their patients throughout their entire health journey, rather than only in consultation rooms (Health Management, 2022). Patients can take a more active role in their healthcare journey, which in turn positively influences treatment adherence and improved care professional-patient relationships (Stiggelbout, Pieterse, & de Haes, 2015). Therefore, the digitalisation of the care professional-patient interaction is an important factor to mitigate the future problems arising in healthcare.

Understanding how digitalisation will become an aid to physical care will facilitate the implementation of new technology, to support the healthcare workers with their growing workload. While the main goal of healthcare will not change, the efficiency and effectiveness of the way this is done can be improved. Reducing the administrative burden currently felt in healthcare services across organisations is the first step to making healthcare future-proof.

2.2 Barriers to Digitalisation in Healthcare

Digitalisation requires a great deal of change in hospitals, whose processes have solidified in the many years of use. Obstruction of the adoption of digital technologies can come from stakeholder specific interests or organisational structures (Konttila, et al., 2019), and there are often ethical concerns about protecting patients' data (Konttila, et al., 2019). Previous negative experiences with digitalisation can create barriers for the implementation process (Konttila, et al., 2019). This results in a reliance on paper, or a combination of paper and technology that further complicates the implementation of digital solutions (Black & Sahama, 2016).

The way technology is currently used also forms a barrier to the implementation of healthcare; the current use of electronic health records (EHRs) causes a high administrative burden on healthcare professionals and takes attention away from the patients (Berry, 2019; Black & Sahama, 2016).

Schreiweis et al. (2019) propose barriers for digitalisation that fall into three categories: individual barriers, environmental and organisational barriers, and technical barriers (Figure 6). Individual barriers are for example cognition (people's ability to learn, linguistic barriers or eHealth literacy), motivation (unclear benefits of new technology), accessibility (missing information about health services) and lack of trust in digital technology. Environmental barriers could be financing problems, political barriers, or misalignment of how digitalisation could fit into an organisation's structure. Examples of technical barriers are unsuited services, security, system language, missing support, missing feedback, and missing standards (Schreiweis, et al., 2019).

Keeping these barriers in mind when designing the future of healthcare will facilitate the implementation of digitalisation in healthcare. Addressing each barrier within the future healthcare scenario will create opportunities for the adoption of new digital technology.

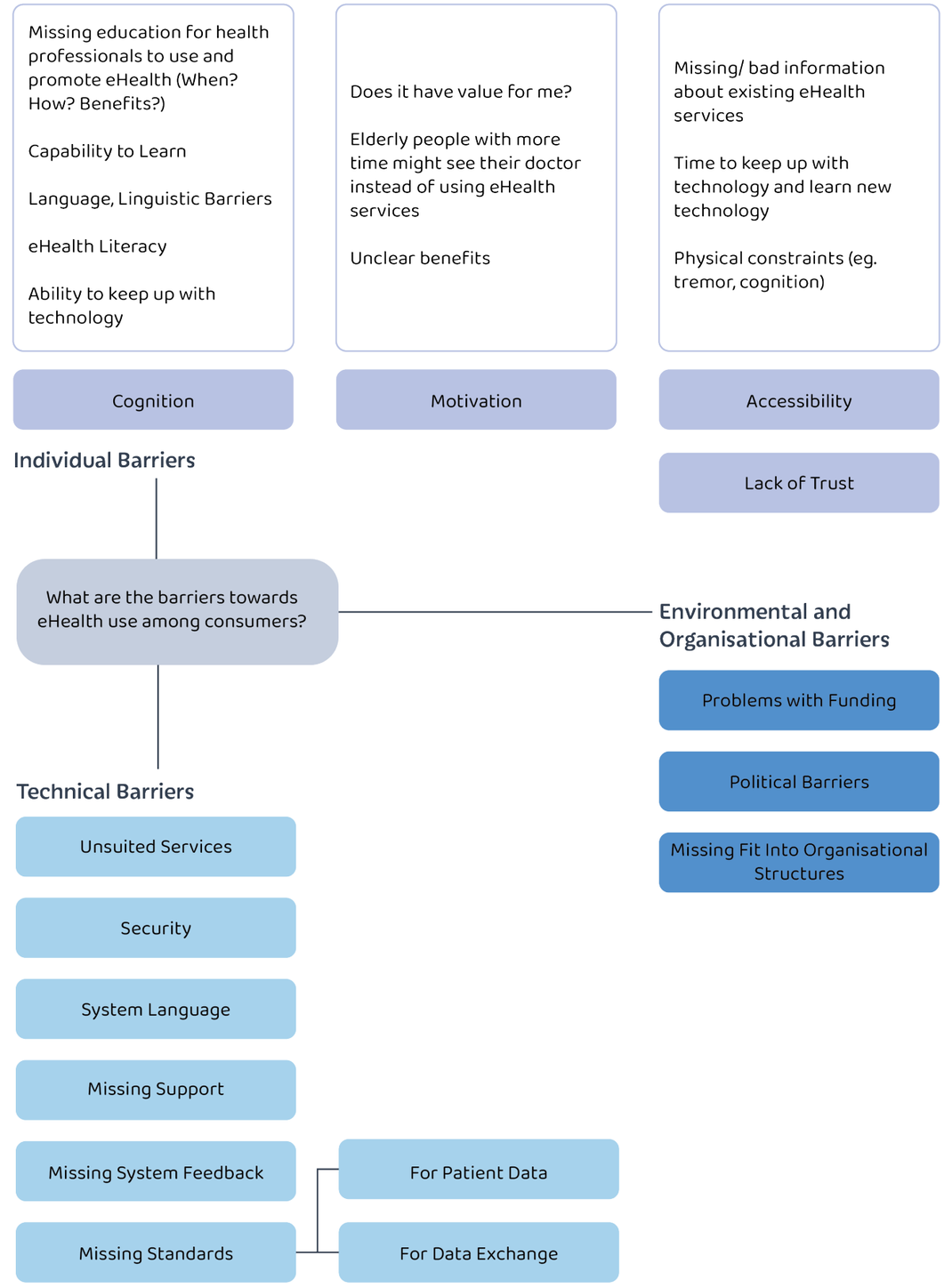


Figure 6: Barriers for the implementation of digitalisation (Schreiweis, et la., 2019)

2.3 Facilitators for the Implementation of Digitalisation in Healthcare

There is room for improvement in the implementation of digitalisation solutions. While many digital solutions are already integrated into the hospital system (Reinier de Graaf Gasthuis, 2022), staff are unaware of the possibilities within the platform, or simply don't want to change their views on digitalisation and are unwilling to learn (D. Wijffels, personal communication, 20th February 2024). Yet digital competence and literacy have been proven to be beneficial for the acceptance of new technology, as they influence the ability to provide patient care (Konttila, et al., 2019; Lu & Zhang, 2021). When a patient understands their treatment plan, because their information is readily available online, and they were able to find this information, the medical specialist can answer their specific questions more efficiently and the patient can be more present in the consultation. It is therefore also important to keep digitalisation knowledge up to date with training, although this could prove difficult as many healthcare professionals have a negative attitude towards technology education (Konttila, et al., 2019). In order to facilitate the implementation of new digitalisation in heathcare, there needs to be intrinsic motivation from all parties to participate (Konttila, et al., 2019), including both managerial positions and healthcare workers (Kraus, et al., 2021). To create intrinsic motivation from either party, they should be included in the development process and implementation of new technology. By doing so, their acceptance and willingness to use the innovations will increase. Therefore, a culture change stimulated at organisational level needs to take place to facilitate further implementation of digitalisation in healthcare.

Schreiweis et al. (2019) also mentions facilitators for implementing digitalisation in healthcare (Figure 7). Once again, the factors are split into individual success factors, environmental and organisational success factors, and technical success factors. The top six factors mentioned are ease of use, improves communication, motivation, integration into care, involvement of relevant stakeholders, availability of resources, and user-friendliness. When designing the outcome of this project, these factors will be considered and included in the roadmap.

In conclusion, facilitators for the implementation of digitalisation have an influence on the success of the implemented new technology and should be considered when designing a strategy for the digital transition of interaction. One of the most important facilitators is including the users in the development of new technology, demonstrating the added value it has for their workflow and creating intrinsic motivation to apply the new technology. For the digital transition to be possible, simultaneous top-down and bottom-up pushes are needed. This will facilitate the ease of a digital transition in healthcare.

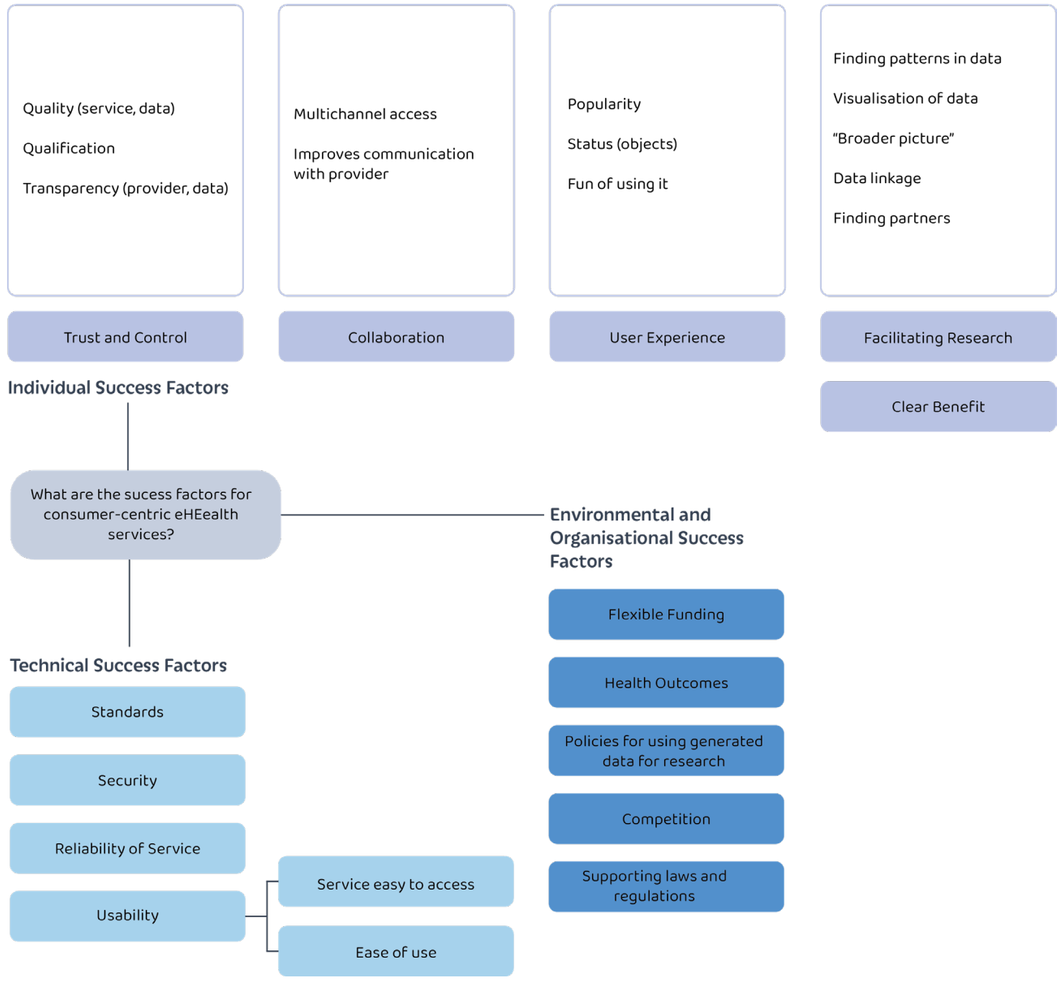


Figure 7: Success factors for the implementation of digitalisation (Schreiweis, et al., 2019)

2.4 Patient Information Management

In healthcare a lot of information is generated and distributed. Information gets lost and the sharing process is not uniformed, leading to problems for both patients and care professionals. It is therefore relevant to consider how a patient manages information surrounding their care journey.

2.4.1 Communication and Shared Decision Making

As mentioned previously, healthcare is a 'high-emotion service', where patients experience heightened fear and anxiety (Berry, 2019). During their healthcare journey, patients encounter many different methods for information sharing and communication, which differs between care providers. Alongside their heightened emotions, this can become very overwhelming. By giving patients a more active role in the decision-making process and care management, ease of care and increased treatment adherence can be achieved (Kraus et al., 2021; Stiggelbout et al., 2015).

An example of this active or person-centred care is shared decision making (SDM), where the patient and specialist discuss the treatment options together, and then make an informed decision based on the patient's preferences and values (Stiggelbout, et al., 2015; Robinson & Thomson, 2001). While SDM is more frequently used in chronic care (Kuijpers, et al., 2022), its principles are also applicable to general health care. The main principle of SDM is that the patient has all necessary information available, so that they can make the most informed decision possible (Kuijpers, et al., 2022). This means that, with the digitalisation patient information and accessibility to care all information is readily available for the patient in a digital database. This will also create the opportunity for all stakeholders in the process – the patient, medical specialists, GP, the patient's family – to take part in their role in treatment decision (Griffioen, et al., 2017). Increased influence on the decision-making process also increases patient adherence to the prescribed treatment (Légaré & Thompson-Leduc, 2014).

Additionally, Ekman et al., (2011) state three principles for providing person centered care:

1) patient narratives;
2) shared decision making;
3) documenting the narrative.

Person-centred care provides a platform for a patient to take a more active role in their healthcare process, which is tailored to their own preferences (Ekman, et al., 2011). In step 1, medical specialists ask the patient about their views on their life situation. In step 2, these views are combined with the sharing of experiences, after which the medical specialist and patient decide on a treatment plan together. Finally in step 3, all beliefs, values and experiences the patient shared are added to their medical record, which makes the preferences transparent to other care professionals. This provides validation of a patient's values and preferences in their own health journey. Including patients in their health journey takes the structure of healthcare away from the current paternalistic view, where patients are not included in their care journey, to a person centered structure.

In conclusion, the principles of shared decision making and person centered care can be applied to information sharing and communication during a patient's health journey, to facilitate treatment adherence and understanding. By including all actors in the process of digitalisation, more intrinsic motivation can be cultivated to make the transition to digital care.

2.4.2 eHealth Literacy

Health literacy refers to a person's ability to obtain, understand, interpret, and apply health information (Sørensen, et al., 2012). eHealth literacy is the digital application of health literacy, in for example electronic communication between patients and physicians, or patient portals (Kim & Xie, 2017). eHealth literacy has been found to influence the way patients process and retain information, as well as the quality-of-care patients receive when having competent eHealth literacy (Lu & Zhang, 2021). Adequate skills in this area can facilitate self-management and positively influences adherence, communication with physicians, information seeking and -quality (Lu & Zhang, 2021; Sørensen, 2012; Kim & Xie, 2017; van der Vaart & Drossaert, 2017).

In turn, insufficient skills in terms of eHealth literacy can have adverse outcomes on the treatment process, such as poor treatment adherence (Kim & Xie, 2017) and can make digital health-related resources difficult to use (Lu & Zhang, 2021). Age and education level have a negative correlation on a patient's eHealth literacy level (van der Vaart & Drossaert, 2012). Research has also shown that many online health information platforms utilise language which is above the average literacy level, making information difficult to understand for individuals with low health literacy (Kim & Xie, 2017). This only increases the unequal of access to care for individuals with low health literacy.

In conclusion, in a society where eHealth is increasingly used during healthcare (Sørensen, et al., 2012), eHealth literacy is an important factor to consider when aiming to improve digital interaction in healthcare. This means that educating both patients and healthcare professionals is important when implementing new digital technology. This gives patients the opportunity to improve the self-management of their health care journey, and ultimately improve the overall treatment experience. Language use on digital platforms should also be considered, to ensure equal access to care when transitioning to the use of digital healthcare platforms.

2.4.3 Information Retention

In high emotion situations, it can be difficult for patients to retain the information that is given to them about their care and treatment process (Berry, 2019). Research has found that 40-80% of medical information provided during a medical consult is forgotten by patients (Kessels, 2003; Visser et al., 2017). This can be further influenced by other factors, such as amount of information received (Khaleela, et al., 2020), terminology used during a consult (Kessels, 2003) or the way information is given to a patient (e.g. spoken or written). Kessels (2003) divides these factors into three groups: clinician-related factors, mode of information and patient-specific factors.

Clinician-related factors can be for example the language used during a consult. Difficult medical terminology can be difficult for patients to process during a consult (Kessels, 2003), and insufficient attention from medical specialists during a consult can prevent patients from retaining information (Black & Sahama, 2016). This can be prevented by using simple, easy to follow language during consults (Kessels, 2003).

Mode of information factors illustrate differences in the way patients receive information. If given verbally during consults, patients are likely to only remember the perceived most important information, such as the diagnosis (rather than the treatment methods) (Visser et al., 2017). Information found online during self-management can be overwhelming, with a large amount of information available (Moen, Chronaki, Martins, & Ferrari, 2022) and uncertainty surrounding the reliability of the information found (Kim & Xie, 2017). By providing reputable information directly through the medical platform, this uncertainty can be prevented.

Patient-specific retention factors are influenced by multiple elements, such as for example the emotional state a patient is in. Research has shown that a patient's stress levels are directly linked to the amount of information they retain; the more stress a patient has, the less information is retained (Kessels, 2003; Visser et al., 2017). Khaleela et al. (2020) also found that this related to the level of information overload a patient experiences, which negatively influences the amount of retained information. The level of information overload is linked to age, health literacy level and education level (Khaleela, et al., 2020), where people of higher age, lower health literacy and lower education level have an increased likelihood of experiencing information overload. Patient stress levels can be reduced by physicians, if they use non-threatening body language and take the time to ensure patient understanding during the consult (Kraus et al., 2021).

In conclusion, there are many factors that influence the retention of information during health consults (Figure 8). To mitigate the large amount of information that may be forgotten following a consult, simple language should be used, and sufficient time should be given for patients to process the information. Reputable information should also be provided by the healthcare provider, so the patient can read through this in their own time. Non-threatening body language and taking the time to explain diagnosis and treatment during a consult will help reduce patient stress levels.

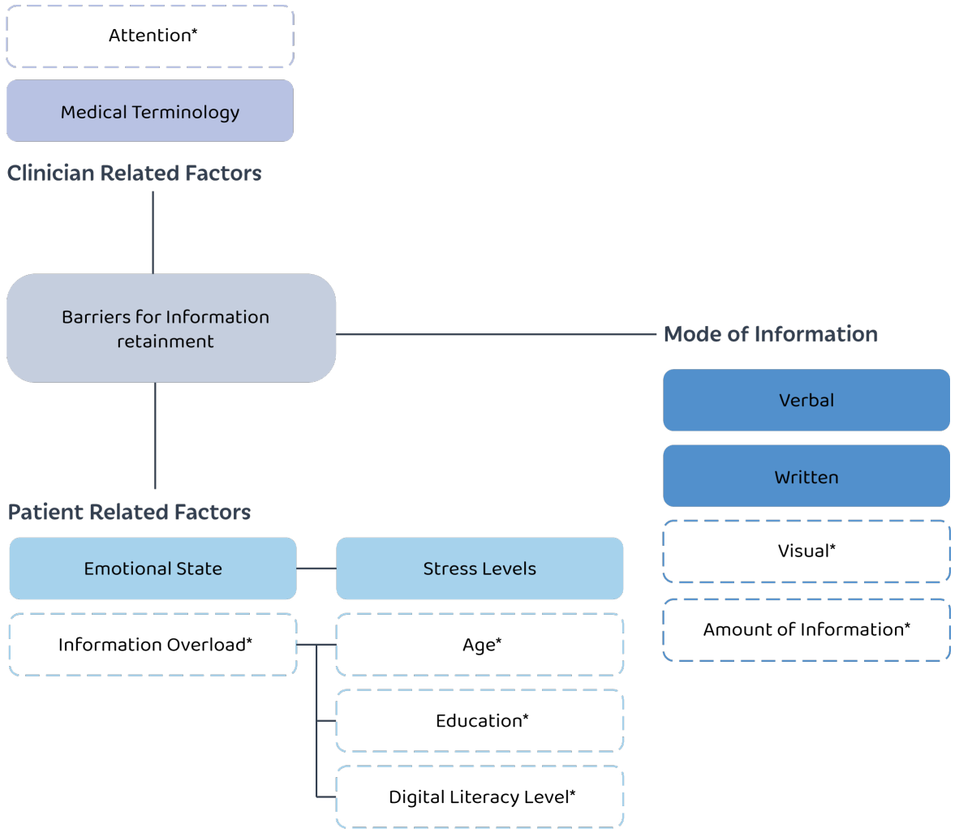


Figure 8: Barriers for information retention

Adapted from Kessels (2003): Patients memory for medical information. Journal of the Royal Society of Medicine 96, 219-222
**These topics are not from Kessels (2003), but added by the author based on expanded literature from paragraph 2.4.3*

2.5 Conclusion

This literature research was conducted to answer the research question:

1) What is the current state of digitalisation in healthcare?

The answer is as following: digitalisation is a relevant topic in healthcare with the rise in both new technology, and the use of existing technology, however it has become clear that healthcare is lagging behind in comparison to other organisations. The reason behind this is complex, and will be illustrated more thoroughly throughout this report, but the crux is this: to implement the new technology, a change needs to happen in the way healthcare is approached. Currently new technology is implemented without taking barriers for digitalisation or facilitators for digitalisation into account, which makes the implementation process much more difficult than it could be. The way patients receive and process information and are included in their health journey is also ready for a change from a paternalistic view of a patient, towards a process that is more patient-focussed. This is important with the growing pressure on healthcare, as patients can take (part of) the administrative burden from healthcare professionals. With the implementation of this change, care can become more person-specific, while still implementing more standardisation of the way information is shared at organisational level.

For the transmural ENT health journey a patient takes from GP to hospital, this means the patient will become more in control of their own health information and communication management.

03
Context Exploration

This chapter aims to create understanding surrounding the context of digitalisation of healthcare in the Netherlands. This is done through desk research (section 3.2), followed by observations and interviews with relevant stakeholders (section 3.3).

3.1 Method

To map the current context of healthcare provision in the Netherlands through a transmural health journey lens, a socio-technical systemic approach is taken. This means that human, social, organisational, and technological factors are considered during the analysis and design process (Baxter & Sommerville, 2011). This is relevant to do, as changes to a system are seldom effective when not all influential factors are considered (Sony & Naik, 2020). Organisations tend to make technological changes without considering how human-technology interaction will be influenced by this change, causing the changes to 'fail' as they provide insufficient support to the existing working procedure (Baxter & Sommerville, 2011). In this project, the system is analysed using the social ecosystem map defined by Jones & van Ael (2022), by categorising the insights from each section of research into this model. Three system levels are considered: micro, meso and macro (Figure 9).

Micro level concerns the three main actors of this research: the patient, the GP and the ENT care team at the RdGG. The healthcare organisations surrounding these actors are considered at meso level, such as the hospital or the GP practice. The macro level includes the healthcare legislation parties, insurance companies and for example the tech companies that design hospital information systems.

Once the desk research has been completed, observations and informal discussions were conducted to specify the system model to the current context at the RdGG. Based on these observations, a setup was made for semi-structured interviews. Once the interviews had been conducted, thematic analysis was applied to the transcripts, to identify reoccurring themes within each actor group.

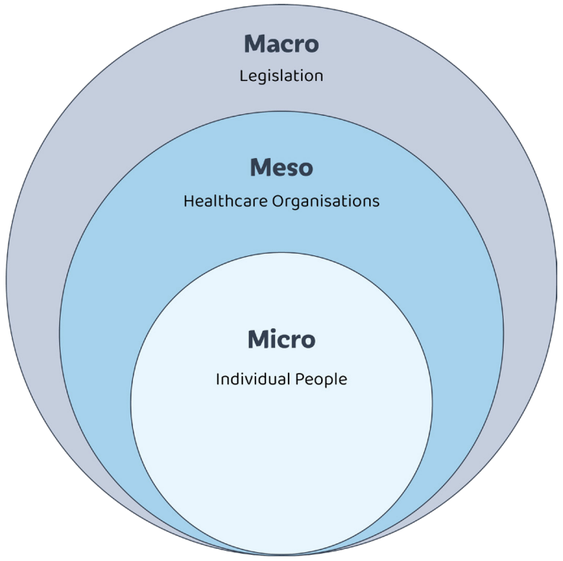


Figure 9: System model (Jones & van Ael, 2022)

3.2 Current Context

3.2.1 Healthcare System in the Netherlands

In the Netherlands, a patient will visit their GP when they have pain symptoms before possible hospital referral for non-traumatic incidents. They make an appointment at their GP's practice, and following the consultation it is determined whether a patient needs referral to what's called 'second line care'. This pertains to treatment at a hospital with medical specialists (MSs). This system has been put into use to reduce the high pressure second line care institutions, as the referral through the GP is meant to remove some of the burden from medical specialists. When a patient transitions from 'first line care' to 'second line care' (and sometimes to 'third line care' at specialised hospitals), this is referred to as a transmural health journey. Once it has been determined that a patient is going to be treated at a second line care organisation, a referral document is made on a platform called Zorgdomein (Zorgdomein, 2024). The referral is sent digitally to the correct second line care department, where triage is performed to determine which specialist the patient should see. The patient can then come to their appointment to be treated by a medical specialist.

Which patient information is transferred between healthcare organisations, is determined by the so-called 'Act of electronic data exchange in healthcare' (*Wet elektronische gegevensuitwisseling in de zorg*, WEGIZ) (Zorginstituut Nederland, 2024). Within WEGIZ, the Dutch ministry for public health, VWS, has determined that certain basic information, such as allergies and blood type should always be shared. This is done through a format called the 'basic patient dataset' (*Basisgegevensset Zorg*, BgZ) (Ministerie van Volksgezondheid, Welzijn en Sport, 2024). The BgZ is a form of electronic health record (EHR), available to any healthcare organisation treating a patient. The legislation surrounding information sharing falls under the 'macro' level of Jones & van Ael's (2022) system map.

At organisational level, the macro level, each hospital and GP's office have their own information system. These systems tend not to be interoperable, so platforms such as Zorgdomein are used when transferring information. Each organisation will typically also have their own patient portal, where health care professionals can communicate with their patients, or provide additional information. The way this platform is used, and which functionalities are available, is dependent on the organisation itself. This can be confusing for patients, as each health organisation will store information and communicate differently. This influences the micro level of the system map, where the three main actors communicate with each other (patient, GP and care team).

Some patients will also have their own information platform, called a 'personal data environment' (*Persoonlijke Gezondheidsomgeving*, PGO) where they can request to view part of their own health data. While the new legislation is intended to make patient information accessible between care providers, patients still don't have access to their full patient information (Moen, et al., 2022), even after the implementation of BgZ. The patients' PGO only contains certain information that their healthcare provider has pre-approved, not their full health history (Nictiz, 2024). Because of the open market in the Netherlands, there are over 20 PGOs

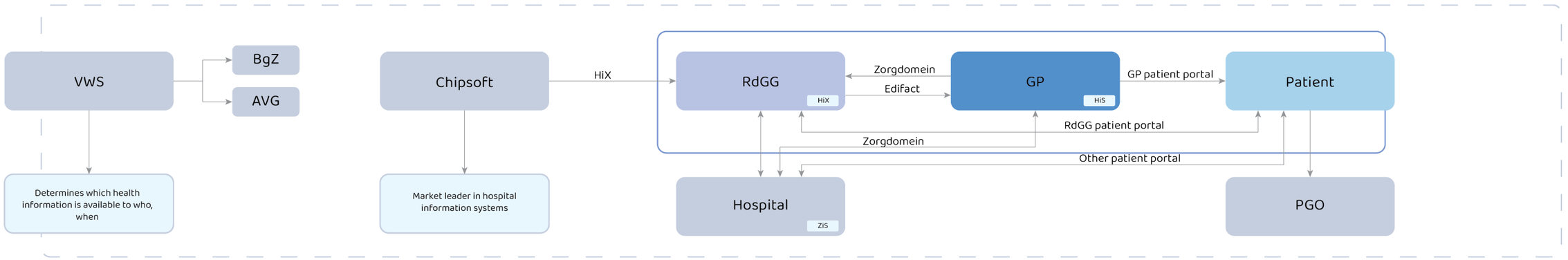


Figure 10: Current healthcare system context

that a patient can choose from (MedMij, 2023). Not all PGOs have the same functionalities; patients make a choice based on feature preferences. This decision is also influenced by the interoperability with the platform their healthcare providers have chosen. This example illustrates the complicated forms of communication patients must face when managing their own health journey and information. So, although efforts have been made to improve information sharing in the healthcare system (Figure 10), clear information seeking remains a challenge for both patients and healthcare providers.

3.2.2 Observations and Informal Discussions

While the literature review is relevant to understand the current state of the healthcare field regarding digitalisation, observations were done to specify this to the actual state of digitalisation at the RdGG. These were conducted at the outpatient clinic for ear, nose, and throat (ENT) treatments. Observations were also conducted of progress meetings regarding digitalisation at the hospital. The researcher initially adopted an observational role, and asked questions afterwards for clarification.

Preceding the observations, informal interviews were conducted to understand the way digitalisation is regarded at the RdGG. The interviews were done with people with the following job titles:

- Manager of the Transmural Care Office
- Innovation Manager, Research Advisor
- Project Lead ICT, Functional Management
- Project Manager ICT

The interviews were partially used to create the observation tables below (table 1 and 2), as well as to search for people to interview at organisational level. The following goals were set up for observations:

- Observe how medical specialists use the hospital information systems during their workflow
- Observe/ ask how medical specialists communicate with patients
- Observe/ ask how medical specialists give information to patients
- Observe/ ask how medical specialists communicate with other care professionals
- Observe general workflow at the ENT outpatient clinic

Based on these goals, two observation tables were made: one for internal (care professional) interaction and one for external (patient- care professional or between care professional) interaction. General observations or topics mentioned concerning digitalisation or technology were noted.

Internal Functionality HiX	Used? Y/N
Register + call patient	N
Opening, checking and closing orders	Y
Internal referral	Y
Zorgdomein: Triage + online working list	Y
Use of Q&A section	Y
Communication between MS and outpatient clinic employee	Y

Table 1: Internal care professional interaction

Internal Functionality HiX	Used? Y/N
Use of patient portal	Y
Patient asks questions on patient portal	N
Digital folders	Y
Questions via email/ phone	Y
Video/ phone consults	Y
Patient permission for sharing information	?
Use of zorgplatform	Y
Repeat prescription via patient portal	Y
Send prescription to pharmacy	Y
Patient can plan own appointments on patient portal	Y
Use of digital appointment confirmation	Y
Use of E-consult	Y

Table 2: External patient - care professional interaction

3.2.3 Outcomes

At the beginning of 2024, the hospital implemented a 'digital unless' strategy, where all information is to be done digitally unless explicitly requested by the patient. In March, it became possible to plan appointments on the patient portal. At the time of observations, this functionality had not yet been implemented. The most important outcomes from the observations are described below, organised into themes.

System Complications

While doctors do want to use the possibilities the system provides to aid their workflow, often the system is too slow to use them efficiently. An example of this is the calling function, which is a button doctors can use to call the next patient to their room. However, this functionality is very slow and disables the use of the rest of the screen when pressed. It takes a few minutes to load, which takes up too much of the time allocated to each patient. The doctor cannot prepare for the patient at the same time either, as all information is blocked by the calling function.

Another example is the ease of use of the system. The doctors occasionally had difficulty finding the information they were looking for, as the place where the information was stored had changed. While the doctors received an email with the changes to the information system, they did not have enough time to read through them or spend time discovering how the new functionality worked.

The way the hospital system works differs between outpatient clinics. The functionalities are in different places, and while this is meant to be tailored to the platform use for each outpatient clinic, it means information is stored and communicated differently. When making a referral to another clinic, the transferred information is often incomplete, requiring a phone call to the other department for additional information.

Administrative Burden

During the past transition into the digitalisation of the hospital system, the basic system was expanded with new functionalities when problems arose. This means the current system is comprised out of many different buttons that sometimes show the same information, and it can be confusing when trying to find certain information. While medical specialists are used to the system and know where to find the necessary information, it is not an intuitive system, and is quite outdated in its use. Most of the system is also not automated, which means hospital

workers spend a lot of time filling in information by hand in the correct box. Information is also repeated in different areas. Some buttons are automated, but the user then must double check the information used, as it can sometimes be out of date. Doctors say that they almost spend just as much time filling in the administrative part of care as they do in patient treatment.

Lack of Time

It is no surprise that hospitals are very busy places. Some clinics have waiting lists that are months long, and almost everyone must spend time in a phone queue when calling the clinic. At the ENT clinic, each patient has 7.5 minutes to speak with the doctor, and each doctor sees patients back-to-back for four-hour shifts. The burden on healthcare is only going to get bigger, with the growing and ageing population and shortages of care workers. It is therefore important that the time management is done as efficiently as possible, which means a lot of care workers do not want to try new digitalisation technology. They simply do not have enough time in their day to still efficiently see patients for treatment, as well as try new things that have a high chance of not working.

Top-Down Digitalisation Push

When initially working towards digitalisation in healthcare, the hospital wanted to try and use a bottom-up approach to the implementation of digitalisation. This didn't work however, as care workers don't have enough time in their day to put effort into the development and implementation of digitalisation while still completing their main tasks. People tend to keep using processes that are familiar to them. This meant that digitalisation did not get enough traction, and the hospital fell behind on its implementation schedule. Now, a push is being made for top-down implementation of digitalisation and implementing new technology and workflows hospital wide at once. An example of this is the recent implementation of the 'digital information, unless…' rule, where all information must be given to patients digitally (unless they explicitly ask otherwise). The implementation of the digital appointments is another example of this, healthcare workers did not feel the necessity of making this change, saying that the current method of making appointments by phone worked well enough.

3.2.4 Conclusion

The observations lead to the identification of four themes: '*System complications', Administrative burden', 'Lack of time',* and *'Top-down digitalisation push'*. Medical specialists have difficulty with the available technology, mentioning that the system is too slow to facilitate their workflow (which has a fast turnaround), that the system is difficult to use and administrative differences between outpatient clinics during internal referral. Medical specialists spend a lot of time completing administrative tasks, such as summarising the treatment recommendations following the consult, rather than fulfilling their main task of treating patients. Medical specialists simultaneously do not have enough time to properly prepare the following consult, as the administrative tasks from previous consults take up the precious time between consults. Finally, medical specialists mention that the implementation of more digitalisation within the hospital comes from management, 'from above', without consulting the actual workflow in outpatient clinics. These observations were considered when setting up interview questions (Appendix B).

In conclusion, medical professionals are busy people with a high workload, which the current technology does not properly facilitate. While medical specialists are open to trying new technology, it must support their workflow and not increase their workload even more.

3.3 Interviews

As the previous observations were regarding the use of the hospital information system at the outpatient clinic ENT, interviews were done with four groups of people to create a holistic understanding of the interactions all actors have with digitalisation in healthcare. The three main actors are included in this (ENT patients, GPs and ENT medical staff), as well as digitalisation staff at the hospital. Interviews were 20-30 minutes long and contained questions regarding digitalisation and how the actors interacted with each other during the care process. These were semi-structured interviews, following an interview guide (see Appendix A). This structure was chosen to ensure the research questions were answered, while still leaving room for exploring any unmentioned subjects that were still relevant for the research (Adeoye-Olatunde & Olenik, 2021). The participants were selected with maximum variation sampling, and for patients within the age group of 18-70 years old. This age range was chosen to be representative of the largest group of patients that visit the hospital each year (VZ Info, 2023). Interviewing children would bring in their parents as additional stakeholders, which would make interaction analysis complicated. People above the age of 70 are generally assumed to be less digitally competent (van Giesen, Verheijen, & Prüfer, 2023), which would have an influence on the outcome that is not representative for the largest part of the population.

As this is an explorative study, the aim was to interview a sample size of 3-5 participants. The first 5-10 interviews have been shown to have the most relevant data for a study (Longhurst, 2003), which was considered when selecting participants.

3.3.1 Target Group

Patients

The first group of actors to be interviewed were patients. To ensure variation within the sample size, age, gender, and digitalisation skills were considered. As mentioned previously, patients between the ages of 18 and 70 were interviewed. In the selection, the aim was to have an equal amount of male and female patients, with varying digitalisation skills and use of technology. Following the METC approval, a timeslot was booked within the ENT clinic to conduct interviews with patients. Based on the previously mentioned criteria, several participants were selected, who the researcher then provided with information concerning the interview topic and information shared (Appendix A and C). Five patients agreed to an interview.

Care Team at RdGG

To provide an insight into the perspective of digitalisation from the point of view of healthcare providers, interviews were conducted within the ENT clinic at the RdGG. The emphasis was on doctor's assistants and receptionists, as the doctors had already been included in the observations previously. Four people on the care team agreed to an interview, whose functions are explained below.

1. Doctor's Assistant and Receptionist
2. Doctor's Assistant and Receptionist
3. Administration Employee
4. Medical Specialist

General Practitioners

To provide an insight into the first part of the care process the patient encounters, GPs were also interviewed on their care process and interaction with digitalisation and technology in their daily practice. During the selection, gender and digitalisation skills were varied to insure variation of participants. GP's were provided a short informational folder before agreeing to an interview (Appendix D). Six GPs agreed to an interview.

1. Male, 55-65, Nootdorp
2. Male, 40-50, Delft
3. Female, 40-50, Delft
4. Male, 40-50, Leidschendam
5. Female, 40-50, Delft
6. Male, 40-50, Pijnacker

Digitalisation Staff

To determine the further state of the field from the perspective of the facility management at the RdGG, interviews were conducted with some of the staff from different positions within the company. Seven employees agreed to an interview, with the following functions.

1. Program Manager Functional Management, focus ICT and HiX implementation
2. Advisor Quality & Safety, focus digitalisation
3. Project Manager Transition of Healthcare, focus moving to digitalisation in healthcare
4. Team Lead Reception and Volunteer, focus on implementation of Digipunt
5. Project Manager Change Agency, focus on patient inclusion and participation
6. CNIO, focus introducing digitalisation to nurses
7. Advisor Quality & Safety, focus digitalisation and patient participation

3.3.2 Preparation

In preparation for the interviews, two interview protocols were made. One for patients and one for GPs, hospital workers and digitalisation staff. An interview guide was also made to facilitate the semi-structured interviews (see Appendix A). For the interviews with the patients, a simplified patient journey template (Figure 11) was made with possible actors, and methods of communication. This was printed on A3, and the communication tabs were cut out. The patients could write their personal journey timeline on the template, also demonstrating the amount of time between each step of the process. Then, using the communication tabs, they could visualise which methods of communication were used for each part of the process, giving an indication of which digital platforms they use. The simplified patient journey was made as a visual aid to bring up tacit knowledge surrounding the interactions with their care professionals during their care journey so far (Melles et al., 2021; Sanders & Stappers, 2012).

Figure 11: Interview template

04
Analysis

This chapter contains the analysis of the interview data. First, the use of patient journey mapping was explained, followed by the description of the use of thematic analysis. Finally, the second sub-research question is answered.

The analysis of the visual data, interview data and observations was done in a few different steps. First, the visual data from the simplified patient journey used in the interviews was compiled into a single overview. This was then used to form the basis for the full patient journey, which included the perspectives of the three involved actors. Simultaneously, thematic analysis was conducted for each interviewed target group. A code tree was made for each target group separately, to ensure all data was fully included in the analysis. Each code tree was separated into current scenario surrounding the implementation of the digital transition, and an envisioned future scenario (by the interviewees) surrounding digital patient- care professional interaction.

4.1 Simplified Patient Journey

The simplified patient journey used in the interviews contained the basic parts of a patient journey: the actors and a timeline (Simonse, Albayrak, & Starre, 2019). This was done to prevent information overload, as the visual was meant to facilitate the conversation surrounding the patient's care journey. For analysis, each patient was given their own colour which was applied to the elements of their patient journey, to be able to trace back each step to the patient. Then the information from all patients (Appendix E) was combined into one visual (Figure 12).

Based on this analysis, the conclusion can be made that each individual has their own care journey, and that steps in the treatment procedure cannot be standardised. What can be generalised, and included in the patient journey, are the process steps patients take during their ENT health journeys.

1. The patient makes an appointment at their GP's office. This is done on the phone, or via the GP's portal, dependent on the GP's preference.

2. Following the consult at the GP's office, the patient makes an appointment at the ENT clinic. This once again varies from patient to patient; sometimes the patient calls the clinic, sometimes the clinic calls them, sometimes they make an appointment via the hospital portal, and occasionally the patient receives a physical letter instructing them to make an appointment.

3. The patient looks for information regarding their procedure. Once again, the method and outcome vary per patient.

4. The patient goes to their consult at the ENT clinic. Patients mention that their appointment information can be found in different places: in their email, from a physical letter, or in the patient portal.

Using this information, a full patient journey was completed following these care journey steps.

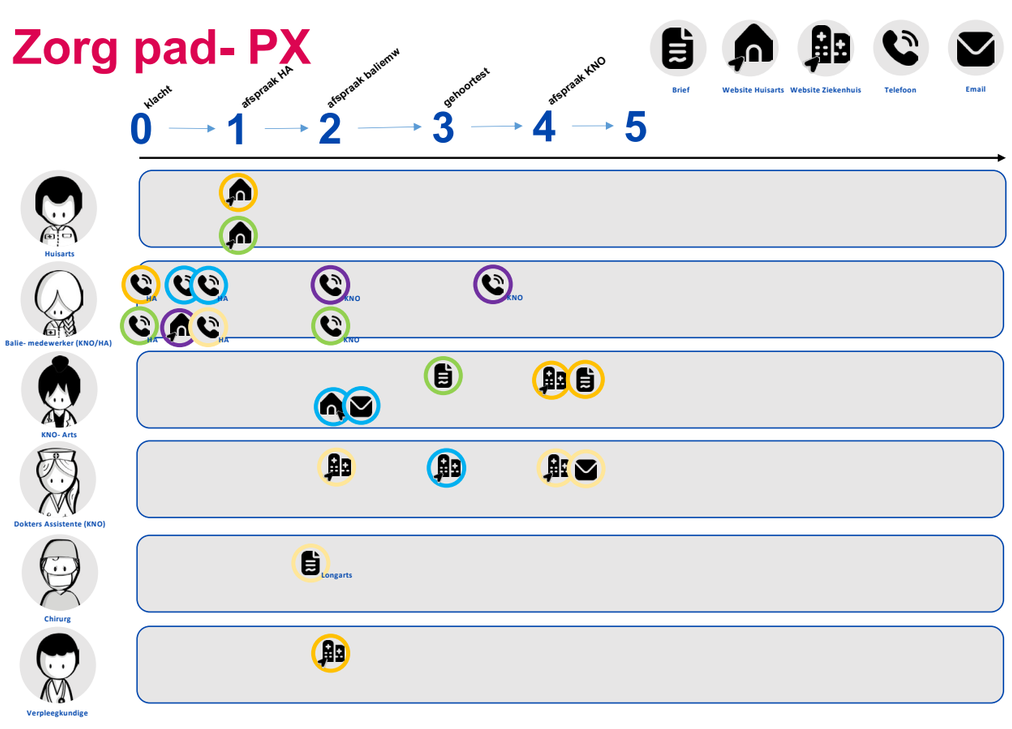


Figure 12: Interview guide filled in with all patient information

4.2 Full Patient Journey

To create an overview of the journey a patient makes during their ENT care path, a patient journey was made. The five maps collected from the interviews were then combined and analysed into a single basic patient journey (Figure 12). This was then used with data from the interviews with GPs and ENT staff, to create the full patient journey map. The full patient journey map can be found in Chapter 6.1, with an expensive explanation of each step.

Patient journey mapping integrates the patient's perspective on the use of a product or service, which facilitates insights into the patient's health journey (Simonse, Albayrak, & Starre, 2019). This is where design brings novel information into a patient journey. By including the perspectives of multiple stakeholders, a patient journey brings to the treatment process human insights, which have an influence on the way the journey is experienced by stakeholders. Using these insights, points in the map can be identified where opportunities are to improve (parts of) a patient's journey (Ly, Runacres, & Poon, 2021). A patient journey map includes interactions with relevant stakeholders, interactions with technology and experienced emotions. Within this project, the identified pain points and opportunities from the patient journey map can be linked to influencing factors from other system levels. By doing so, changes at organisational level can be shown to influence changes at personal level within the patient's journey.

4.3 Thematic Analysis

Following the interviews, the transcripts were coded, then analysed using thematic analysis. To ensure a replicable systematic approach (Nowell et al., 2017), the thematic analysis was conducted following the process described by Braun & Clarke (2006). Qualitative research is subjective based on the researcher conducting the analysis, which makes it important to take a replicable approach to ensure the generation of insightful and trustworthy research findings (Nowell et al., 2017). Thematic analysis is said to be a useful method for "examining the perspectives of different research participants" (Nowell et al., 2017, p. 2), which is relevant in this research which includes four different interviewed target groups. However, the analysis was performed separately, then later combined once relevant themes had been identified concerning the digital transition of interaction in healthcare. In this analysis, an inductive strategy was used, where the codes and themes were made dependent on the topics mentioned by participants, rather than from analysed theory (Braun & Clarke, 2006).

Braun & Clarke's (2006) method for thematic analysis follows six steps:
1) familiarising yourself with the data;
2) generating initial codes;
3) searching for themes;
4) reviewing themes;
5) defining and naming themes;
6) producing the report.

Braun & Clarke (2006) structure thematic analysis as a linear process, however it will be used iteratively for this project. The first two steps were conducted during the transcription process of the interviews. Then in the initial analysis, steps three and four were completed, organising the codes into clusters. Steps five and six were performed iteratively, first sorting the clusters into current situation and future situation. Then the clusters were organised into categories and themes. The categories often had sub-categories within them, which were defined and organised to ensure they were supported by at least three quotes from the interviews.

4.4 Conclusion

Based on the interviews, the following research question can be answered:

2) What are the current forms of interaction that a patient encounters during their transmural ENT health journey between a GP the hospital?

A patient has different methods for interacting with care professionals, depending on what is available to them. Generally, this one of the following options:

- Phone call
- Email
- Physical Website
- GP patient portal
- Hospital patient portal
- In-person contact (at the front desk)

The form of communication and amount of information available for the patient for each interaction method is determined by the concerning care professional. GPs, for example, can make their own choice whether appointments can be made by phone or on the GP patient portal, which is largely dependent on personal preference. This becomes a problem when a patient encounters multiple care professionals and/ or organisations, such as is the case during transmural health journeys. In-depth implications for these different communication methods are further explained in chapters 5 and 6.

05
Results

This chapter discusses the results of the previous analysis, and their relevance to creating the final design. The outcomes from the analysis of each target group are discussed. Finally, a description is provided of how the results will be used to define the design brief.

5.1 Digitalisation at RdGG, organisational perspective

To analyse the quotes from the digitalisation staff, the codes were split into themes and categories, visualised by a code tree (Figure 13). The left-hand side of the tree is the current scenario surrounding the digital transition of interaction, and the right-hand side is the envisioned future scenario. The analysis following from interviews with digitalisation staff had the largest number of codes (n=179). During coding, several quotes were excluded, as they were no longer relevant (n=7). Within the current situation, four themes were identified: *'Organisational Barriers'*, *'Person-Specific Barriers'*, *'Literacy Barriers'*, and *'Expectational Barriers'*. Each theme was split into categories (n=13) and sub-categories (n=33). The sub-categories were not included in the code tree but used later in the synthesis map to illustrate their influences other categories. For the future scenario of healthcare, two themes were identified: *'Aid to Physical Care'* and *'Proactive Care'*. Once again, the themes are split into categories (n=7).

There are four defined themes surrounding the current situation surrounding the digital transition of interaction at the hospital, seen as barriers for this transition:

- Theme 1, *'Organisational Barriers'* uncovers the bottlenecks at organisational level for the digital transition of interaction at the hospital.
- Theme 2, *'Person-Specific Barriers'* illustrates the bottlenecks at personal level for the digital transition of interaction at the hospital.
- Theme 3, *'Literacy Barriers'* demonstrates how digital and physical literacy affect people's ability to facilitate the digital transition of interaction at the hospital.
- Theme 4, *'Expectational Barriers'* shows how expectations of technology and of others influence the digital transition of interaction at the hospital.

There are two defined themes surrounding the future of healthcare, with the digital transition completed:

- Theme 5, *'[Digitalisation as an] Aid to Physical Care'* concerns the categories which digitalisation staff would like to see as part of healthcare in the future or influence the future of healthcare.
- Theme 6, *'Proactive Care'* uncovers the expectation that healthcare in the future is going to be more patient-centred, proactive care.

5.1.1 Organisational Barriers

This theme consists of five categories: *'System Connectivity'*, *'No Responsible Party'*, *'Lack of Time'*, *'Lack of Money'* and *'Department Specific Protocol'*. It was mentioned that technological systems are interoperable, and that digitalisation is being prevented by privacy and security legislation (n=3). One person states:

"Digitalisation is being prevented by backlogs in the links between new and old technology." (Digitalisation staff member 7)

According to digitalisation staff, the transition is also being prevented by lack of responsibility surrounding digitalisation, and difficulties in determining which person should take on the role of the digitalisation transition (n=4). A staff member states:

"Digitalisation is being prevented because no one feels responsible for it." (Digitalisation staff member 4)

Lack of time and money is not surprising within the medical field, and this is supported by statements staff members made during their interviews (n=7):

"Care workers have a high workload, and don't get enough time to think about digitalisation." (Digitalisation staff member 1)

Department specific protocols also are mentioned to be a barrier to the implementation of digitalisation at the hospital (n=3):

"Not every clinic uses the technology in the same way, the amount of use of technology is dependent on the type of illness a patient has." (Digitalisation staff member 6)

5.1.2 Person-Specific Barriers

This theme consists of four categories: *'ICT – Care Worker Clash'*, *'Care Worker Reluctance'*, *'Care Worker Fear'*, and *'Care Worker Ignorance'*. As will be demonstrated later, most of these categories heavily influence one-another.

The ICT – Care Worker Clash (n=7) is influenced by a few factors: the physical distance between the departments, differences in priorities, and the perceived sense of urgence felt by each party:

"For care workers patient treatment comes in first, digitalisation or change is not one of their priorities." (Digitalisation staff member 2)

Care worker reluctance (n=12) is mentioned to be influenced by the profile care workers have, their closed mindset and stagnant work processes. Someone stated:

"If the old work process works, why would you change it?" (Digitalisation staff member 6)

Care worker fear (n=4) is said to be influenced by fear of job replacement by technology, unfamiliarity surrounding technology and fear of an increased workload. A worker said:

"People are scared that digitalisation is going to take over their jobs." (Digitalisation staff member 7)

Finally care worker ignorance (n=4) is formed by lack of knowledge surrounding new digital possibilities and not learning about digitalisation:

"Digitalisation is being prevented because care workers are not deepening their understanding of it." (Digitalisation staff member 4)

5.1.3 Literacy Barriers

Literacy barriers are split into two categories: *'Digital Literacy'* and *'Physical Literacy'*. These two categories are linked, because aspects of physical literacy also (in) directly influence digital literacy. This category concerns and is relevant for both care workers and patients.

Digital literacy (n=9) is concluded from interviews to be mostly influenced by familiarity and digital experience, but also influenced by physical literacy factors (n=4) such as age, education level, spoken language and ability to describe symptoms. For example, someone states:

"Staff must have good digital skills in order to implement digitalisation." (Digitalisation staff member 6)

5.1.4 Expectational Barriers

This theme consists of two categories: *'Expectations About Digitalisation'* and *'Assumptions About Others'*. Once again, these categories are applicable to both care workers and patients.

Expectations about digitalisation (n=5) include the expectation that information is readily available, the technology is easy to use, and that the technology works:

"Care workers expect a lot from digital possibilities, but it cannot be too complicated [to use]." (Digitalisation staff member 1)

Assumptions about others consists of two subcategories: workers assume patients are not capable (n=4) and patients are capable (n=11). Someone states:

"Patients are further at [developing their digital skills] than care workers are." (Digitalisation staff member 1)

5.1.5 Aid to Physical Care

Five categories were identified surrounding the future scenario of digitalisation as an aid to physical care: *'Human Connection', 'Patient-Self Management', 'Complex Care', 'Time to Digitalise'* and *'Process Uniformity'*.

In future care, it is important to keep the human connection as a part of care (n=5). Patients will take over more of the management of their healthcare process (n=13) to provide an aid to the increasingly complex care (n=10). Care workers need more time to spend on digitalisation (n=4) and processes have to be made more uniform (n=7) to be able to keep up with the growing number of care cases.

5.1.6 Proactive Care

Two categories were defined within this theme: *'Culture Change'* and *'Supportive Technology'*.

In order to facilitate self-management of care for patients, a culture change needs to take place (n=7). Healthcare currently provides reactive care (care is provided once symptoms have arisen) (n=5), and technology needs to be supportive of this change in care provision (n=6).

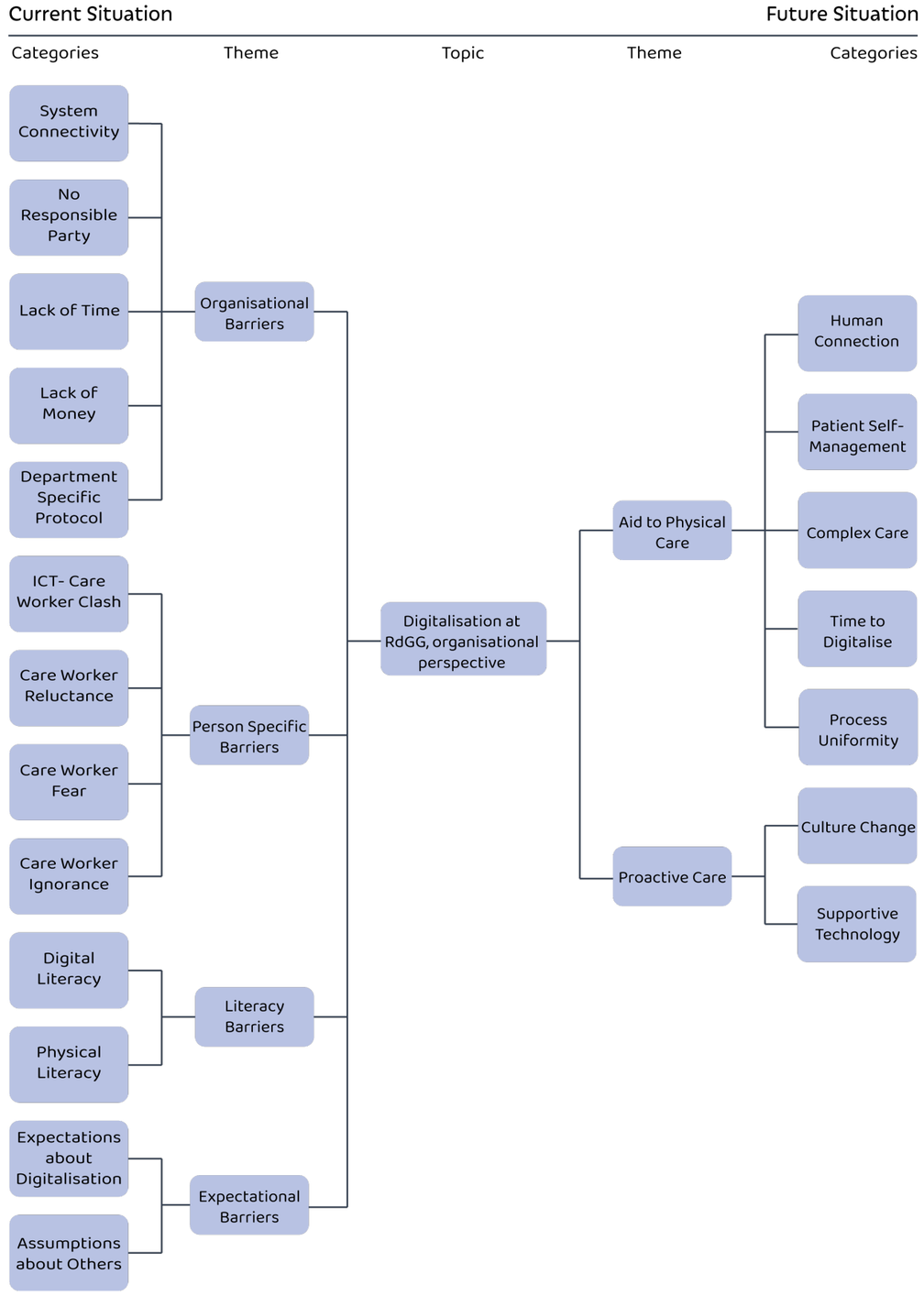


Figure 13: Code tree for digitalisation at RdGG, organisational perspective

5.2 Digitalisation at the ENT Clinic at the RdGG

Based on interviews with the ENT care team, codes (n=57) were clustered into four themes regarding current digital interaction and three regarding future digital interaction (Figure 14). Each theme was divided into categories (n=16). The four themes mentioned regarding the current digital interaction are as follows: *'Internal Technology'*, *'Treatment Procedure'*, *'Policy Management'* and *'Patient Literacy'*.

- Theme 1, *'Internal Technology'* contains codes surrounding information sharing and connectivity. Participants state that there is insufficient system connectivity, which hinders their ability to provide care.

- Theme 2, *'Treatment Procedure'* explains the procedure that the ENT clinic uses when treating patients, and possible barriers that arise during treatment in terms of digital interaction.

- Theme 3, *'Policy Management'* elaborates on care professional's view regarding the implementation of digital interactions in their treatment process.

- Theme 4, *'Patient Literacy'* highlights the importance of patient literacy when providing care, indicating that their ability to describe their symptoms influences the ENT treatment process. Language spoken and education level were also mentioned within this category.

For future digital interactions during healthcare, three themes were defined: *'Shared Case File'*, *'Complex Care'* and *'Aid to Physical Care'*.

- In theme 5, *'Shared Case File'*, care professionals mention that a shared case file would facilitate the treatment process, as there would be less steps to take when reviewing patient information. They distinguish here between a shared patient file and a shared file for professionals.

- In theme 6, *'Complex Care'* care professionals mention the population increase and shortage of caregivers, making providing care difficult. They also mention that the complexity of care problems is increasing, with patients seeking treatment from multiple outpatient clinics simultaneously.

- Finally in theme 7, *'Aid to Physical Care'* care professionals mention the importance of retaining humanity in care in the future, and how technology and communication influence the treatment process. Information provision is also mentioned to be important when treating patients, so patients can prepare before consults to save time.

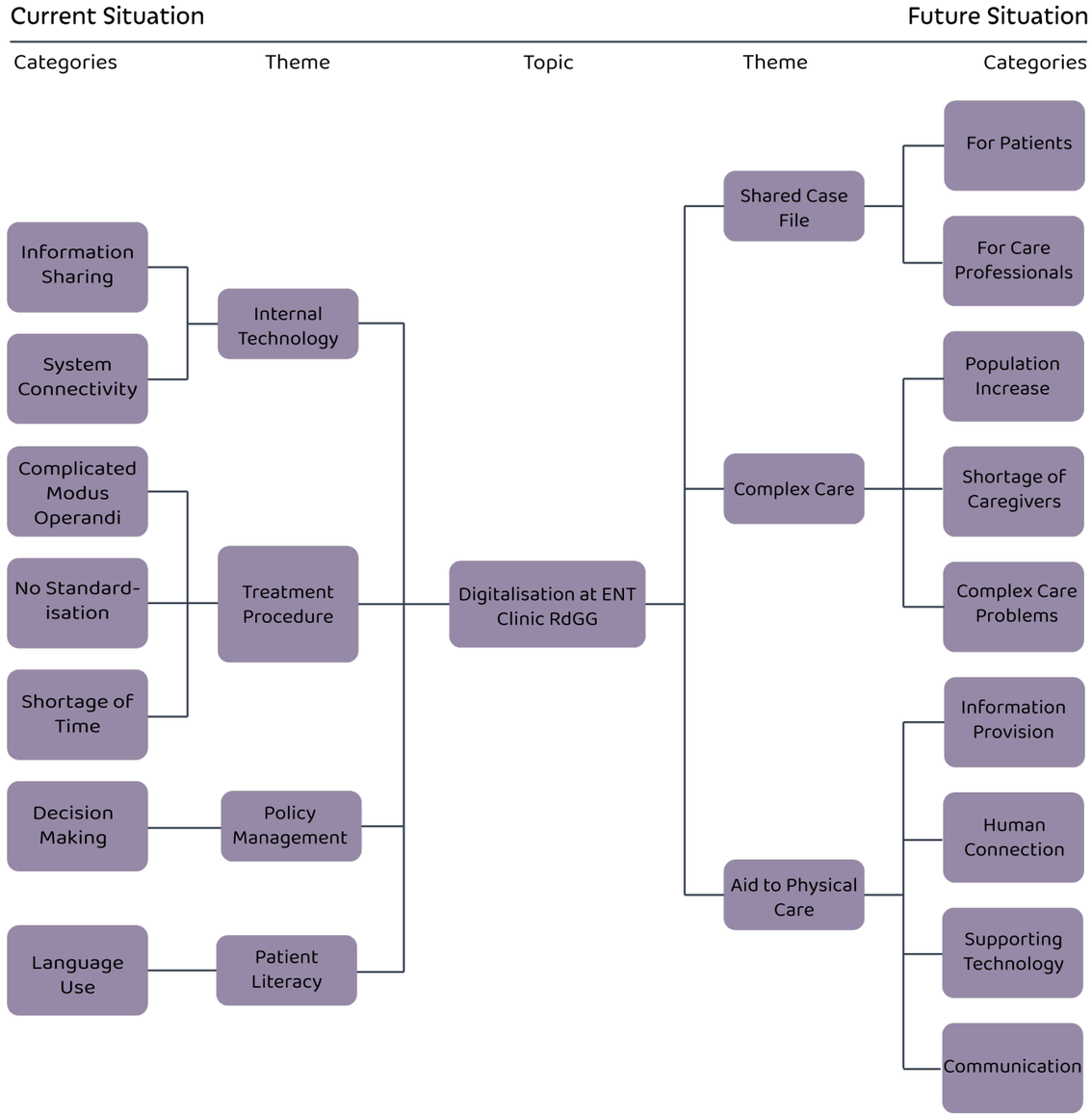


Figure 14: Code tree for digitalisation at the ENT clinic at the RdGG

5.3 Digitalisation at GP practices

This topic summarises the interviews with GP's, with the codes (n=140) clustered into current themes (n=3) and future themes (n=3), and categories (n=15) (Figure 15). For the current state of digital interactions at GP practices, the following themes were identified: '*Internal Technology'*, *'National Technology Legislation'* and '*Patient Literacy'*.

- In theme 1, '*Internal Technology'*, GPs mention that the peer-to-peer consultations with medical specialists at the hospital provide a good respite for the long waiting times from traditional referral. They mention their procedures surrounding digital appointment making (although this differs per GP) and that their treatment process has become more complicated in the past few years.

- Theme 2, '*National Technology Legislation'* touches upon how legislation affects a GPs treatment process. They mention that lack of system connectivity and interoperability is a large problem, as is lack of standardisation of practice and communication. Unknown care professional availability is also mentioned to be a problem, making it difficult for GPs to contact other care professionals.

- Theme 3, '*Patient Literacy'* highlights how literacy affects a GPs treatment procedure and digital interaction, largely influenced by education level and language use.

For future digital interactions at the GP practice, the themes *'Shared Case File', 'Complex Care',* and *'Aid to Physical Care'* were defined.

- In theme 4, '*Shared Case File'*, GPs mention their preference towards a shared case file with both professionals and patients. Having a shared case file with other care professionals would facilitate the care a GP provides, removing the necessity for duplicate testing and clarity and insights on treatments a patient receives from others.

- Theme 5, '*Complex Care'* once again touches upon population increase and shortage of caregivers, with the emphasis on the large burden GPs carry in their patient's treatment process. Increasing complex care problems is also mentioned as an influencing factor.

- Finally in theme 6, '*Aid to Physical Care'* GPs explain how digital interaction has aided their care practices so far, and how it could aid it in the future. GPs emphasise the need for human connection in care, with technology playing a supporting role to physical care.

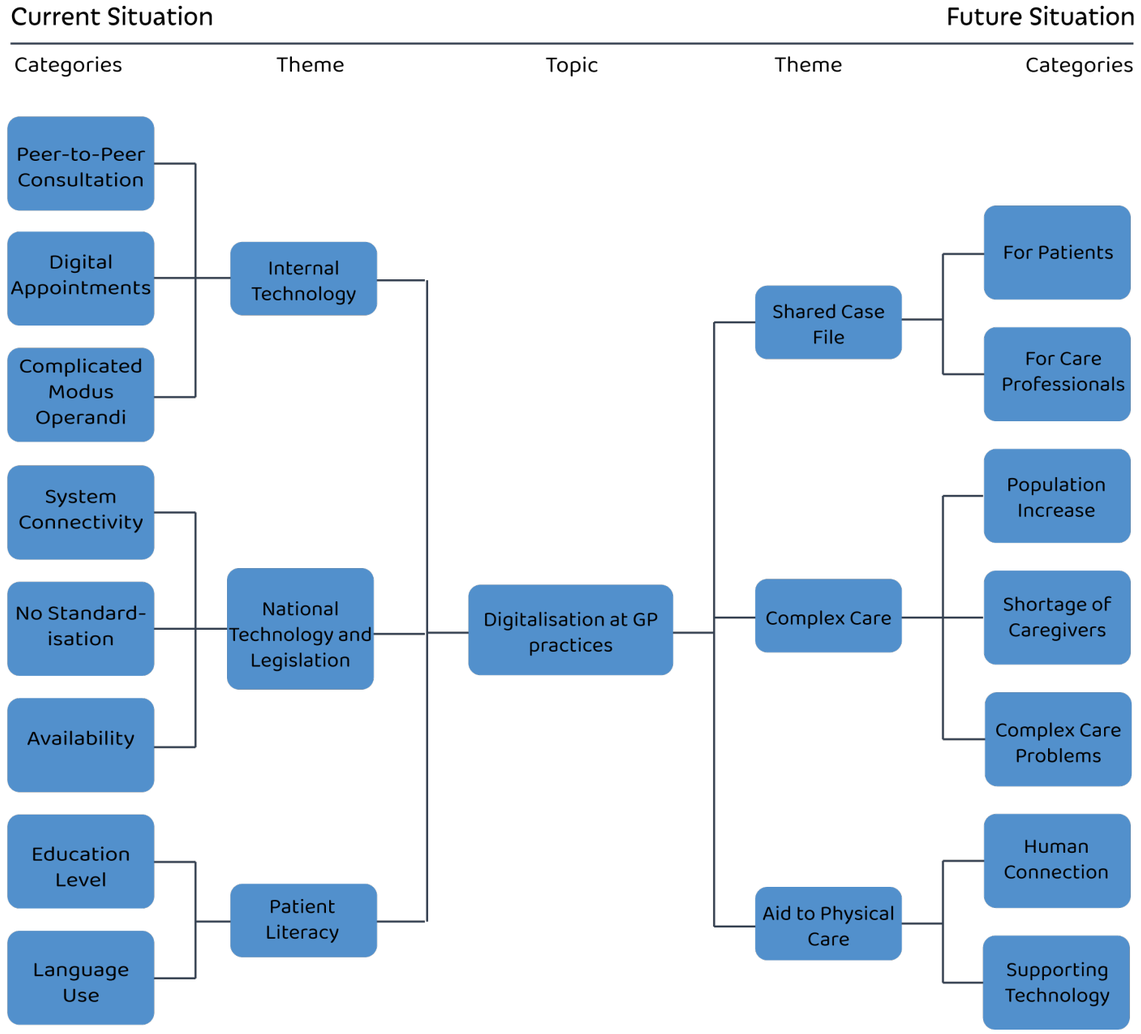


Figure 15: Code tree for digitalisation at GP practices

5.4 Digitalisation of Healthcare Management for ENT Patients

This group of interviewees had the smallest number of codes to analyse (n=43), as part of the interview data was previously recorded on the simplified patient journey. The code tree for ENT patients (Figure 16) is divided into the current state of digital interactions during a patient's ENT care journey, and future digital interactions. This is further divided into themes (n=4) and categories within the themes (n=7). In the current digital interactions, two themes were identified: *'Healthcare Management'* and *'Patient Literacy'*.

- In theme 1, *'Healthcare Management'* patients explain how digital technology paid a role in their interactions during their care journey. This was focussed on how patients communicated with care professionals (GPs and ENT clinic care professionals) and how information surrounding treatment was provided.

- Theme 2, *'Patient Literacy'* touches on patient's view on digital literacy, touching upon age, familiarity, and education level.

For future digital interaction, two themes were identified: *'Aid to Physical Care'* and *'Shared Case File'*.

- In theme 3, *'Aid to Physical Care'*, patients mention the importance of human connection in healthcare. They also pinpoint the digital availability of healthcare professionals in the future, making it possible to receive care more quickly than is currently possible.

- In theme 4, *'Shared Case File'*, patients express their wishes to be able to see their entire case file in the future, without having to ask the GP for the information.

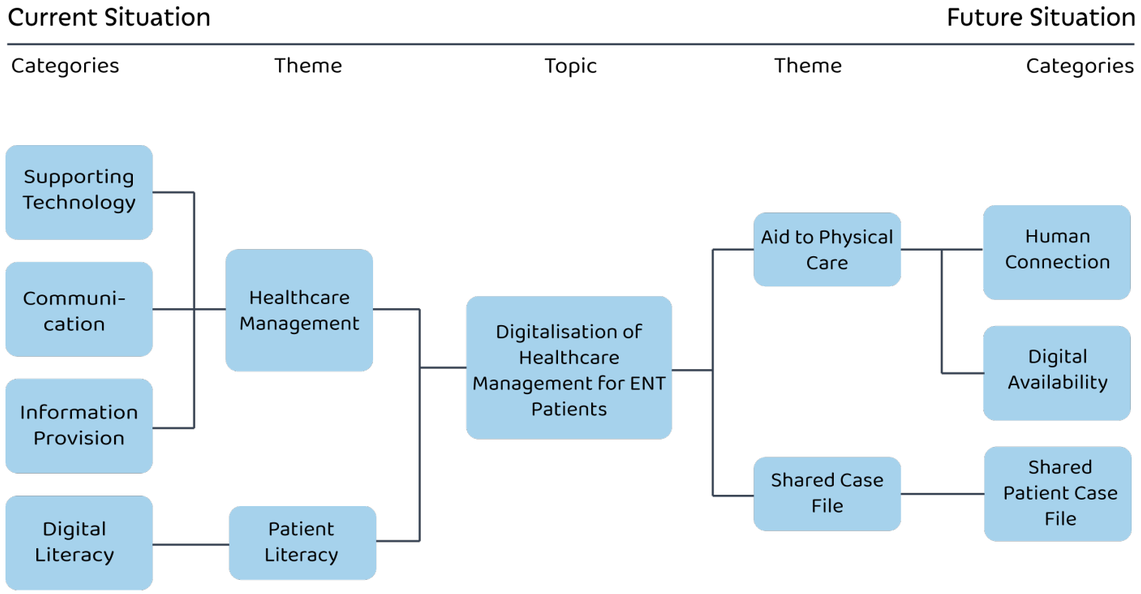


Figure 16: Code tree for digitalisation of healthcare management for ENT patients

5.5 Future Scenario

Based on the code trees, a future scenario can be made containing the elements each target group mentioned (Figure 17). For this analysis, the categories from the code trees were clustered based on topic. This created a third column of sub-categories in the future scenario. Topics mentioned by all target groups were given their own colour in Figure 17, to demonstrate their importance in the future of healthcare. Two main themes were identified to be relevant in the combined future of healthcare: *'Aid to Physical Care'* and *'Patient- Centred Care'*.

Theme 1, *'Aid to Physical Care'* consists of four sub-categories: *'Human Connection', 'Information Provision', 'Supporting Technology'* and *'Shared Case File'*. This theme identifies a future where technology is an aid to physical healthcare, keeping the valuable human connections through efficient communication. There is sufficient information provision for patients and healthcare professionals, and this information is readily available. Technology forms the basis for efficient care provision, with enough time spend on digitalisation, uniformed care processes, and digital availability of care professionals. Finally, there are shared case files for patients and care professionals, enabling communication surrounding a patient's care, without legislative barriers. Patients have ownership of their own case file. This provides the basis for increased self-management of care for patients in the future.

Theme 2, *'Patient-Centred Care'* consists of three sub-categories: *'Patient Self-Management', 'Complex Care',* and *'Culture Change'*. To make the switch from paternalistic healthcare - where the doctor tells the patient their treatment plan - to patient-centred healthcare – where patients take a larger part in their treatment process -, an increase in a patient's self-management is necessary. This envisioned to be done by proving case file access to patients, giving them the opportunity to take over part of their care. To make this possible, a culture change is required. The change to person-centred care supports healthcare providers to deal with the increase of complex care, caused by increased population, a shortage of caregivers, and an increase in the complexity of care.

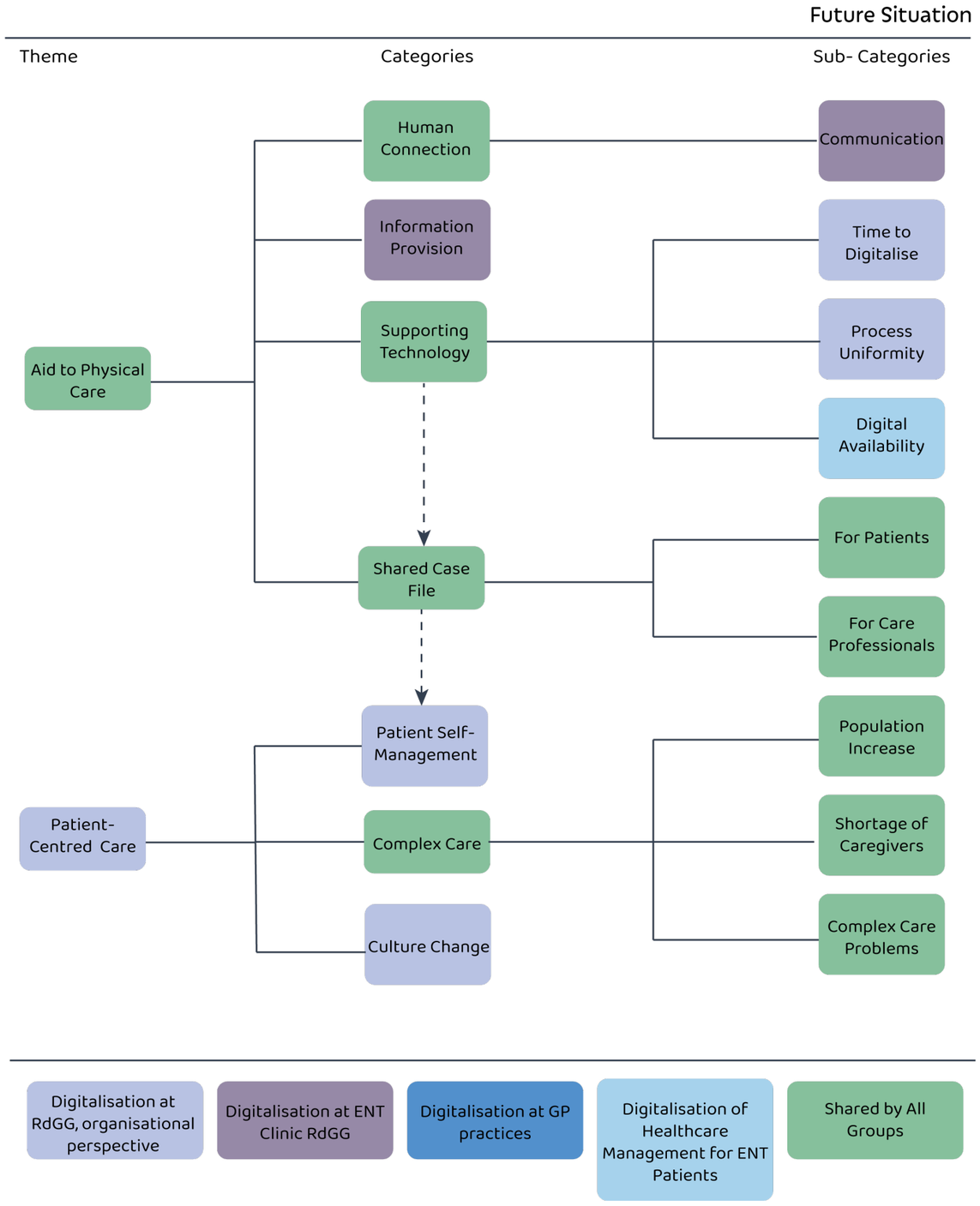


Figure 17: Future scenario- combined perspective from interviews

5.6 Conclusion

Following the analysis, the following conclusions can be made. All target groups mention lack of system connectivity and interoperability to be a problematic. The provision of healthcare has become more complicated with the increase in complex care and population, and the shortage of care professionals. Technology and digitalisation were meant to facilitate the provision of care by providing an administrative aid, but this has proven to be more difficult to implement than was expected.

In the future patients, GPs, care professionals and medical staff want to see a shared case file between patients and care professionals. This will lower the administrative burden currently felt by care providers, and the complications of self-management felt by patients. Digitalisation and the implementation of technology will provide an aid to physical care, while keeping humanity as a core value of healthcare provision.

To fully understand the complexity of the system and how each of the categories and themes interact and influence one another, they were combined in a synthesis map (Figure 18) The code trees from the main actors of this project, the patient, GP and ENT care professionals were combined into a patient journey at micro level of the system map. The current digital interaction (left hand side of the code tree) was used to map each step of the treatment process the patient experiences, and to identify barriers they face during the journey. The right-hand side of the code tree (the future of digital interaction) was then used to identify opportunities in the patient journey.

As for the code tree from the digitalisation staff, this was used to create the main barriers for implementation of digital interaction at 'meso' level of the system. The current situation is used for the synthesis map, to identify barriers and opportunities for innovation. The future situation of the code trees was used to identify facilitators for the implementation of more digital interaction, which were then implemented in the roadmap and future vision (Figure 19).

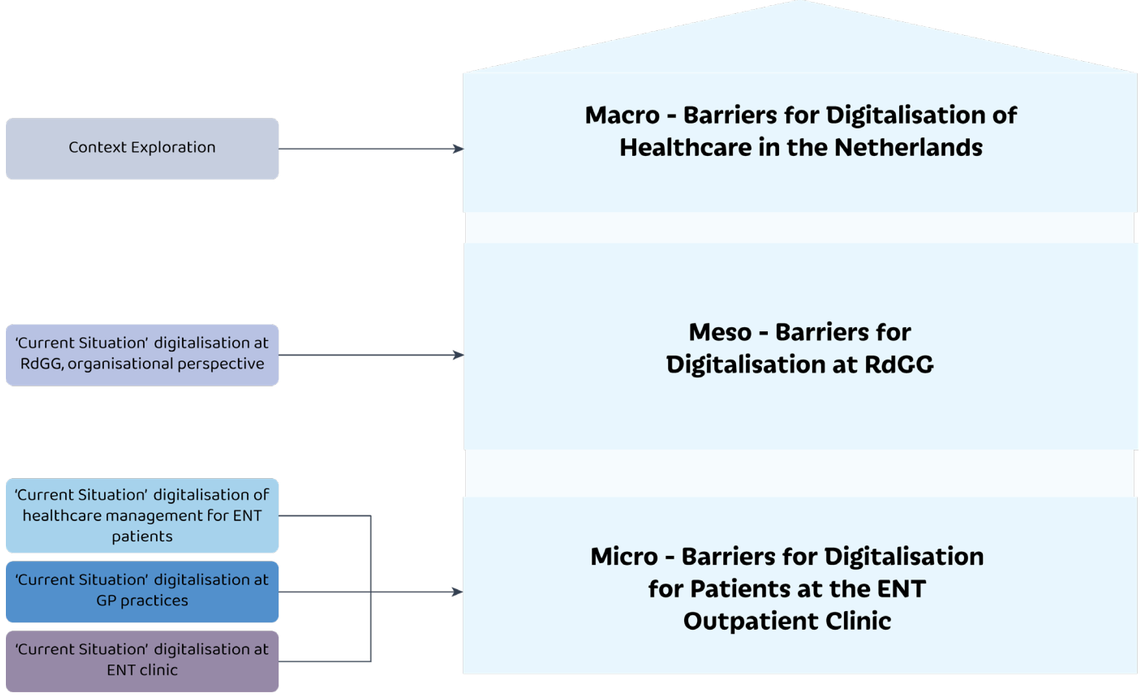


Figure 18: How analysis results are used in the synthesis map

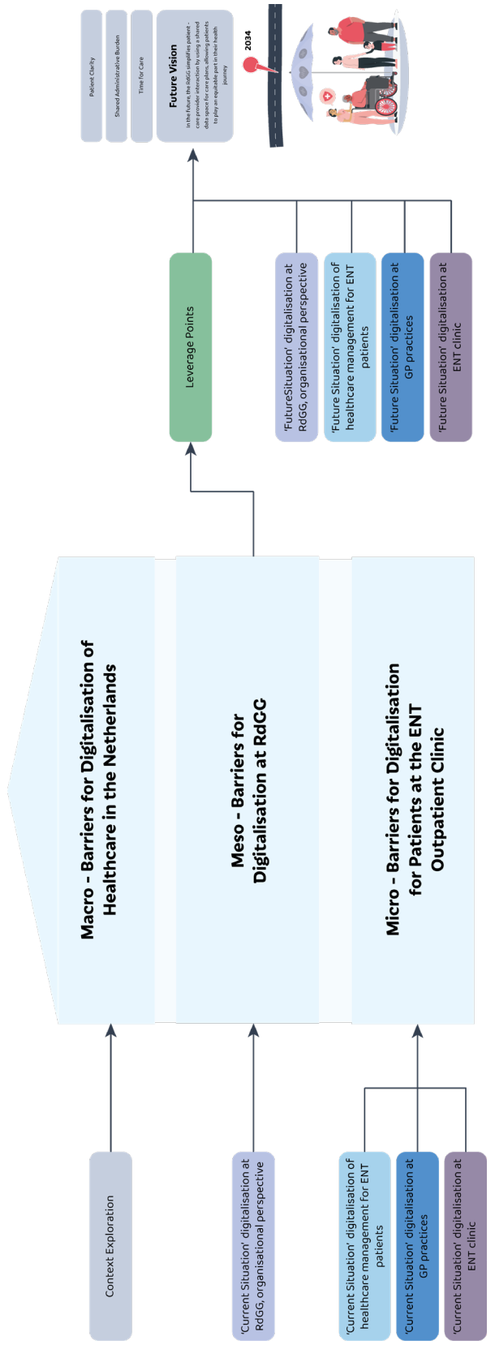


Figure 19: How analysis results are used fo the roadmaps and future vision

06
Design Brief

In this chapter, a secondary analysis is conducted in the form of synthesis mapping. This also functions as an aid for the first steps towards creating the final design. Each level of the synthesis map is explained, followed by a description of the future vision.

6.1 Synthesis Map

Synthesis mapping is a technique that is used to visualise complex systems, such as in healthcare, to identify design opportunities. The principle evolved from Gigamapping, developed at the Oslo School of Architecture and Design, which expanded on a system map by including the interactions between stakeholders (Jones, 2024). Synthesis maps also include information from theory and are evidence-based, making them effective when visualising complex social- technical systems in healthcare (Jones & van Ael, 2022).

The definition for a complex system differs dependent on the source but comes down to the following: a complex system is a system that consists of multiple components, that are interrelated and interdependent, with interactions that are difficult to describe and understand (van Egmond, 2023). A socio-technical system consists of both human elements (social) and technical elements that interact to reach a common goal (Sony & Naik, 2020). When making the digital transition, it is important to understand all aspects of a complex socio-technical system and how they interact and influence one another, as the digital transition requires an organisation to be dynamic and adapt to new technological implementations when presented (Govers & van Amelsvoort, 2023). Baxter and Sommerville (2011) state that projects where the complexities of socio-technical systems are not considered and understood often fail, leading to unstable requirements or poor systems design, where the user interfaces do not fit user needs. Synthesis mapping provides the opportunity to visualise the complexities and interactions within a complex socio-technical system, facilitating the understanding of the system needed to implement the transition to digital interaction at the RdGG. This aims to illustrate the complexity of the healthcare system, as well as aiding in identifying so-called leverage points (van der Bijl, 2021) which can be adjusted to make changes to the system.

This form of visual analysis will lay the foundation for the future vision and roadmap. By showing the different system levels there are in healthcare and illustrating how those levels interact and influence one another, an intervention can be designed at a level that influences multiple stakeholders within the broader social-technical system (Melles, Albayrak, & Goossens, 2021).

The synthesis map is split into two areas of interest: background information and the system analysis, consisting of micro, meso and macro system levels (Figure 20). The background information contains theory from the literature research at the beginning of this report and demonstrates how these identified factors influence the system on the right-hand side of the map.

Jonelle Ooms - 2024

Digitalisation of Patient Interaction During Transmural ENT Health Journeys

Background

Project Scope

With the population expected to keep steadily growing in the coming years, health care consumption will also grow. There are not enough health care resources however to be able to provide the care the population will need. This means steps will need to be taken to make the digital transition expand to healthcare. The Reinier de Graaf Gasthuis (RdGG) needs to make these steps towards transitioning to digital healthcare, but as the healthcare system is complex this will require strategic, operational, and behavioural changes (Reinier de Graaf, 2023). Within this graduation project, the transition patient makes at digital level from their GP to the Reinier de Graaf and their care journey following the transition will be studied. This will include the patient's role in using digital tools, such as the online environment of the Reinier de Graaf. A limitation in this project is that healthcare is a complex system with many influential stakeholders and organisations whose opinions need to be considered. The main actors in this project are the patient, their GP, and the outpatient clinic team at the RdGG within the ear, nose, and throat clinic (ENT).

Figure 1: Project Actor Map


Figure 2: ProjectStakeholder Map

As mentioned in the previous paragraph, the main actors in this project (figure 1) are the people with an ENT health condition, their GP, and the care team at the ENT outpatient clinic at the RdGG (figure 1). These actors form a three-way interaction stream, with lines of communication and information sharing which will be analysed.

There are more stakeholders involved however in the process of digitalisation of healthcare, which are shown in figure 2. The patient stands in the middle of the stakeholder map, as each health journey is centred around the patient. In the next level up, actors are depicted that come into direct contact with the patient during their health journey. This includes for example their GP and ENT specialist, but also other actors they encounter during treatment. In the next circle, policy makers from the RdGG are included, who indirectly influence the patient's digital journey by implementing policies and technology hospital wide.
In the outer level of this stakeholder map, stakeholders such as the ministry for public health, welfare, and sports (VWS), health insurance companies and medical software development companies are included. These parties are not considered within this project.

Literature Review

Digitalisation is often referred to as the fourth industrial revolution, with a quick rise in the amount of technology used (Popov, et al., 2022). This could be new AI softwares, or electronic medical devices, but it also includes digital communication and information sharing in healthcare. Think of digital information folders or consults on the phone instead of in a doctor's office. Patients frequently look for information online to supplement their consultations to facilitate understanding of their personal medical situation, or to receive forms of support regarding their treatment from peers (Neely & Hao, 2023). Patients have also started using digital technology outside the consultation room to facilitate self-management during their treatment, so why has the healthcare system not adapted itself accordingly to fit the transition towards a digital society?

According to Popov, et al. (2022), there are seven relevant forms of digitalisation in healthcare: Internet of Things (IoT), Artificial Intelligence (AI), mobile technology, simulation and modelling, Big Data analytics (BDA), augmented reality (AR) and digital manufacturing. Each form of digitalisation has its own impact on the healthcare domain, from transitioning to new technology in the operating room, to the way hospital data is stored and managed. According to Krasu et al. (2021), "digital transformation refers to a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication and connectivity technologies" (p.557). The main goal in healthcare is to treat patients and protect their wellbeing. Digitalisation of processes in healthcare can facilitate this, by aiding in administration processes and improving operational efficiency (Krasu et al., 2021; Kontitla, et al., 2019). Digitalisation also provides a platform for care professionals to maintain contact with their patients throughout their entire health journey, rather than only in consultation rooms (Health Management, 2022). Patients can take a more active role in their healthcare journey, which in turn positively influences treatment adherence and improved care professional-patient relationships (Stiggelbout, Pieterse, & de Haes, 2015). Therefore, the digitalisation of the care professional-patient interaction is an important factor to mitigate the future problems arising in healthcare.

Barriers For Digitalisation

While the healthcare domain might recognise the importance of digitalisation at managerial level, the industry still lags behind other organisations in the field of digitalisation.

Digitalisation requires a great deal of change in hospitals, whose processes have solidified in the many years of use. Obstruction of the adoption of digital technologies can come from stakeholder specific interests or organisational structures (Kontitla, et al., 2019), and there are often ethical concerns about protecting patients' data (Kontitla, et al., 2019). Previous negative experiences with digitalisation can create barriers for the implementation process (Kontitla, et al., 2019). This results in a reliance on paper, or a combination of paper and technology that further complicates the implementation of digital solutions (Black & Sahama, 2016).

The way technology is currently used also forms a barrier to the implementation of healthcare; the current use of electronic health records (EHRs) causes a high administrative burden on healthcare professionals and takes attention away from the patients (Berry, 2019; Black & Sahama, 2016).

Schreiweis et al. (2019) propose barriers for digitalisation that fall into three categories: individual barriers, environmental and organisational barriers, and technical barriers (Figure 3). Individual barriers are for example cognition (people's ability to learn, linguistic barriers or eHealth literacy), motivation (unclear benefits of new technology), accessibility (missing information about health services) and lack of trust in digital technology. Environmental barriers could be financing problems, political barriers, or misalignment of how digitalisation could fit into an organisation's structure. Examples of technical barriers are unsuited services, security, system language, missing support, missing feedback, and missing standards (Schreiweis, et al., 2019).

Keeping these barriers in mind when designing the future of healthcare will facilitate the implementation of digitalisation in healthcare. Addressing each barrier within the future healthcare scenario will create opportunities for the adoption of new digital technology.


Figure 3: Barriers for Digitalisation (Schreiweis et al., 2019)

Facilitators For Digitalisation

There is room for improvement in the implementation of digitalisation solutions. While many digital solutions are already integrated into the hospital system (Reinier de Graaf Gasthuis, 2022), staff are unaware of the possibilities within the platform, or simply don't want to change their views on digitalisation and are unwilling to learn (D. Wijffels, personal communication, 20th February 2024). Yet digital competence and literacy have been proven to be beneficial for the acceptance of new technology, as they influence the ability to provide patient care (Kontitla, et al., 2019; Lu & Zhang, 2021). When a patient understands their treatment plan, because their information is readily available online, and they were able to find this information, the medical specialist can answer their specific questions more efficiently and the patient can be more present in the consultation. It is therefore also important to keep digitalisation knowledge up to date with training, although this could prove difficult as many healthcare professionals have a negative attitude towards technology education (Kontitla, et al., 2019). In order to facilitate the implementation of new digitalisation in healthcare, there needs to be intrinsic motivation from all parties to participate (Kontitla, et al., 2019), including both managerial positions and healthcare workers (Krasu, et al., 2021). To create intrinsic motivation from either party, they should be included in the development process and implementation of new technology. By doing so, their acceptance and willingness to use the innovations will increase. Therefore, a culture change stimulated at organisational level needs to take place to facilitate further implementation of digitalisation in healthcare.

Schreiweis et al. (2019) also mentions facilitators for implementing digitalisation in healthcare (Figure 4). Once again, the factors are split into individual success factors, environmental and organisational success factors, and technical success factors. The top six factors mentioned are ease of use, improves communication, motivation, integration into care, involvement of relevant stakeholders, availability of resources, and user-friendliness. When designing the outcome of this project, these factors will be considered and included in the roadmap.


Figure 4: Facilitators for Digitalisation (Schreiweis et al., 2019)

eHealth Literacy

Health literacy refers to a person's ability to obtain, understand, interpret, and apply health information (Sørensen, et al., 2012). eHealth literacy is the digital application of health literacy in. For example electronic communication between patients and physicians, or patient portals (Kim & Xie, 2017). eHealth literacy has been found to influence the way patients process and retain information, as well as the quality-of-care patients receive when having competent eHealth literacy (Lu & Zhang, 2021). Adequate skills in this area can facilitate self-management and positively influences adherence, communication with physicians, information seeking and -quality (Lu & Zhang, 2021; Sørensen, 2012; Kim & Xie, 2017; van der Vaart & Drossaert, 2017).

In turn, insufficient skills in terms of eHealth literacy can have adverse outcomes on the treatment process, such as poor treatment adherence (Kim & Xie, 2017) and can make digital health-related resources difficult to use (Lu & Zhang, 2021). Age and education level have a negative correlation on a patient's eHealth literacy level (van der Vaart & Drossaert, 2017). Research has also shown that many online health information platforms utilise language which is above the average literacy level, making information difficult to understand for individuals with low health literacy (Kim & Xie, 2017). This only increases the unequal of access to care for individuals with low health literacy.

In conclusion, in a society where eHealth is increasingly used during healthcare (Sørensen, et al., 2012), eHealth literacy is an important factor to consider when aiming to improve digital interaction in healthcare. This means that educating both patients and healthcare professionals is important when implementing new digital technology. This gives patients the opportunity to improve the self-management of their health care journey, and ultimately improve the overall treatment experience. Language use on digital platforms should also be considered, to ensure equal access to care when transitioning to the use of digital healthcare platforms.

Information Retention

In high-emotion situations, it can be difficult for patients to retain the information that is given to them about their care and treatment process (Berry, 2019). Research has found that 40–80% of medical information provided during a medical consult is forgotten by patients (Kessels, 2003; Visser et al., 2017). This can be further influenced by other factors, such as amount of information received (Khaleela, et al., 2020), terminology used during a consult (Kessels, 2003) or the way information is given to a patient (eg. spoken or written). Kessels (2003) divides these factors into three groups: clinician-related factors, mode of information and patient-specific factors.

Clinician-related factors can be for example the language used during a consult. Difficult medical terminology can be difficult for patients to process during a consult (Kessels, 2003), and insufficient attention from medical specialists during a consult can prevent patients from retaining information (Black & Sahama, 2016). This can be prevented by using simple, easy to follow language during consults (Kessels, 2003).

Mode of information factors illustrate differences in the way patients receive information. If given verbally during consults, patients are likely to only remember the perceived most important information, such as the diagnosis (rather than the treatment method) (Visser et al., 2017). Information found online during self-management can be overwhelming, with a large amount of information available (Moen, Chronaki, Martins, & Ferrari, 2022) and uncertainty surrounding the reliability of the information found (Kim & Xie, 2017). By providing reputable information directly through the medical platform, this uncertainty can be prevented.

Patient-specific retention factors are influenced by multiple elements, such as for example the emotional state a patient is in. Research has shown that a patient's stress levels are directly linked to the amount of information they retain; the more stress a patient has, the less information is retained (Kessels, 2003; Visser et al., 2017). Khaleela et al. (2020) also found that this related to the level of information overload a patient experiences, which negatively influences the amount of retained information. The level of information overload is linked to age, health literacy level and education level (Khaleela, et al., 2020), where people of higher age, lower health literacy and lower education level have an increased likelihood of experiencing information overload. Patient stress levels can be reduced by physicians, if they use non-threatening body language and take the time to ensure patient understanding during the consult (Krasu et al., 2021).

In conclusion, there are many factors that influence the retention of information during health consults (Figure 5). To mitigate the large amount of information that may be forgotten following a consult, simple language should be used, and sufficient time should be given for patients to process the information. Reputable information should also be provided by the healthcare provider, so the patient can read through this in their own time. Non-threatening body language and taking the time to explain diagnosis and treatment during a consult will help reduce patient stress levels.

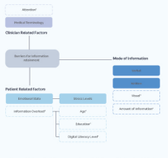
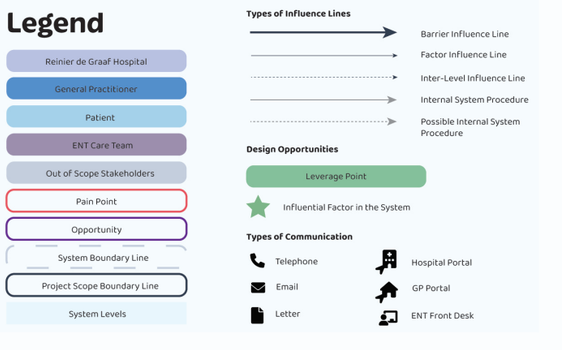
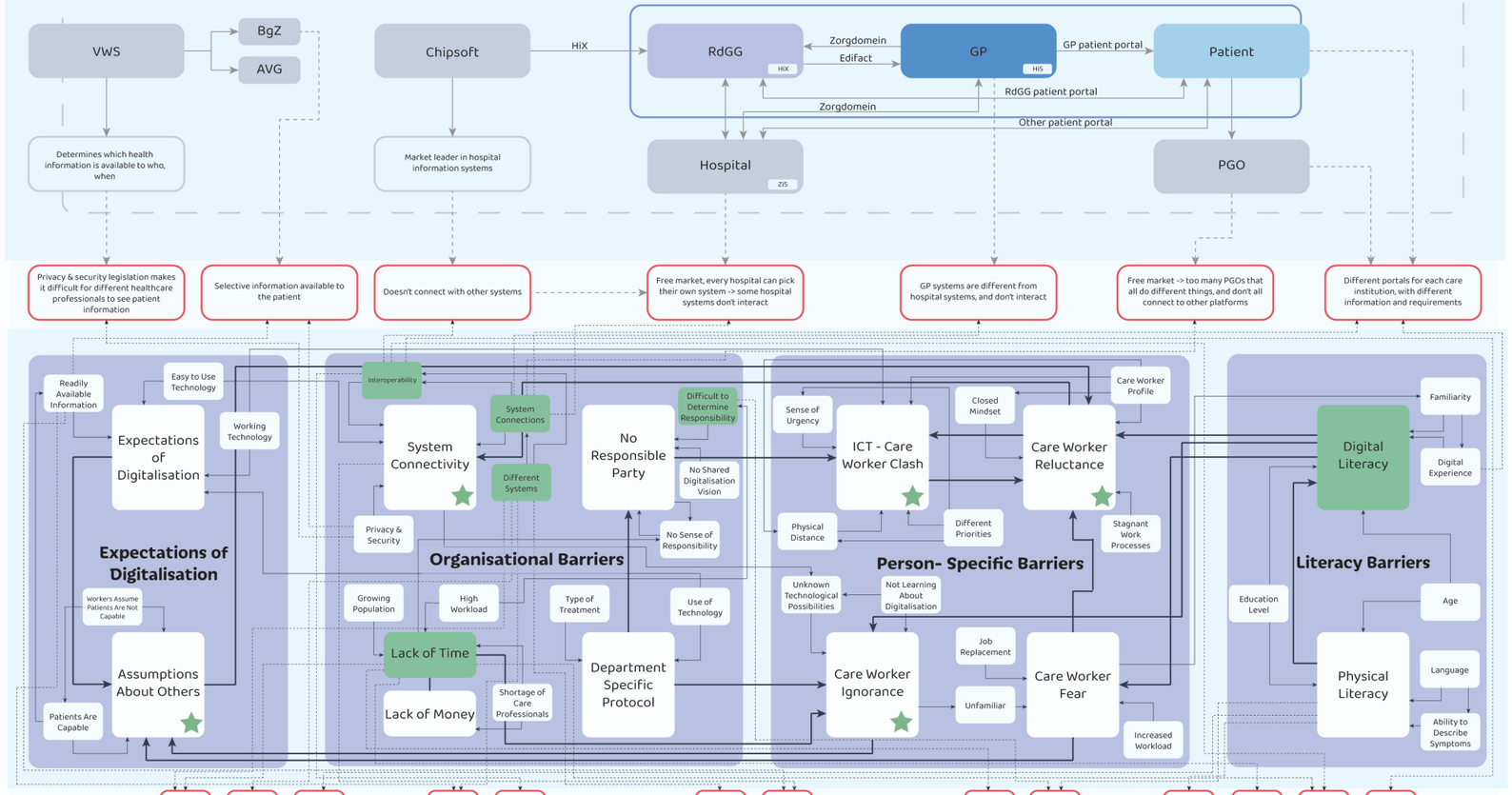


Figure 5: Barriers for Information Retainment (Kessels, 2003) *additional barriers based on other literature



Overview of Hospital System Levels

Reinier de Graaf
Je ziekenhuis voor het leven



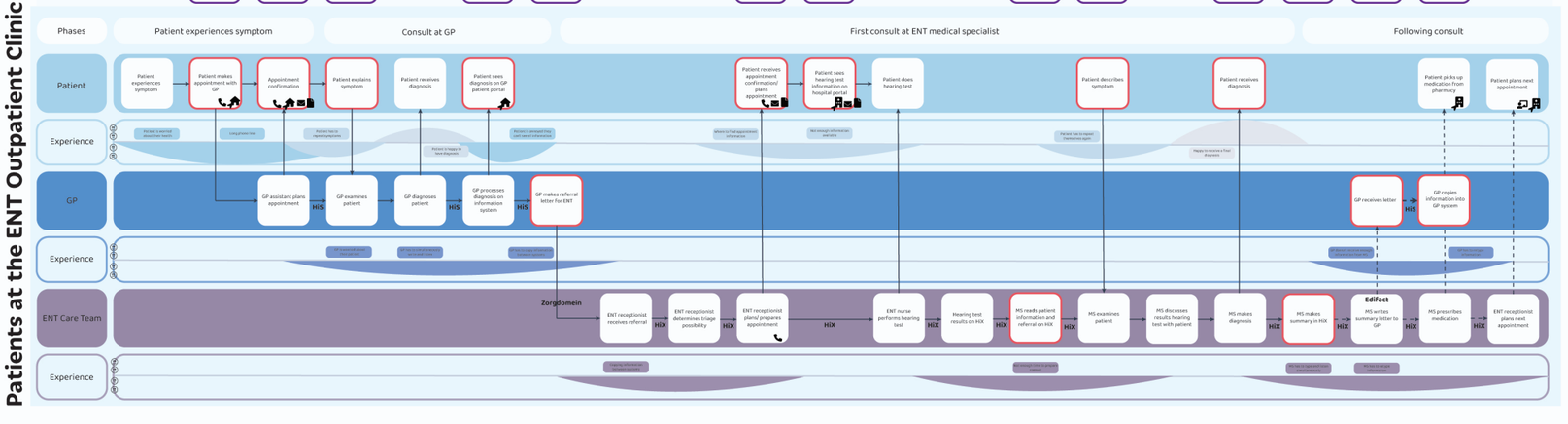


Figure 20: Synthesis map

6.1.1 Micro- Level System Analysis: Patient Journey

The micro-level analysis of the digital patient-care professional interaction was analysed with a patient journey map (Figure 21). The information on this map is comprised out of the 'current situation' sections of the interviews with patients, GPs, and ENT care professionals. This was used to identify pain points, which are connected to organisational barriers defined in the meso-level analysis. Using interview data from the 'future situation' sections, opportunities are identified to design a solution to the previously identified pain points. The patient journey consists of 18 steps the actors experience in the treatment journey from symptom to first consult at the ENT outpatient clinic. Three more steps follow the first consult, but as patients were interviewed before their first consult, these steps are seen as optional steps.

The steps in the journey are separated into four categories:

- 'Patient experiences symptom',
- 'Consult at GP',
- 'Consult at ENT clinic', and
- 'Following first ENT consult'.

The technology and systems used between each step of the patient journey are written on the arrows between each step. Modes of communication are depicted with icons with the following possibilities:

- phone (phone),
- email (envelope),
- physical letter (letter),
- GP patient portal (house with mouse),
- hospital patient portal (hospital with mouse), and
- receptionist (person with screen).

This is meant to demonstrate the many possibilities a patient has to communicate with care professionals. Each step is explained below, including the experienced emotions, pain points and opportunities.

Patient Experiences Symptom

1. Patient experiences symptom
   Experience: The patient is worried about their health
   Pain Point: -
   Opportunity: -

2. Patient makes an appointment with GP
   Experience: Patient experiences annoyance at the queue on the phone taking a long time
   Pain Points: Making appointments can be done in several different ways depending on the care provider, which is confusing for patients. Patients have to wait in long phone queues and have to remember to call at a certain time during the day.
   Opportunities: Uniform the way patients make appointments across care providers, and make online appointments available (with a questionnaire as triage) to diminish confusion and waiting time.

3. GP's assistant plans appointment and patient receives confirmation
   Experience: -
   Pain Point: Every care organisation plans and sends appointment details differently, eg. via phone, email, or portal. Patients don't know where to find their appointment details
   Opportunity: Uniform the way care organisations send appointment details: eg. email confirmation and information on portal

Patient Journey

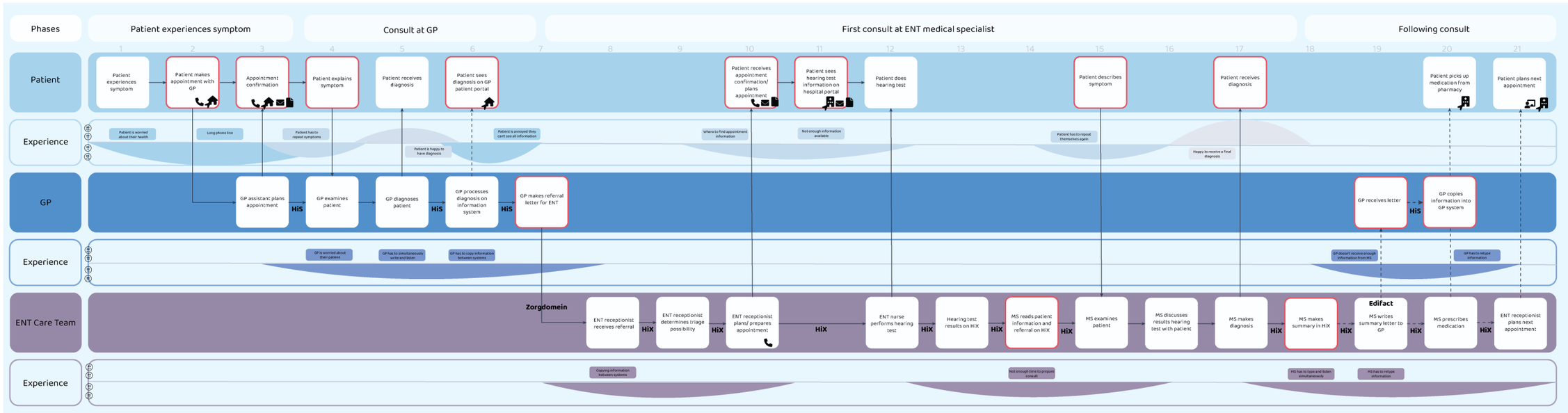


Figure 21: Patient Journey Map

Consult at GP

4. GP examines patient and patient explains symptom
   Experience: Patient experiences frustration at repeating previously explained symptoms and GP is worried about their patient's health
   Pain Points: Patients have to be able to describe their symptoms well for the doctor to make an appropriate diagnosis. Care problems are becoming more complex, multiple symptoms can be brought at once
   Opportunities: Proactive care: educate patients about general healthcare. This can also help prevent multiple symptoms at once, or helps manage them

5. GP diagnoses patient
   Experience: Patient is happy to receive diagnosis, GP is annoyed at having to type on the computer and listen simultaneously
   Pain Point: -
   Opportunity: -

6. GP processes consult in their portal, patient sees their diagnosis on the patient portal
   Experience: Patient is annoyed that they can't see all their information in the portal
   Pain Points: The amount of information in a GP portal differs between GP's. Patients want to be able to see their full case file without asking the GP for part of it and expect to see more information on the patient portal than is available.
   Opportunities: Make all healthcare platforms interoperable and synch important information automatically; make patient files accessible to the patient (non-editable, but readable); automatically link appropriate thuisarts page for diagnosis

7. GP makes referral letter for the ENT outpatient clinic
   Experience: GP is frustrated at having to copy information by hand between systems
   Pain Points: Basic information is copied from the GP's HiS to zorgdomein, but the actual referral letter has to be hand written. Not all patient information is included in the referral letter
   Opportunity: Make all healthcare platforms interoperable and synch important information automatically

Consult at ENT Clinic

8. ENT receptionist receives referral
   Experience: Receptionist is annoyed about copying information between systems
   Pain Point: -
   Opportunity: -

9. ENT receptionist determines triage possibility
   Experience: -
   Pain Point: -
   Opportunity: -

10. ENT plans/ prepares appointment and patient receives appointment confirmation/ plans appointment*
   Experience: Patient is confused, finding appointment information is difficult
   Pain Points: Every care organisation plans and sends appointment details differently, eg. via phone, email, or portal. Patients don't know where to find their appointment details.
   Opportunity: Uniform the way care organisations send appointment details: eg. email confirmation and information on portal

*this step changed around the same time interviews were conducted. The hospital implemented the possibility to make digital appointments online, byt the patients interviewed did not yet have this possibility.

11. Patient sees hearing test information on the hospital patient portal
   Experience: Patient is frustrated, not enough information is available on the portal
   Pain Points: Patients expect more information to be available on the portal than there is. The portal is not intuitive to use, and information is difficult to find. Care workers have to manually upload information to each patient's portal.
   Opportunities: Update the portal to be less complicated for patients, do user testing. Automatically upload information to portal based expected diagnosis from triage questionnaire

12. ENT nurse performs hearing test with patient
   Experience: -
   Pain Point: -
   Opportunity: -

13. Hearing test results on HiX
   Experience: -
   Pain Point: -
   Opportunity: -

14. MS reads patient information prior to consult
   Experience: MS is stressed, they don't have enough time to properly prepare the consult
   Pain Points: HiX doesn't work very fast, so doctors spend more time than they have waiting for things to load. MSs don't have enough time between consults to read all patient information. MS assistants summarise case in one word, so MS knows at a glance what the consult is about
   Opportunities: Update HiX system and interface; streamline interface over hospital, add specific quick links per specialist. More time per patient, aim to unburden more of second line care

15. MS examines patient and patient describes symptoms
   Experience: Patient is annoyed to repeat themselves again.
   Pain Points: Patients have to be able to describe their symptoms well for the doctor to make an appropriate diagnosis. Care problems are becoming more complex, multiple symptoms can be experienced at once. Patients expect the hospital to know their symptoms, the GP would have sent the information through to the MS.
   Opportunities: Proactive care: educate patients about general healthcare. This can also help prevent many symptoms at once, or helps manage them. Shared file per care professional working with a patient, to see all relevant information and previous diagnosis from GP

16. MS discusses results hearing test with patient
   Experience: -
   Pain Point: -
   Opportunity: -

17. MS makes diagnosis and patient receives diagnosis
   Experience: Patient is happy to receive a diagnosis
   Pain Point: Diagnosis is not available for patients to see later (they don't have access to their file), they have to remember as much as possible from the consult, which is difficult (high stress, medical terminology)
   Opportunities: Make patient file accessible to patients, give them ownership of their health information (read-only, to prevent incorrect information). Use a working memory (not to be seen by patient) for care professional, which is then automatically summarised for the patient's file

18. MS makes a summary in HiX
   Experience: MS is annoyed because they have to type and listen simultaneously
   Pain Point: MSs don't have much time between patients to fill in the outcomes of the consult on HiX, they type this by hand
   Opportunity: Use an automatic summary tool (Autoscriber) during consults

Following Consult

19. MS writes summary letter to GP
   Experience: MS is annoyed they have to retype information between systems, the GP wants to receive more information from the MS (and more quickly) than they do
   Pain Points: MSs don't always send outcomes back to the GP. GPs can't see which tests have been conducted and the results of them
   Opportunity: Automatically link diagnosis on all platforms to be visible for other care professionals working with the patient

20. MS send prescription to pharmacy, patient picks up medication, GP adds information to their system
   Experience: GP is annoyed to retype information between systems
   Pain Point: Consult outcomes are sent via edifact, which doesn't connect to the HiS, GP's have to manually fill in any relevant information into their own patient file
   Opportunity: Automatically link diagnosis on all platforms to be visible for other care professionals working with the patient

21. ENT plans next appointment with patient at front desk
   Experience: -
   Pain Point: -
   Opportunity: -

The general conclusion at micro level, is that the systems between GP and MS are not interoperable. Both GPs and MSs spend a lot of time copying information between systems. Patients meanwhile encounter too many different systems between care providers, which is confusing. They don't know where to find appointment details, procedure information or where to ask questions. Patients also want more access to their case file than they currently have. GPs want to be able to view consult conclusions following referral, which is not possible due to privacy legislation at present. MSs don't have enough time per patient, to prepare the consult or to properly hear the patient's story.

Opportunities to solve this are for example a shared case file between care professionals and patients, though patients should not have the opportunity to change any information in their file to prevent information contamination. Systems should be more interoperable for proper care to be provided, this would save care professionals a lot of administrative burden and time that is currently spent retyping information between systems.

6.1.2 Meso-Level System Analysis

The meso level system analysis (Figure 22) takes the barriers for the digital interaction transition defined from the code tree and demonstrates the interactions between each barrier. The larger arrows depict influences factors have on other factors, while small arrows demonstrate influences sub-categories have on other sub-categories or factors. A lot of these influences are cyclical, which means that they might have an influence on one another (which is not depicted here).

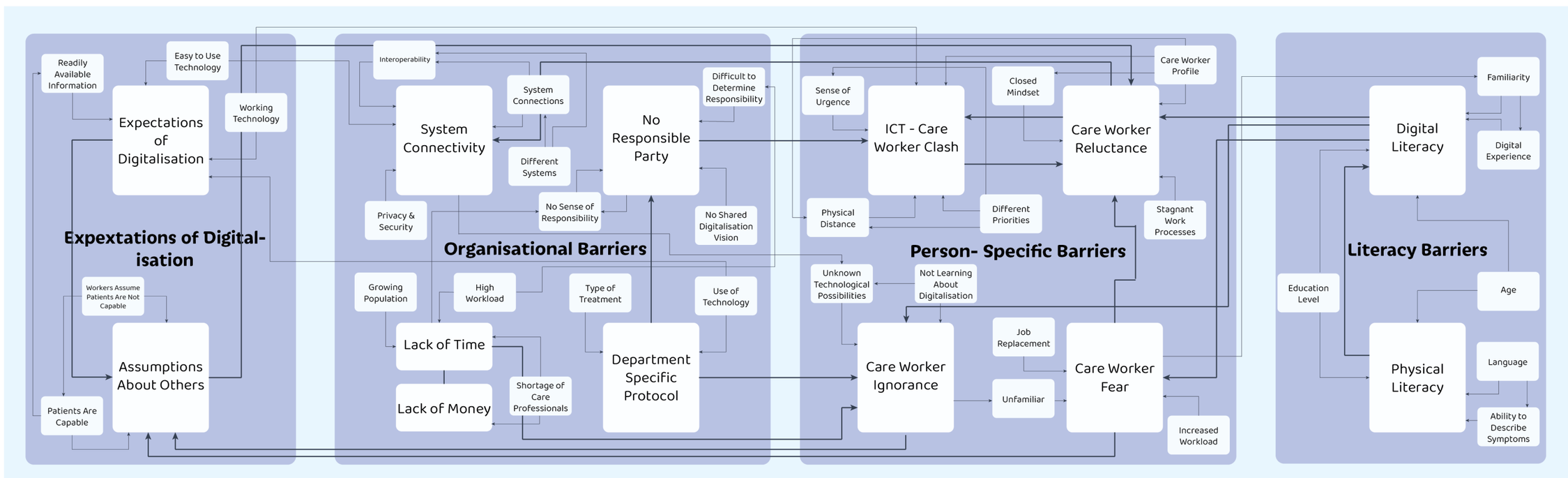


Figure 22: Meso-level system analysis

Expectations of Digitalisation

Two categories were previously defined within expectations of digitalisation: *'Expectations of Digitalisation'* and *'Assumptions About Others'* (Figure 23).

- The first category, *'Expectations about digitalisation'* has one influence line leaving it, to assumptions about others. The expectations people have of technology influence their assumptions of how other people will use it. For example, if the technology doesn't work well, they might assume that another person will have difficulty using it. This category is influenced by four other categories: *'Readily available information', 'Easy to use technology', 'Working technology'* and *'Use of technology'* (organisational barriers – department specific protocol).

  Within this category, there are three sub-categories: *'Readily available information', 'Easy to use technology'* and *'Working technology'*.

  - *'Readily available information'* is influenced by *'Patients are capable'* and influences *'Expectations of digitalisation'*. Patients are capable to use technology, and their expectation is that information about their care journey is available when they are seeking it.
  - *'Easy to use technology'* influences *'Expectations of digitalisation'* and *'System connectivity'* (organisational barriers – system connectivity)
  - *'Working technology'* influences *'Expectations of digitalisation'* and *'ICT – care worker clash'* (person-specific barriers)

The other category in this theme is *'Assumptions about others'*.

- *'Assumptions about others'* influences *'Care worker reluctance'* (person-specific barriers), as care workers make assumptions about the capabilities of their patients that, in turn, affects their reluctance to facilitate digitalisation. This category is influenced by five categories and subcategories: *'Expectations about digitalisation', 'Workers assume patients are not capable', 'Patients are capable', 'Care worker ignorance'* (person-specific barriers) and *'Care worker fear'* (person-specific barriers).

  There are two subcategories within assumptions about others: *'Workers assume patients are not capable'* and *'Patients are capable'*. These subcategories are largely interdependent and are influenced by one another, but still play a role in the assumptions made surrounding the use of digitalisation.

  - *'Workers assume patients are not capable'* is a subcategory that is mentioned quite a lot by managerial staff in particular; they mention *"Elderly patients are not capable of using technology"* or *"My patients wouldn't want that"*. This influences *'Assumptions about others'* and *'Patients are capable'*.
  - *'Patients are capable'* is a direct contradiction to the previous subcategory, but interviews with patients showed that patients were open to digitalisation. This subcategory is influenced by *'Workers assume patients are not capable'* and influences *'Readily available information'* and *'Assumptions about others*.

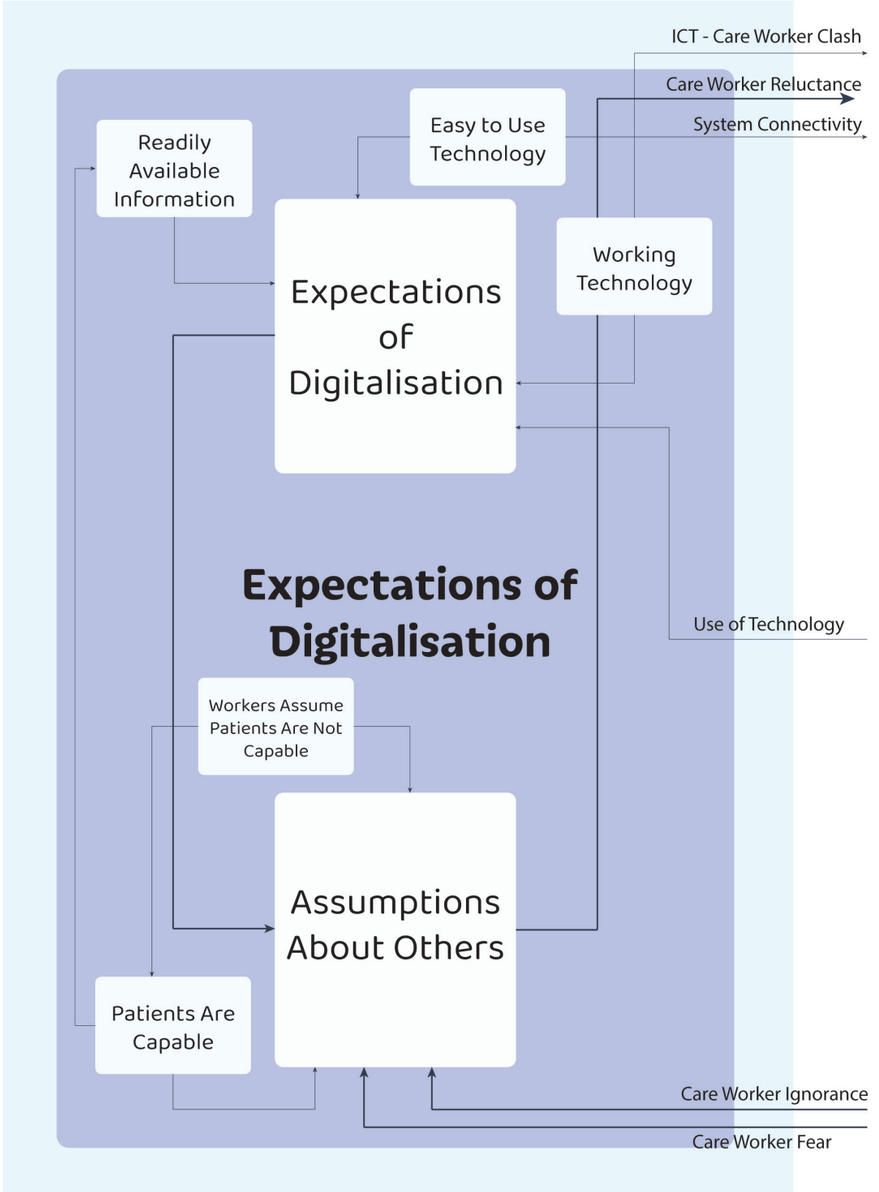


Figure 23: Meso-analysis- Expectations of digitalisation

Organisational Barriers

Five categories were identified within organisational barriers: *'System Connectivity', 'No Responsible Party', 'Lack of Time', 'Lack of Money',* and *'Department Specific Protocol'* (Figure 24).

- The first category, *'System Connectivity'* has one factor influencing it: *'Care worker reluctance'*. Care worker reluctance influences system connectivity, because care workers can create a barrier for the implementation of new technology if they are reluctant to try new technology. System connectivity influences one sub-category: *'Unknown technological possibilities'* (person-specific barriers). This category is influenced by four other categories: *'Easy to use technology', 'Interoperability', 'System connections'* and *'Privacy & Security'*.

  Within this category, there are four sub-categories: *'Interoperability', 'System connections', 'Different systems'* and *'Privacy & security'*.

  - *'Interoperability'* is influenced by *'System connections'* and *'Different systems'*. It influences *'System connectivity'*.
  - *'System connections'* influences *'Interoperability', 'System connectivity',* and is influenced by *'Different systems'*
  - *'Different systems'* influences *'System connections'* and *'Interoperability'*.
  - *'Privacy & security'* influences *'System connectivity'*

- The second category, *'No responsible party'* is influenced by *'Department specific protocol', 'No sense of responsibility', 'Difficult to determine responsibility',* and *'No shared vision of digitalisation'*. This category influences *'ICT- Care worker clash'* (person-specific barriers) and *'No sense of responsibility'*.

  Within this category, there are three sub-categories: *'Difficult to determine responsibility', 'No shared digitalisation vision',* and *'No sense of responsibility'*.

  - *'Difficult to determine responsibility'* influences *'No responsible party'* and is influenced by *'High workload'*.
  - *'No shared vision for digitalisation'* influences *'No responsible party'*.
  - *'No sense of responsibility'* influences *'No responsible party'* and is influenced by *'No responsible party'* and *'Lack of time'.*

- The third category, *'Lack of time'* is narrowly connected to the fourth category *'Lack of money'*. Lack of time influences *'Care worker ignorance'* (person-specific barriers) and *'No sense of responsibility'*. Lack of time has three sub-categories: *'Growing population', 'High workload',* and *'Shortage of care professionals'.*

  - *'Growing population'* influences *'Lack of time'.*
  - *'High workload'* influences *'Lack of time'* and *'Difficult to determine responsibility'.*
  - *'Shortage of care professionals'* influences *'Lack of time'* an *'Lack of money'*

- The fifth category, *'Department specific protocol'* influences *'Care worker ignorance'* (person-specific barriers) and *'No responsible party'*. It has two sub-categories: *'Type of treatment'* and *'Use of technology'*.

  - *'Type of treatment'* influences *'Department specific protocol'.*
  - *'Use of technology'* influences *'Department specific protocol'* and *'Expectations of digitalisation'* (expectations of digitalisation)

Figure 24: Organisational barriers

Person-Specific Barriers

Four categories were identified as person-specific barriers for the implementation of digitalisation at the RdGG: *'ICT- Care Worker Clash'*, *'Care Worker Reluctance'*, *'Care Worker Ignorance'* and *'Care Worker Fear'* (Figure 25).

- Category 1, *'ICT- care worker clash'* influences *'Care worker reluctance'*. It is influenced by *'Care worker reluctance'*, *'No responsible party'* (organisational barriers), *'Sense of urgence'*, *'Physical distance'*, *'Different priorities'*, *'Care worker profile'*, and *'Working technology'* (expectations about digitalisation).

  This category has three sub-categories: *'Sense of urgence'*, *'Physical distance'*, and *'Different priorities'*.

  - *'Sense of urgence'* influences the *'ICT- care worker clash'* and is influenced by *'Different priorities'*.
  - *'Physical distance'* influences *'ICT- care worker clash'* and is influenced by *'Care worker profile'* and *'Different priorities'*.
  - *'Different priorities'* influences *'ICT- care worker clash'*, *'Physical distance'* and *'Sense of urgence'*.

- The second category, *'Care worker reluctance'* influences *'ICT- care worker clash'* and *'System connectivity'*. It is influenced by *'ICT- care worker clash'*, *'Assumptions about others'* (expectations about digitalisation), *'Care worker fear'*, *'Digital literacy'* (literacy barriers), *'Care worker profile'*, *'Closed mindset'* and *'Stagnant work processes'*.

  This category has three sub-categories: *'Care worker profile'*, *'Closed mindset'* and *'Stagnant work processes'*.

  - *'Care worker profile'* influences *'Physical distance'*, *'ICT- care worker clash'*, *'Closed mindset'* and *'Stagnant work processes'*.
  - *'Closed mindset'* influences *'Care worker reluctance'* and is influenced by *'Care worker profile'*
  - *'Stagnant work processes'* influences *'Care worker reluctance'*

- The third category, *'Care worker ignorance'* influences *'Unfamiliar'* and *'Assumptions about others'* (organisational barriers). It is influenced by *'Digital literacy'* (literacy barriers), *'Department specific protocol'* (organisational barriers), *'Lack of time'* (organisational barriers), *'Not learning about digitalisation'*, and *'Unknown technological possibilities'*.

  This category has two sub-categories: *'Not learning about digitalisation'*, and *'Unknown technological possibilities'*.

  - *'Not learning about digitalisation'* influences *'Care worker ignorance'* and *'Unknown technological possibilities'*
  - *'Unknown technological possibilities'* influences *'Care worker ignorance'*. It is influenced by *'Not learning about digitalisation'* and *'System connectivity'* (organisational barriers – system connectivity)

- The final category is *'Care worker fear'*. This category influences *'Assumptions about others'* (expectations about digitalisation), *'Care worker reluctance'* and *'Familiarity'* (literacy barriers – digital literacy). It is influenced by *'Digital literacy'* (literacy barriers), *'Job replacement'*, *'Unfamiliarity'*, and *'Increased workload'*.

  This category has three sub-categories: *'Job replacement'*, *'Unfamiliar'*, and *'Increased workload'*.

  - *'Job replacement'* influences *'Care worker fear'*.
  - *'Unfamiliarity'* influences *'Care worker fear'* and is influenced by *'Care worker ignorance'*.
  - *'Increased workload'* influences *'Care worker fear'*.

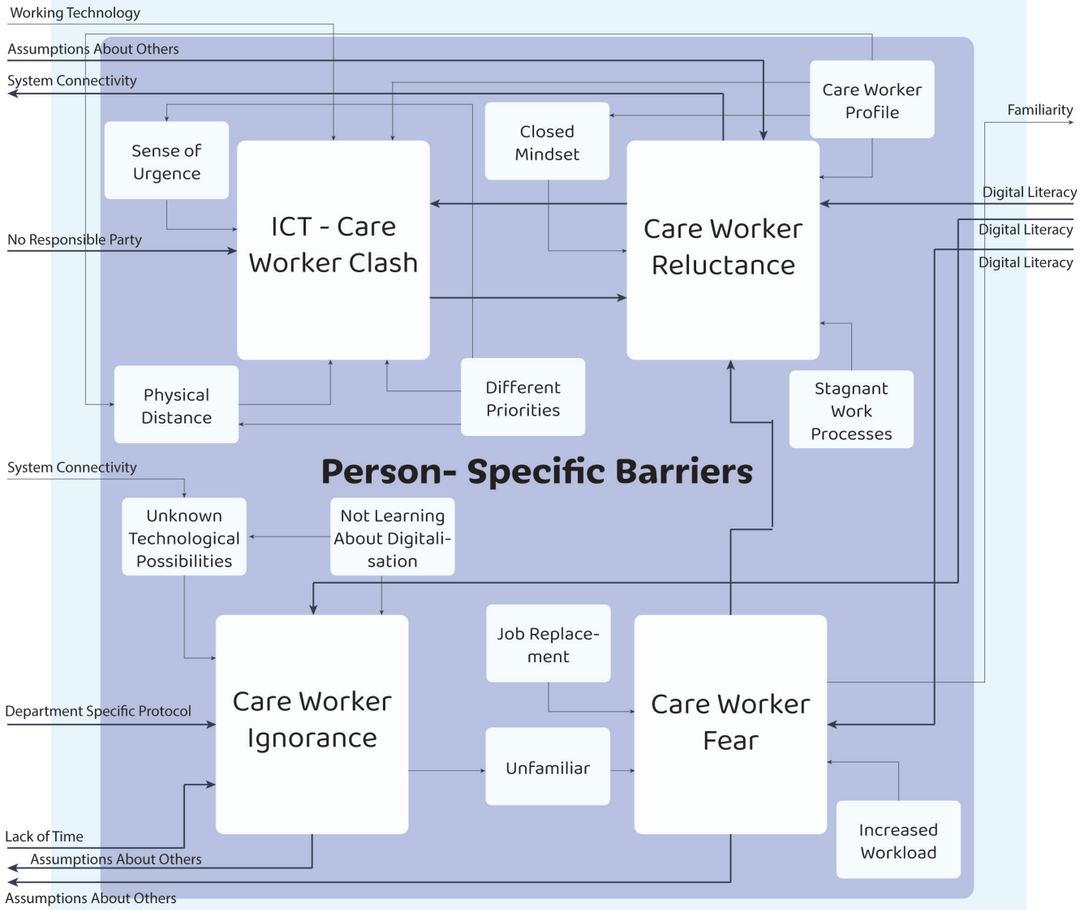


Figure 25: Person-specific barriers

Literacy Barriers

Two categories are identified as literacy barriers: *'Digital literacy'* and *'Physical literacy'* (Figure 26). Both categories are largely influenced by one another.

- The first category is *'Physical literacy'*. Physical literacy influences *'Digital literacy'*. This is influenced by *'Age'*, *'Language'*, *'Ability to describe symptoms'* and *'Education level'*. This category has four sub-categries:
  - *'Age'* influences *'Digital literacy'* and *'Physical literacy'*.
  - *'Language'* influences *'Ability to describe symptoms'* and *'Physical literacy'*.
  - *'Ability to describe symptoms'* influences *'Physical literacy'* and is influenced by *'Language'*.
  - *'Education level* influences *'Digital literacy'* and *'Physical literacy'*.
- The second category is *'Digital literacy'*. This category influences *'Care worker reluctance'* (person-specific barriers), *'Care worker ignorance'* (person-specific barriers), and *'Care worker fear'* (person-specific barriers). It is influenced by *'Physical literacy'*, *'Education level'*, *'Age'*, *Digital experience'* and *'Familiarity'*. There are two sub-categories:
  - *'Familiarity'* influences *'Digital experience'* and *'Digital literacy'*. It is influenced by *'Care worker fear'* (person-specific barriers).
  - *'Digital Experience'* influences *'Digital literacy'* and is influenced by *'Familiarity'*.

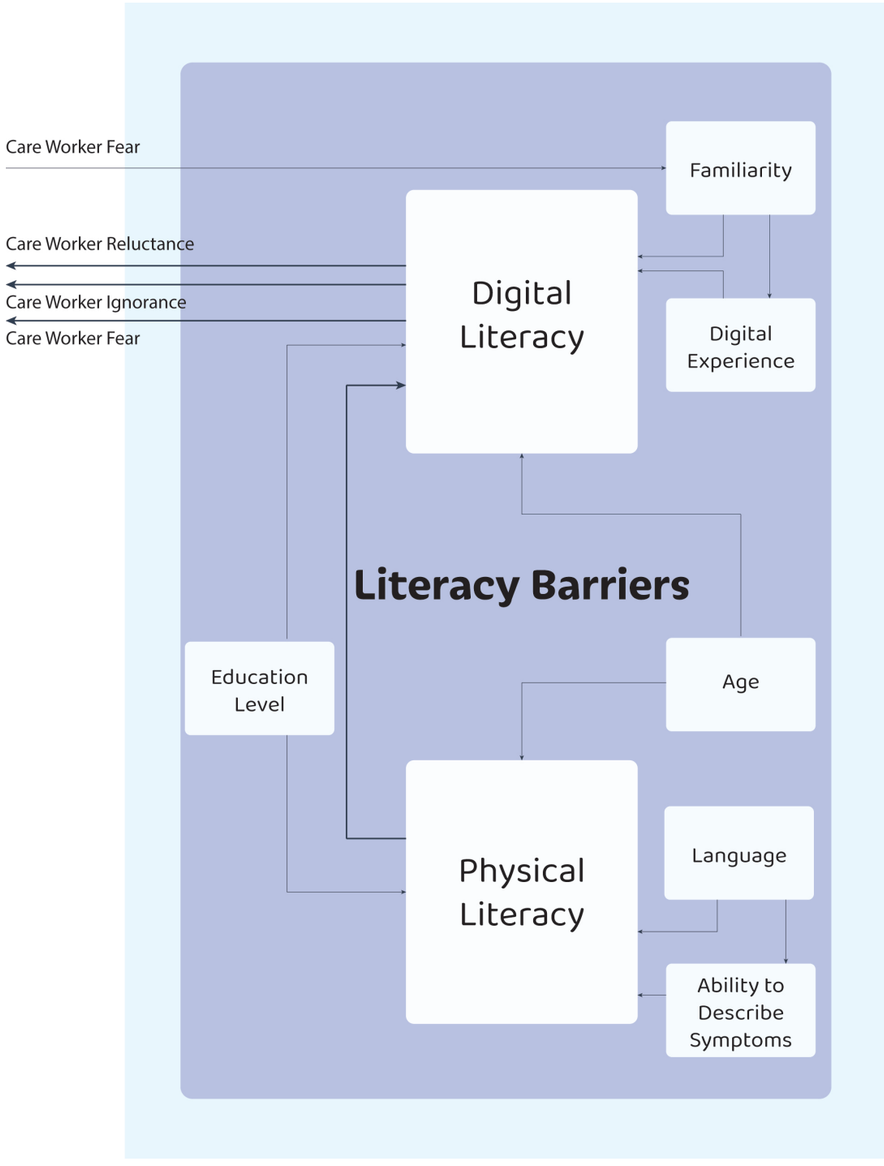


Figure 26: Literacy Barriers

6.1.3 Macro-Level System Analysis

The macro level analysis of the system map is not as detailed (Figure 27), as it falls outside of scope for this project. It is largely based on the context desk research conducted previously. The macro system level contains the stakeholders from the outside of the stakeholder map, concerning legislation and technology policy. The technology used to communicate and share information between each actor is described along the influence lines.

Legislation

The ministry (VWS) determines which information is shared between care professionals. There is a new legislation being implemented (WEGIZ and BgZ), which should improve some of the information discrepancies currently experienced by stakeholders in digital interaction in healthcare.

Pain points: Privacy & security legislation makes it difficult for different healthcare professionals to see patient information and while the WEGIZ is meant to improve information discrepancies between health care professionals and patients alike, still not all information is shared with the patient.

System Interconnectivity

For this part of the analysis, only Chipsoft was included, which is the provider for the RdGG hospital information system HiX. HiX is one of the largest hospital software programmes used in the Netherlands (Consultancy.nl, 2024), however it is not interoperable with many other systems. This makes it difficult to share information between hospitals and care professionals. In the Netherlands there is a free market concerning hospital systems (Autoriteit Consument & Markt, 2021), which means hospitals can choose their own system. The same is true for GP systems and PGO's. Because of the differences in systems, there are also differences in which information is available on platforms, which can be very confusing for patients and care professionals alike.

Pain points: If technological systems used in healthcare don't interact and are not interoperable, the best possible care cannot be provided, because information is not readily available when needed. Information is difficult to find, and often isn't complete because of differences in the way it is recorded.

6.1.4 Inter-Level System Analysis

The strength of a systemic analysis is the ability to show inter-level complexities within a system. In this synthesis map, pain points are defined from the macro and micro levels, which are connected to the factors at meso level of the system analysis. Arrows are drawn between these pain points and factors, to demonstrate their influence.

The pain points previously defined at macro level on the topics legislation and system interconnectivity are largely influenced by the 'System connectivity' category. This comes down to the fact that the lack system interoperability and their inability to efficiently operate with other systems within the healthcare domain largely influences the barriers for the digital transition of patient- care professional interaction. This is also one of the main points within the micro-level pain points, as GP systems don't optimally interact and connect with hospital systems.

The other two main categories for influencing the pain points at micro level are 'Lack of Time' and 'Physical Literacy'. Lack of time largely is connected to the MS part of the patient journey, as they don't have enough time to spend per patient and would like to have this time to provide the best care to their patients. Physical literacy largely is influenced by the patient's ability to describe their symptoms to their GP and/or MS.

These influences show the final influences on the macro-level barriers, which can then be used to define influential points and leverage points within the system.

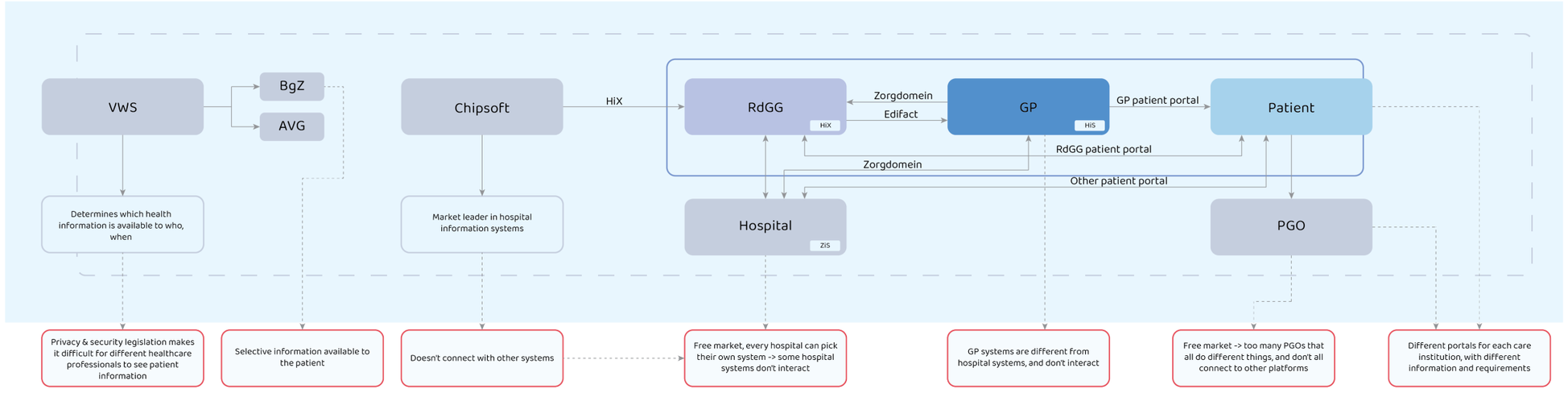


Figure 27: Macro-level system analysis

6.2 Synthesis Map Results

The added value of a synthesis map is the visualisation of the connections between levels and how they influence one another. A small change at meso level can influence a large change at micro level. Based on this, there are two types of points that can be determined: influential points and leverage points. Influential points are points with many incoming connections, which means that it is influenced by many things within a system (Murphy & Jones, 2020). In this case this means that the influential points are the largest barriers for the digital transition of interaction within the RdGG.

Leverage points are points with a large number of outgoing connections, meaning a change here would influence many other points within a system (Murphy & Jones, 2020). Meadows (1999) was one of the first to define leverage points as parts of a complex system where "a small shift in one thing can produce a big change in everything" (p.1). Changes in a system do not have to come from large actions but can also be small and focussed (Roxas, Rivera, & Gutierrez, 2019). In this project that means recognising the value of changes to the sub-categories, rather than only changes to the identified categories within the barriers for the digital transition of interaction.

6.2.1 Influential Points

When identifying influential points, the number of incoming connections was considered. For a barrier or factor to be influential, it was defined to have at least five incoming connections. This means five influential points can be identified within this system:

- *'Assumptions About Others',*
- *'System Connectivity',*
- *'ICT - Care Worker Clash',*
- *'Care Worker Ignorance'* and
- *'Care Worker Reluctance'*.

Therefore, it can be concluded that these are the main barriers for the digital transition of interaction within the RdGG.

6.2.2 Leverage Points

For the identification of leverage points, the barrier or factor was defined to have at least five outgoing connections. An exception was made for any points that had three or more inter-barrier influence lines, as these have a larger influence on the system than factor-influence lines. Six leverage points were identified: *'Interoperability', 'System Connections', 'Different Systems', 'Difficult to Determine Responsibility', 'Shortage of Time and Money',* and *'Digital Literacy'*. The barriers *'Shortage of Time'* and *'Shortage of Money'* are combined here, as they are largely interdependent on one another. Lack of time to digitalise is influenced by lack of money for digitalisation, and vice-versa.

These leverage points translate into six opportunities for the digital transition of patient – care professional interaction at RdGG:

1. Improve system interoperability
2. Improve system connections
3. Streamline the number of systems used in healthcare
4. Take ownership/ responsibility surrounding digitalisation at the RdGG
5. Make more space in the budget to spend time facilitating the digital interaction transition
6. Improve digital literacy

The top three opportunities are legislative opportunities that the RdGG cannot influence by themselves, so they must be addressed by a group of care providers simultaneously. However, the bottom three opportunities are changes the hospital can make to facilitate the digital transition of patient – care professional interaction. These opportunities can be combined with the analysis of the envisioned future of healthcare from the interviews.

6.2.3 Conclusion

This analysis answers the following research question:

3) What are bottlenecks in the implementation of the digitalisation strategy at the RdGG?

The answer to this question is the following: the bottlenecks to the digital transition of interaction at the RdGG are assumptions about others, system connectivity problems, ICT- care worker clash, care worker ignorance, and care worker reluctance. These bottlenecks can be mitigated by using the following opportunities derived from leverage points:

- Improve system connectivity legislation to facilitate care rather than hindering it;
- Take ownership of the digitalisation strategy at the RdGG and define a clear goal to work towards; and
- Make space in the budget to create time to learn about digitalisation and new technology, improving digital literacy.

6.3 Future Vision

A future vision is an expression of the desired future status, which is used as a reference point for the digital interaction transition roadmap in the following chapter. The future vision provides a handhold for long-term directions for innovation and gives meaning to the actions taken to reach those long-term directions for innovation (Comi & Whyte, 2018).

Based on the analysis, a future was envisioned where all care professionals and patients have access to the same patient case file when treating the patient. Emphasis was put on the necessity for patients to have access to their file, but not the ability to change medical information of diagnoses (so read only access), to prevent contamination of the file. Providing access to a shared case file - where care professionals can see the diagnoses, tests, and outcomes that other professionals have given - will provide insights into the patient's full medical history and prevent unnecessary administrative tasks care professionals currently experience. In this future, technology serves as a facilitator and aid to care, forming the foundation for the provision of care, while still enabling care professionals to provide the human factor that is so important in healthcare. Care workers collaborate to provide care together, surrounding patient values and needs. In this future, healthcare has made the switch from reactive care to proactive care, patients understand more about their general health, preventing illness before it happens. This will take some of the burden off healthcare, enabling patients to receive care when it is really needed.

6.3.1 Vision Themes

There are three main themes identified in this future vision, which are 'Patient Clarity, 'Shared Administrative Burden' and 'Time for Care.

Patient Clarity

In the future, healthcare will shift to more person-centred care, where patients have access to their medical data. For patient-centred care to be possible in the future, more of the system-level processes need to be made uniform (made the same). Healthcare is already tailored to the types of treatments patients need, but it is not possible to spend more time on patients if the system does not allow for it. All customisation is currently specified on type of treatment, leaving no room for personal care per patient. Enhancing patient – care provider interaction through process uniformity will provide more clarity surrounding a patient's health journey, for both patients and care providers alike. Care is further tailored to a patient's wishes with additional focus to patient-centred care. These changes empower patients to take a larger role in their care, making them an integral part of their care journey.

Shared Administrative Burden

In the future, technology is an aid to in-person care, and provides a digital foundation for the provision of care. Digital healthcare platforms are interconnected and can share information automatically without legislative barriers. This requires a change in privacy and security legislation in the Netherlands, with a form of blanket permission for healthcare providers to share patient information between relevant care professionals. This foundation of technology makes it possible for healthcare professionals to provide humanity in their care. An increase in the use of automation in the workflow will allow the administrative burden to be shared between human and technology. By enabling patients to take over part of their care, making use of at-home testing devices, part of the administrative burden is also shared between patients and care providers. Process uniformity will also play a part in this process, as the removal of unnecessary steps simplifies (transmural) communication between care providers.

Time for Care

In the future, the responsibility of care is shared between care professionals and patients. This means that patients take over more of their own care, by focussing more on general health and completing parts of care themselves (e.g. anamnesis). A change in the way healthcare is provided to be more proactive care, preventing problems before they arise, will lighten some of the burden on care professionals created by the rise in complex problems, shortage of care professionals and growing population.

A secondary part of shared responsibility of care points to collaboration between care professionals surrounding a patient's care. This means that multiple care professionals treating a single patient should have access to the same case file, to prevent double work. This

Patient Clarity

Shared Administrative Burden

Time for Care

Future Vision

In the future, the RdGG simplifies patient - care provider interaction by using a shared data space for care plans, allowing patients to play an equitable part in their health journey

Figure 28: Future vision

will provide an insight for different care professionals into other treatments a patient currently has and provides an opportunity for a patient's GP to check in with their patient post-referral. Care organisations are very separated from one another in the current care structure, while in the future it is envisioned that care is provided together rather than separately. In combination with a more distributed administrative burden, this increase in collaboration will enable care professionals to have more time available for patient care.

6.3.2 Future Vision

Based on these themes, the following future vision is defined (Figure 28):

In the future, the RdGG simplifies patient - care provider interaction by using a shared data space for care plans, allowing patients to play an equitable part in their health journey

Interaction

In this future vision, patient – care provider interaction happens from one central point, where all actors have access to the same medical data (Figure 29). This forms the basis for a shared data space for care plans, where the separate systems used by the actors (Figure 30) have automated data-sharing during a patient's treatment. The patient's care plan is determined through collaboration between all relevant care providers treating the patient, and the patient themselves. This is supported by the systems each actor uses, such as a hospital information system (ZiS), GP information system (HiS), and a patient's personal health environment (PGO).

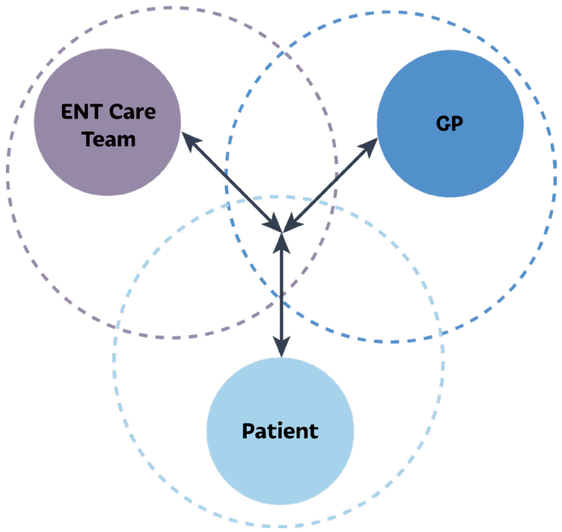


Figure 29: Future vision interaction

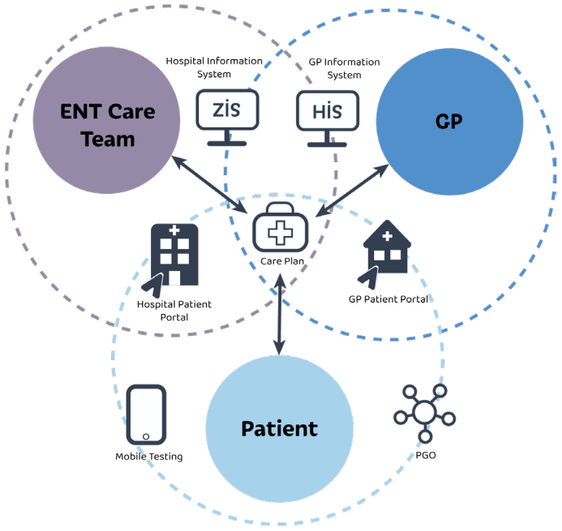


Figure 30: Future vision interaction, technology data space interconnectivity

Vision Link to RdGG Digitalisation Pillars

The hospital has defined five pillars in their digitalisation strategy (Reinier de Graaf, 2021) (Figure 31), which align with the future vision. 'Connected Patient' and 'Regional Information Exchange' fall under the sections *'time for care'* and *'patient clarity'*, with the aim for patients and care professionals alike to be responsible for care. 'Broadening the Digital Foundation', 'Innovation' and 'Data' fall under the section *'shared administrative burden'*, where technology is developed and implemented as an aid to physical care.

The reason why this strategy currently doesn't work is not because the pillars are irrelevant, on the contrary: the pillars the RdGG has identified fit well with the leverage points found in the system map. Meadows (1999) mentions that leverage points often sound logical to actors in a system, but that they are often pushed in the opposite direction than they should be to make a change in the system. An example of this is for example the digital onboarding strategy the hospital wanted to implement to improve the 'connected patient' pillar. What the patient needs surrounding the use of digital systems is less complication and more available information, rather than a new way to be introduced to the patient portal. Another example within the regional information exchange pillar is the implementation of a regional platform. This does not solve the interconnectivity issues that hospitals in the region experience, but rather adds to it.

Based on the synthesis map, the leverage points are used in combination with the pillars from the RdGG strategy to identify actions that will influence the leverage points in a way that will change the influential points in the system.

Connected Patient	Regional Information Exchange	Broadening the Digital Foundation	Innovation	Data
The 'Connected Patient' pillar aims towards (digitally) involving patients more in their care process. This includes for example access to digital technology, virtual treatment and contact with care professionals, improving care professional and patient health literacy, and support surrounding prevention and self-management.	This pillar aims towards for example regional ICT collaboration, choosing between one or two platforms within the region and utilising government subsidiaries to further the digital transformation.	When broadening the digital foundation, the RdGG wants to make digital collaboration surrounding care possible outside of the hospital environment, digitalise more of the internal processes and improve digital capabilities under care professionals.	The hospital plans to focus on innovation by preparing more means (time and money) to do so, while working with the university on the following topics: health data for health journeys, social innovation and technological innovations.	This pillar aims towards using more data to optimise hospital processes and management and improving the electronic health records.

Figure 31: RdGG pillars for digitalisation

07
Roadmap

In this chapter, the final design is explained: a strategic and tactical roadmap for the digital transition of patient – care professional interaction at the RdGG. First, a trend analysis is described, to define the relevant current and future trends in healthcare. This is followed by a description of the time pacing strategy used for both roadmaps. Finally, each horizon of the roadmap is explained, including touchpoints, actions, and user value. This chapter provides an overview of the final designed strategy for the RdGG.

7.1 Design Roadmapping

In this chapter, the final design is explained: a strategic and tactical roadmap for the digital transition of patient – care professional interaction at the RdGG. First, a trend analysis is described, to define the relevant current and future trends in healthcare. This is followed by a description of the time pacing strategy used for both roadmaps. Finally, each horizon of the roadmap is explained, including touchpoints, actions, and user value. This chapter provides an overview of the final designed strategy for the RdGG.

Design Roadmapping is a method that provides handholds for the communication of a design direction or strategic plan to the reader (Simonse, 2017). This ensures that multiple parties within a system understand the goal they are working towards and the steps that need to be taken to reach that goal (Simonse, Hultink, & Buijs, 2015). This is done by mapping the steps along a certain future timeline that is relevant to the envisioned goal, called a future vision. Other elements are included, such as user values, market trends, new technology or products/services. In this project, the elements 'actions', 'user value' and 'trends' are used to support the goal of the roadmap which is to illustrate a strategy for the digital transition of patient- care professional interaction at the RdGG.

Two types of roadmap are made, a strategic roadmap and a tactical roadmap. A strategic roadmap is a simplified version of a tactical roadmap, made to be shown to external stakeholders within a system. It is easy to read and contains the most important elements that need to be communicated. A tactical roadmap contains all elements necessary to communicate the changes needed to the internal stakeholders involved in the system, which is usually more detailed than a strategic roadmap (Simonse, 2017). This project uses both types of roadmap to communicate the strategy for the digital transition of patient – care professional interaction at the RdGG. The roadmap takes the defined leverage points from the synthesis map and uses them to demonstrate the necessary changes to facilitate the strategy to reach the future vision.

The roadmap is split into several categories as mentioned previously:

- The strategic value section highlights the main elements of the future vision: Patient Clarity, Time for Care and Shared Administrative Burden. They contain the general description of actions to be completed in each horizon.
- The service propositions are split into actions for the digital transition for interaction at the RdGG and digital service actinons. This section demonstrates examples of actions that can be taken to reach the defined strategic value elements mentioned above.
- Actor value is divided based on the added value per actor, which are patients, GPs, and the ENT care team, with the addition of the RdGG organisation. Because changes are made at organisational level to improve the digital interaction transition, it is important to demonstrate the added value the actions have.
- The trends section is divided into sociological trends and technological trends, as these are the most relevant trends for a complex socio-technical system.
- Finally at the bottom of the roadmap, the relevant pillars from the current RdGG digitalisation strategy are visualised.

7.2 Trend Analysis

To determine how the digital transition of patient-care professional interaction can be implemented, an overview must be made of relevant trends in the healthcare sector. The principles from a DESTEP trend analysis (Lucidity, 2024) were used to create an overview of possible influences to this transition, however for this analysis the focus has been set on sociocultural trends and technological trends. These trends were determined to have the most important influences on this complex socio-technical system.

7.2.1 Sociocultural Trends

Organisational Transparency

The first sociological trend applicable to this project is organisational transparency. There has been an increase in the need for organisations to be held accountable for their actions, on environmental topics as well as organisational topics, and to communicate their goals towards consumers and staff (KPMG, 2023). The consumer has lost trust in the healthcare system, so restoring this trust by returning value and purpose is important (Siegel, 2024). This means listening to the consumer and their needs, which implies in this context to listen to the needs of both healthcare workers and patients. The Dutch government highlights the importance of organisational transparency when planning for the future of complex healthcare, including the consumer in decisions about the structure of healthcare (den Broeder, Couwenbergh, Hilderink, & Polder, 2023).

Preventative Care

There are multiple factors to the trend 'Preventative Care'. The first is the necessity for improved general health, which is another of the topics the Dutch government want to address in the future healthcare system (den Broeder et al., 2023). This includes the living environment, alongside improving general population health in the Netherlands, which means increasing funding for preventative healthcare (Luijs, Lentink, & Engelen, 2020). To be able to support the increasingly busy and complex care system, healthcare issues can be prevented before the problems arise by improving general population health (Marr, 2023). This suggests an increased focus on improving lifestyle, environment, prevention and early diagnosis.

Digital Fatigue

This trend is not specific to healthcare but is still relevant to healthcare regarding the digital transition. Digital fatigue refers to the fatigue caused by an influx of information and use of technology, which can increase stress and anxiety (Miseviciene, Rimavicius, & Makackas, 2020). It is mostly caused by an increase of technology use, highlighted during the increase of literature published during the COVID-19 pandemic (Gregersen, Astrupgaard, Jespersen, Gårdhus, & Albris, 2023). Device use can be overwhelming, especially when using technology at work and at home (Arbanas, et al., 2023). When implementing the digital transition of interaction, it is important to consider the amount of time care workers and patients spend on their devices and limit the administrative burden health care professionals experience.

Awareness of General Health

Alongside preventative care, there is an increase in awareness surrounding general health (Global Data, 2023). It is increasingly clear to the general population the effect their lifestyle choices have on their general health, such as the positive effects of exercise or negative effects of smoking (Kloosterman, Akkermans, Reep, & Tummers- van der Aa, 2023). The government has also increasingly provided information on determinants for improving general health (Herber & Giesbers, 2024). There is also an increase in the importance and affect mental health has on physical health, highlighting the need for a holistic approach to healthcare in the future (Marr, 2023).

Personalised Care and Communication

The final sociological trend defined is the change towards personalised care and communication. This is supported by collected data, to provide personalised insights and interventions (Luijs, Lentink, & Engelen, 2020). Personalised care cannot be provided in an increasingly complex healthcare system without the support of technology, where new developments are thought to improve the efficient use of medical resources (Marr, 2023). For personalised care to be possible, there must be a shift from organisation-centred ecosystems to consumer-centric ecosystems (KPMG, 2023); to design the care process around the patient's needs rather than the hospital's needs. The patient can play a more active role in their care process, being involved in the decision-making process rather than being told their treatment plan (Ekman, et al., 2011).

7.2.2 Technological Trends

Technology Supported Care

In the future, technology can play a supporting role in the provision of healthcare. Researchers believe technology has the possibility to make medical care more efficient and take over parts of the administrative burden currently felt by care professionals (Konttila, et al., 2019). There are many areas where technology can form a supportive role to the provision of healthcare, for example through the development of AI and portable medical devices for at-home use (Popov, et al., 2022). The use of technology as a supporting factor to medical care was accelerated during the COVID-19 pandemic, where the necessity for home-testing became apparent (Health Management, 2022). In the future, the technological possibilities will only further expand (Chiu & Stafford, 2024). Automation is already a large factor of the implementation of technology (Popov, et al., 2022), but can still have more of a role in supporting the physical provision of care.

AI-Assisted Care

One of the main topics currently discussed as a development in healthcare, is the implementation of AI software. Both AI and generative AI are upcoming in the healthcare sector, with the platform Autoscriber already being tested at the RdGG (Teunis, 2024). Other examples are AI prediction software (for enhancing radio imaging for example) and AI prediction tools for resource management are more examples of the implementation possibilities in healthcare (Siegel, 2024). For this project AI is a supportive tool that can be implemented to lighten the administrative burden on medical professionals.

Jonelle Ooms - 2024

7.3 Time Pacing Strategy

Both roadmaps are designed along the same timeline towards 2034. The actions each part of the organisation can take to reach the future vision are divided over the three horizons. This is done chronologically and based on the pacing of the actions, which have an influence on one another (Simonse, 2017). The first horizon starts in the current context surrounding the digital transition of interaction at the RdGG and finishes at the end of 2025. The second horizon stretches from 2025 to 2028, to ensure that the actions during this period have enough time develop within the time pacing of the horizon. The final horizon is from 2028 to 2034, which is the longest period in the roadmap. This horizon contains elements of culture and legislation change, which take a long time to implement.

When creating a time pacing strategy for a roadmap, there are three design cycles that are completed: value enhancement, value creation and value proposition (Figure 32). Each design cycle is more complex than the previous cycle and requires exponentially more time to complete. In a roadmap, you work towards a future vision that often has a value proposition that might require a new business model, or the use of new technology. This design cycle takes the longest to complete, often aided by faster-paced design cycles. To reach a new value proposition, existing values need to be enhanced. This design cycle is the shortest of the three and happens iteratively throughout the process towards the future vision. To bridge the gap between current values and a future value proposition, new values need to be created. This design cycle has a middle-length time pacing.

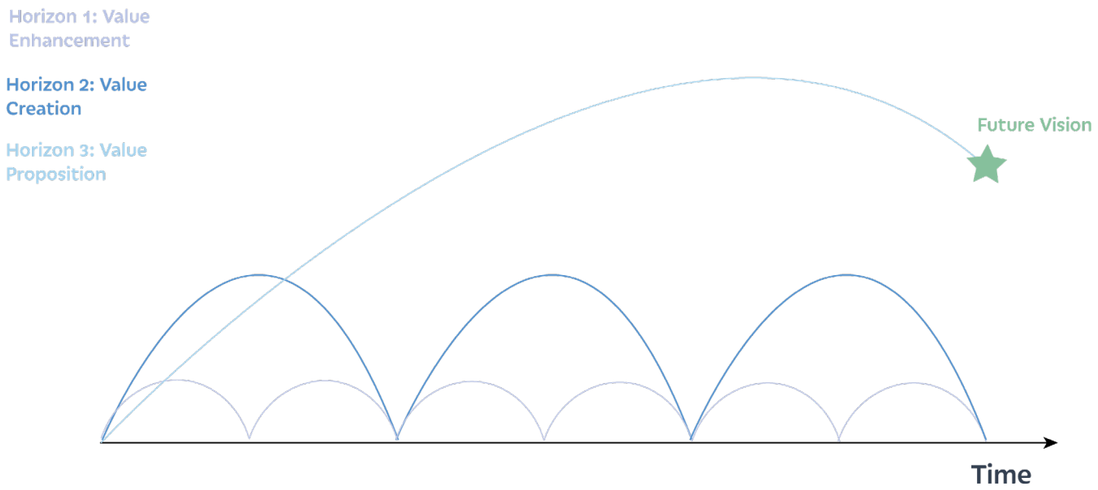


Figure 32: Time pacing strategy Simonse, 2017)

The horizons are based on Simonse's (2017) three horizon's theory (Figure 33), where innovations in the horizons overlap slightly to ensure continuous innovation. The first horizon takes the first steps towards ownership of digitalisation and improving patient and care professional health literacy. The second horizon is about creating space for digitalisation; creating the opportunity for collaboration, uniform care processes and taking the first steps for patients taking control over their health journey. The third horizon aims towards culture change, making healthcare more proactive and preparing the healthcare landscape for the use of new technology.

The elements described from each horizon are visualised in the tactical roadmap in Figure 34.

A strategic roadmap was also designed to communicate the main elements from the tactical roadmap to patients, care staff and other stakeholders not involved in the implementation of the digital transition of patient- care professional interaction (Figure 35).

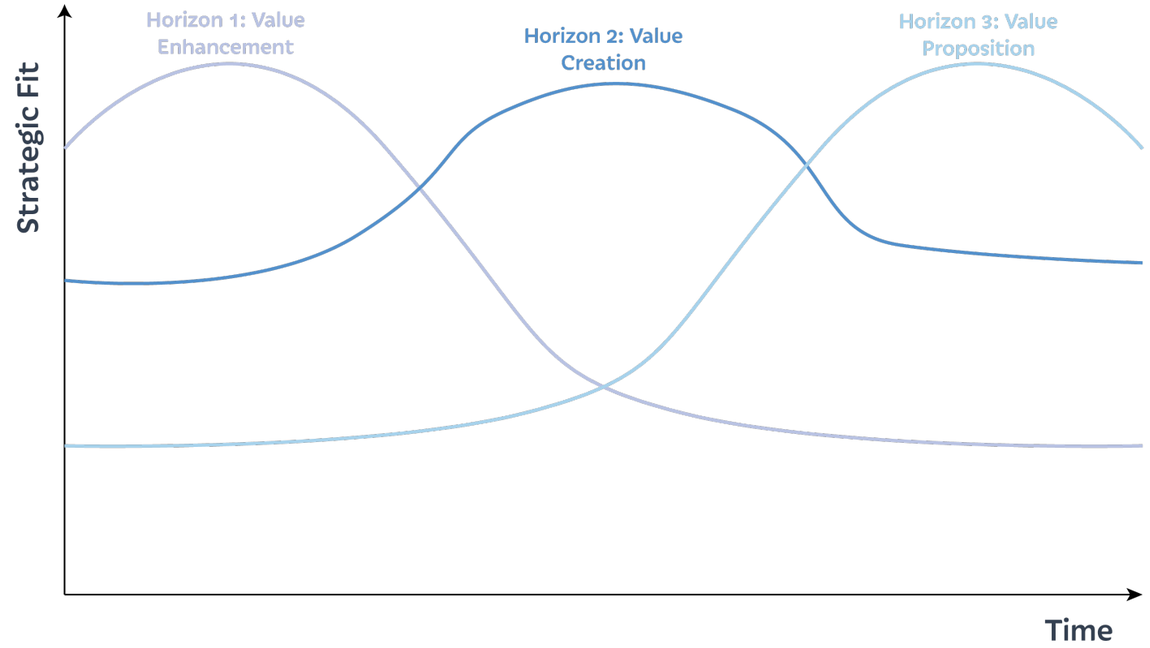


Figure 33: Three horizons model

7.4 Tactical Roadmap

Figure 34: Tactical Roadmap

7.5 Strategic Roadmap

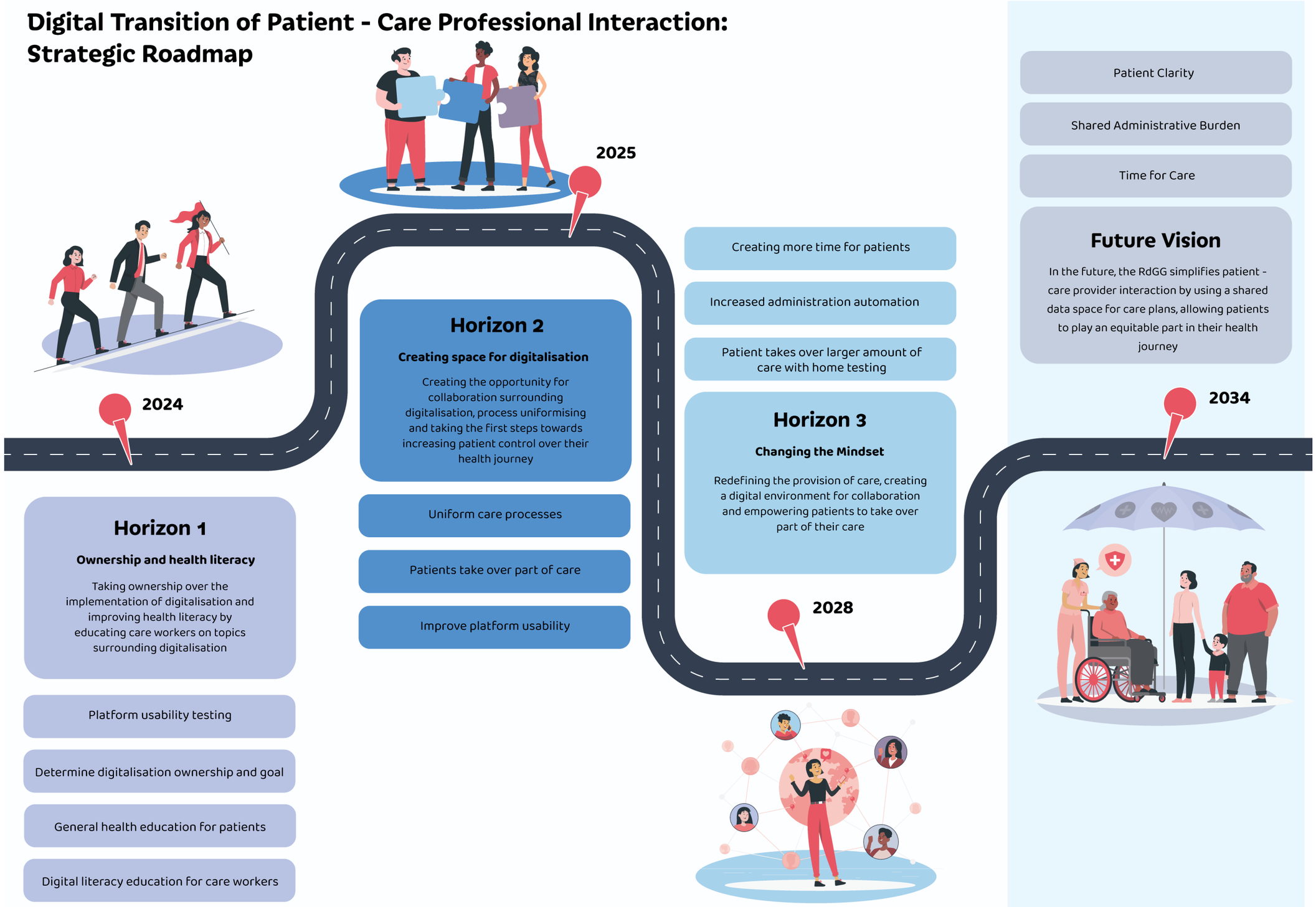


Figure 35: Strategic Roadmap

7.6 Roadmap Horizons

To explain the full roadmap, this chapter is split into the three sections. Each section describes one horizon of the roadmap, demonstrating its goal and how strategic value elements and service proposition actions taken in each horizon play their part towards reaching the future vision. First, the patient – care provider interaction in each horizon is visualised. This pertains to the methods of communication and information sharing between actors. Secondly, the strategic value elements are highlighted, which indicate which steps globally should be taken in each horizon. This is specified further by the service proposition actions section. This is followed by a section describing how the previous sections have added value for the relevant actors in this project. The relevant socio-technical trends are them mentioned, concluding with an explanation of how this horizon fits with the current digitalisation strategy pillars at the RdGG.

7.6.1 Horizon 1: Ownership and Health Literacy

Goal

The goal of this horizon is: taking ownership over the implementation of digitalisation and improving health literacy by educating care workers on topics surrounding digitalisation.

Interaction

The interaction in this horizon demonstrates the current method of interaction between the actors in this project (Figure 36). The care providers, the ENT care team and GP, have minimal communication and exchange only basic information when conducting a referral. Their interaction with the patient is relatively paternalistic and one-sided, the care providers inform the patient of their treatment decision. There is little space for the patient to take part in their care journey.

Strategic Value

The first horizon forms the basis for the digital transition of patient – care professional interaction (Figure 37). The first element to take place falls under the first main element for the digital transition of interaction strategy, time for care. The first touchpoint is to define and take ownership of digitalisation. Based on this, a new digitalisation strategy should be developed with clear goal setting. This will make clear for staff, care workers and patients who oversees the digitalisation strategy and how the projects that are being developed to fit into this strategy. Simultaneously, the RdGG can seek collaboration with other hospitals to learn about their methods for implementing digitalisation. It is important to make more time in the business plan for digitalisation, both the education surrounding digital literacy, as time to co-create and develop new systems. This element falls under the shared administrative burden element. When time is made for digitalisation, education for staff can start concerning digital literacy and new technology. Schreiweis et al. (2019) mention in their research that an individual barrier for the implementation of eHealth is cognition, which demonstrates that lack of eHealth literacy and missing education for care workers surrounding eHealth negatively impacts the adoption of new technology. Addressing this in the first horizon paves the way for patients to be able to take over more of their

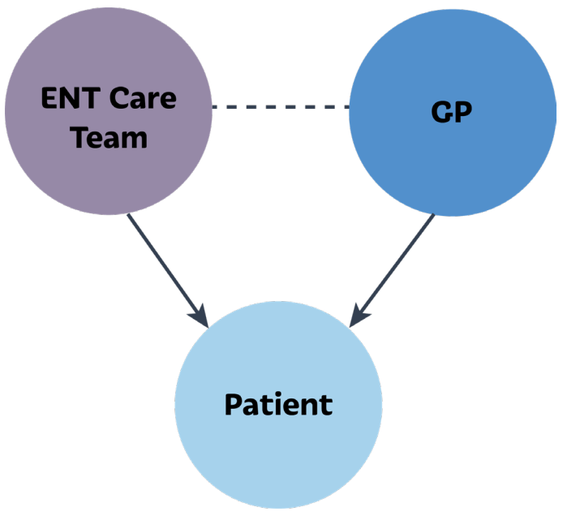


Figure 36: H1 patient- care provider interaction

Horizon 1

Ownership and health literacy

Taking ownership over the implementation of digitalisation and improving health literacy by educating care workers on topics surrounding digitalisation

Platform usability testing

Determine digitalisation ownership and goal

General health education for patients

Digital literacy education for care workers

Figure 37: Horizon 1

health and to facilitate trust in digital technology under care workers. This happens simultaneously with the first patient clarity element, which is to educate patients about general health using a reputable and trustworthy platform. Care professionals have the knowledge about improving general health, the platform just needs to create the means to do so.

Service Proposition Actions

For the digital transition of interaction at RdGG, the first action to take in horizon 1 is to determine ownership of digitalisation. Once this is completed, the strategy can be implemented. This will continue over all three horizons. An example of an action to make a new strategy, would be to organise a meeting with staff involved with digitalisation. A common goal should be defined, and overview must be created of the projects that are currently being developed of how they fit with this goal. Once the new strategy has been defined, regular, e.g. biannual meetings should be held with interested parties, to make sure everyone is on track to reaching the predefined goals. The next step for this transition would be to audit the current level of digital literacy under the staff at the RdGG. This will create clarity and a baseline for improving their digital literacy and knowledge. Following this audit, digital literacy training can be provided by the Reinier Academie in the form of monthly workshops.

For platform use, research and user testing should be done on both the patient portal and HiX. During interviews, both patients and health care workers indicated that the hospital platforms do not work intuitively, which prevents them from receiving and providing the best healthcare possible. User testing is a good first step for the barrier of platform usability (Schreiweis, et al., 2019) to be removed. If healthcare workers and patients believe their feedback is being considered, they are more likely to adopt future technology. This also will play a role in increasing trust for digital interactions. User testing also plays a role at organisational level, by laying the groundwork for the implementation of the standard version of HiX (if it were to be implemented). By creating understanding of the barriers and successes of the current system, the organisation will have an overview of which elements to transfer to the new system and which to remove. This will make the transition to the new version of HiX smoother for the organisation. ICT workers can also provide educational videos on the patient portal and hospital website, where patients can find reputable and trustworthy information surrounding general health.

Actor Value

Patients

For patients, the following points of added value are identified. Patients will have increased knowledge on general health because of the education the hospital starts providing in this horizon. Education surrounding digitalisation will also provide patients with more clarity on the use of digital technology and treatment procedure, and who to go to with questions. Finally, the provided education will improve patient's digital literacy.

GPs

For GPs, the digital interaction strategy will provide more clarity surrounding information transfer and communication with the hospital.

ENT care workers

For care workers, there is more clarity surrounding the ownership of the digitalisation process, and they know who to address with questions or ideas for new technology. By educating care workers about digitalisation, their fear surrounding the topic will be reduced, while simultaneously improving their digital literacy. They will have an increased sense of being heard and understood, which will in turn increase their trust in digital technology and in management.

Organisation

At organisational level, the workflow will become more efficient with improvements to the platforms (e.g. less phone calls from patients who can't find information). Clarity surrounding the digitalisation strategy will streamline the initiatives and projects surrounding the digital transition of patient- care professional communication.

Trends

Social

The social trends applicable in horizon 1 are organisational transparency, preventative care, digital fatigue, and awareness of general health. By developing a new strategy for the digital transition of interaction, the RdGG fits within the trend of need for organisation transparency surrounding goal setting and innovation. Improving health literacy also takes the first steps in the transition to preventive care and education about general health. Improving health literacy will also influence the experienced digital fatigue, as this is largely influenced by the perceived difficulty of technology (Khaleela, et al., 2020).

Technical

The technical trends applicable in horizon 1 are technology supported care and automation. Research into the use of the patient portal and HiX demonstrate how technology can support the provision of care, and provide insight into how automation can aid the provision of care.

RdGG Digitalisation Strategy Pillars

The RdGG strategy pillars for digitalisation that are applicable here are Broadening the digital foundation and connected patient. This steams from taking the first steps towards improving the patient portal and HiX systems with usability testing, as well as starting the education procedure for patients and healthcare professionals. Education surrounds the base for creating a foundation for the digital transition, and providing the opportunity for patients to connect with care workers and take over more of their healthcare journey.

7.6.2 Horizon 2: Creating Space for Digitalisation

Goal

Creating the opportunity for co-creation and collaboration surrounding digitalisation, process uniformization and taking the first steps towards increasing patient control over their health journey.

Interaction

The second horizon is all about improving the interaction between care providers (Figure 38). To reach the future vision, care providers need to be able to share more information surrounding the patient's care and determine the optimal communication and information procedure. The patient is still learning about general health in this horizon, so they are not fully part of their care provision process yet. The first steps towards this are taken by allowing the patient to take over part of the intake information (anamnesis).

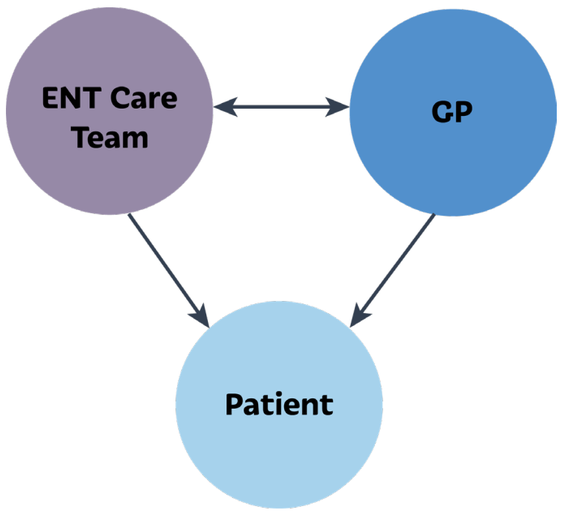


Figure 38: H2 patient- care provider interaction

Strategic Value

Horizon 2 is the largest horizon in terms of touchpoints and actions (Figure 39). Once the base of education and strategy has been implemented, the next steps can be made to change the way healthcare is provided.

For patient clarity, this horizon focusses on improving general health and uniformising the care process. Improving general health will lay the foundation for patients taking over part of their care, as positive lifestyle changes will help with preventative care, health issue prevention, and early diagnosis. Uniformising care processes within the hospital will provide the basis for person-centred care. Care processes are currently specified per outpatient clinic, which makes it difficult to comprehensively provide care across multiple clinics or care providers. Uniformising this (documentation) process will provide clarity, giving care workers the ability to tailor care to the patient, rather than the clinic.

This transitions into the element for time for care, where patients can take over part of their care following their education in horizon 1. Seeking collaboration with other hospitals and businesses will provide opportunities for reaching the future vision in two topics: patient - care provider interaction, and the provision of care. It became evident following analysis that care workers would prefer to work together more surrounding the method of provision of care. First-, second- and third-line care organisations are very separated from each other, creating unnecessary barriers for the optimal provision of care for the patient. Changing the way care organisations work together and share responsibility for care will pave the way for patient-centred healthcare in the future.

Finally, this horizon also includes the next steps for co-creation of the digital transition of interaction within the RdGG, by including care professionals in the development of new technology. In horizon 1 they would have created understanding of the process of the implementation of new technology and improved their health literacy. This provides the perfect base to provide the opportunity to include care professionals in the development of technology or system adaptations.

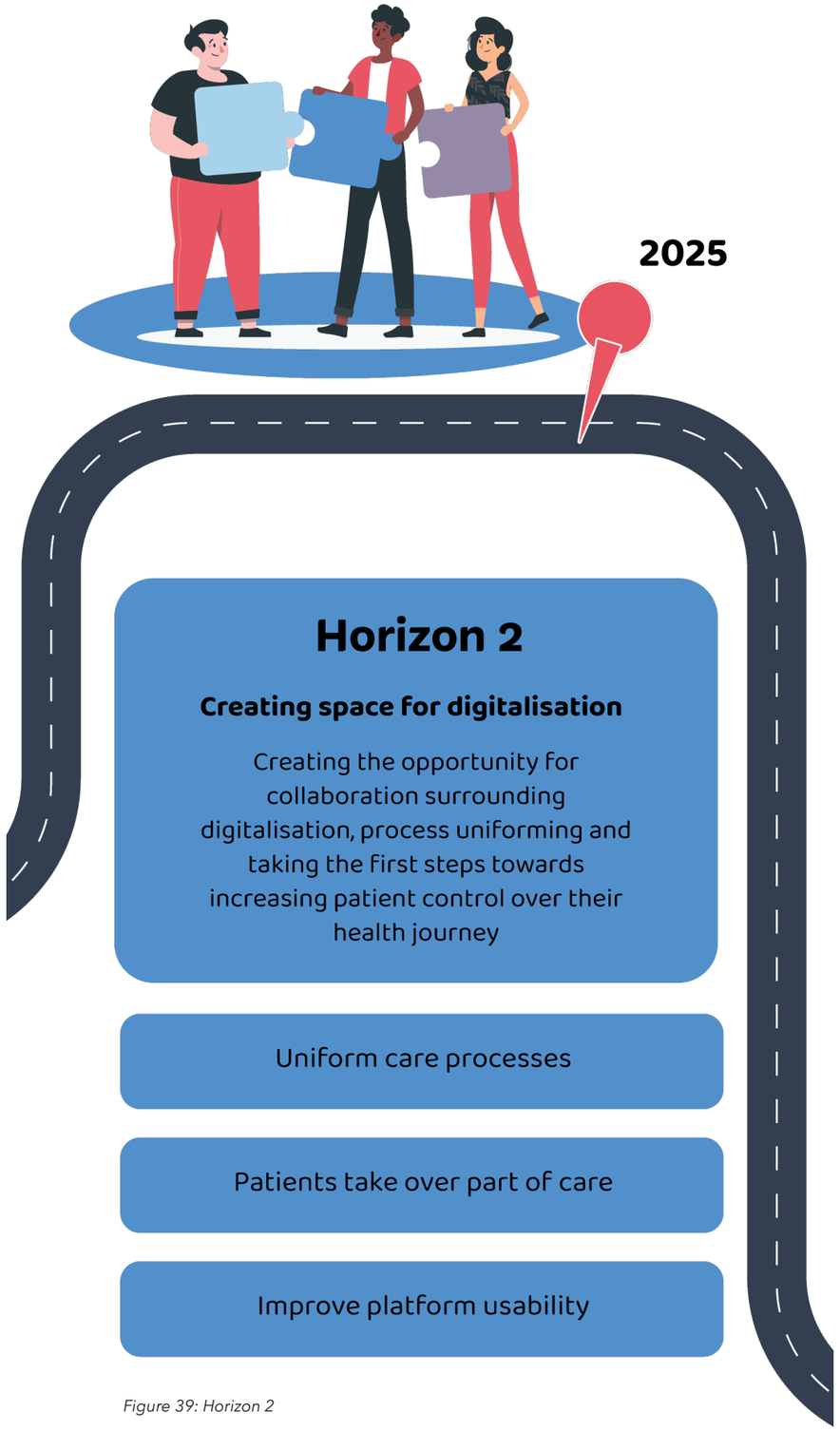


Figure 39: Horizon 2

The implementation of new technology will be facilitated as the next step towards technology as an aid to physical care. This is supported by working towards an increase of the use of automation in the care process and optimising the way technology is used by removing unnecessary steps in the workflow.

Service Proposition Actions

Following the literacy training in horizon 1 for digitalisation staff, the first suggested action in this horizon is to provide digital literacy training to new staff when hired. This happens alongside uniformising the care process across outpatient clinics, partially based on the analysed working processes in horizon 1. Patients take over (partial) anamnesis when checking in to the hospital through a questionnaire on the patient portal. This questionnaire is supported by research on the correlation between appointment time and type of treatment. The data from the research can then be used to develop an automated system that can be used when making appointments, to determine the appointment length based on a patient's symptoms. This is the first step taken towards distributing the administrative burden for care professionals.

For the platform, the previous user testing can also lead to usability improvements of the patient portal and HiX, which facilitate the care process rather than hinder it.

Actor Value

Patients

User testing on the patient portal paves the way for an improved patient portal, tailored to a patients' needs. This will improve user experience. Patients also experience increased control over their healthcare management, as they are given more of a role in their care process by completing anamnesis.

GPs

Streamlining the care process across care providers will improve user experience for GPs when making a referral to hospitals, while also improving their workflow by removing unnecessary administrative steps in the process. They will also experience more connectedness with other care providers (mostly second line care) through the biannual meetings and improved communication.

ENT care workers

For care workers, improving the system based on feedback will have multiple repercussions. It increases trust in the system, makes their workflow more efficient, improves user experience and reduces digitalisation reluctance. This is also influenced by their improved digital literacy and increased trust in their patients' ability to use digital systems. The physical evidence of patients completing (parts of) the care process will facilitate the ability to change their mindset surrounding patient's ability for digital systems use and the way care is provided.

Organisation

At organisational level, improving the platform will give employees a more efficient workflow. Systems that work increase motivation and improve service reliability for users. This leads to more efficient care provision and the base for a bottom-up change movement, facilitated by including care workers in the development of technology.

Trends

Social

The relevant social trends in this horizon are personalised care, preventative care, personalised communication, and awareness surrounding general health.

Technical

The relevant technological trends are once again technology supported care and automation. In horizons 2 and 3, the trend AI assisted care is also added. While this is not part of the future vision or strategy, AI has the possibility to provide the possibility to lighten some of the administrative burden care professionals have. It is developing so fast, that assumptions cannot be made about the part which it will play in the future of healthcare.

RdGG Digitalisation Strategy Pillars

From this point on, all of the strategy pillars are relevant and addressed in the horizon. Implementing more technology, increased data availability, and improving current technology will provide a basis for the digital foundation. Including the patient in their health journey makes the patient more connected and facilitates innovation. Finally regional information exchange comes through the biannual regional meetings surrounding legislation and care provision.

7.6.3 Horizon 3: Changing the Mindset

Goal

Redefining the healthcare landscape surrounding the provision of care, creating a digital environment for collaboration and empowering patients to take over part of their care.

Interaction

In this horizon, patients take over a larger part of their care. Technological advancements make at-home testing possible, which unburdens the care providers to provide the opportunity to make time for patients. As the patient has improved their knowledge of general health, and has access to information surrounding their treatment, they can start playing a larger role in their care process. The actors take the next steps towards providing care together. There is reciprocal interaction between each actor, improving communication and information sharing surrounding the care process (Figure 40).

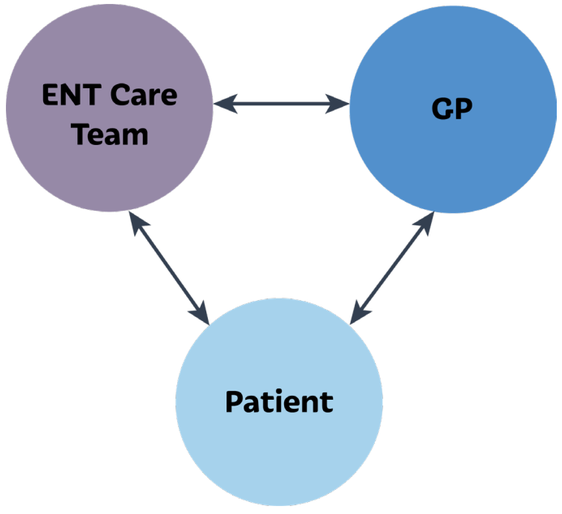


Figure 40: H3 patient- care provider interaction

Strategic Value

The final horizon encompasses the final changes needed to reach the future vision (Figure 41). For patient clarity, this means building on the uniformization in the previous horizon. Once this has happened, the physical parts of a patient's health journey can be tailored to fit their needs. Patients have access to their own medical data and take a larger part in their treatment. Patients complete parts of their care themselves from home, only coming to the hospital when necessary. This requires a change of mindset in healthcare surrounding the way care is provided, with patients having the ability to take over part of the care, sharing the responsibility of care with care professionals. Sharing responsibility of care also means that care providers have access to and can work in the same medical data, so no double work is done. Results and diagnosis are available for care professionals to view when necessary. The innovation mindset is expanded on, and new technology is tested and implemented. Automation becomes a larger part of the care process, with automatic triage questionnaires when making appointments.

Service Proposition Actions

Building on the previous addition to digital literacy education when starting at the hospital, digital literacy is included during health care professionals' education, improving their skills from the start. As mentioned, patients take over a larger amount of their care, using available home-testing technology. This takes over part of the administrative burden from care providers, making it possible to spend more time treating patients.

At technological system level, previous research on platform use can be utilised to prepare for a shared medical data space. Process uniformity from previous horizons aids this, as it makes it possible to share medical data without confusion or miscommunication. Time should be spent however streamlining past documentation of medical data, to ensure the seamless transition to an increase in accessibility to this data with other care providers.

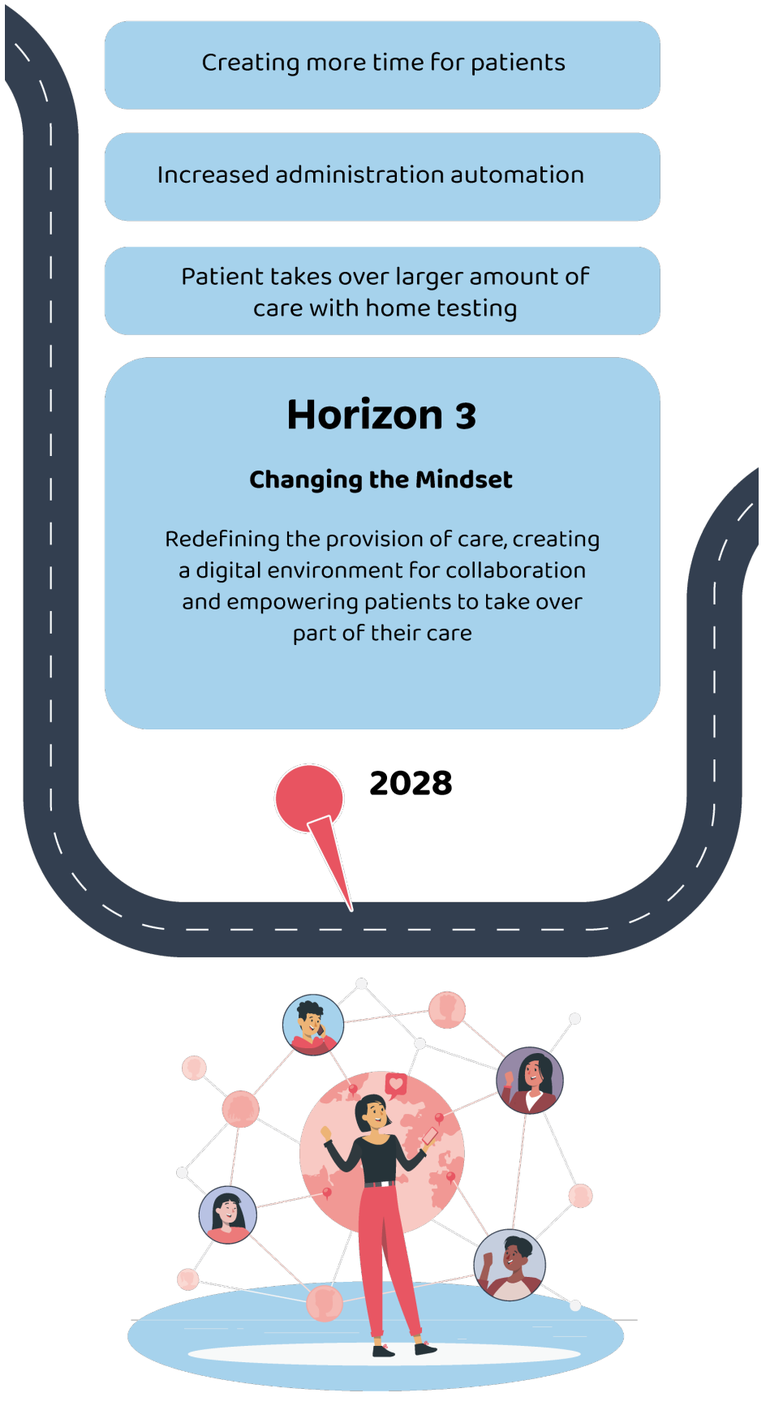


Figure 41: Horizon 3

The development of triage questionnaires can be implemented in this horizon in combination with an increase in automation, making it possible for patients to plan in the correct amount of time for appointments based on their type of health complaint. This increases the availability for care providers to spend on patients, as there is less administration to be completed.

Actor Value

Patients

Patients have increased trust and control in the system interoperability. Patients trust that their opinions matter in their care journey. There is more clarity surrounding their care journey, they know who to contact with questions and where to find information surrounding their treatment. Being able to read their diagnosis after the appointment will help a patient's information retention, giving them the time and space to process when needed.

GPs

GPs have increased trust in the patient's ability to take part in their care journey and their digital skills, while having a more efficient workflow due to the administration changes. They are more connected with other care workers and have the availability to provide the best care necessary according to the patient's needs. GP's have more insight into their patient's treatment process post referral and can play an active role in it when necessary.

ENT care workers

Care workers have an increased trust in the system and patient, expanding on the previously built trust. They have a more efficient workflow, due to changes in system use and administration, which leads to intrinsic motivation to develop new technology. They have a reduced fear of digitalisation and have changed their assumptions about others.

Organisation

At organisational level, care provision becomes more efficient without technological barriers. Employees are motivated to implement new digital interaction technology and are inspired by a bottom-up change movement. Finally, the ICT- care worker clash is diminished, as their priorities are more aligned.

Trends

Social

The relevant social trends in this horizon are personalised care, preventative care, personalised communication, and awareness surrounding general health.

Technical

The relevant technological trends are once again technology supported care and automation. In horizons 2 and 3, the trend AI assisted care is also added. While this is not part of the future vision or strategy, AI has the possibility to provide the possibility to lighten some of the administrative burden care professionals have. It is developing so fast, that assumptions cannot be made about the part which it will play in the future of healthcare.

RdGG Digitalisation Strategy Pillars

The digital foundation is broadened due to the mindset change surrounding digitalisation, with healthcare workers collaborating with company management to develop and test new digital interaction technology. The patient has taken over more of their care journey and is connected with their care providers through shared responsibility for their care. Regional information exchange is made possible through regular interactions between care professionals. This also creates is opportunity for data driven innovation at the hospital.

Jonelle Ooms - 2024

7.7 Future Patient Journey Blueprint

To demonstrate how the changes from the roadmap will influence the treatment procedure, a blueprint was made for the future patient journey (Figure 42). The categories are the same, however there are a few new steps that have been implemented. Each step of the patient journey is explained below, including the added value the new steps have for the patient, GP and ENT team.

Patient Experiences Symptom

1. Patient experiences symptom
   This step is self-explanatory. When a patient experiences a symptom, they want to make an appointment with their GP.

2. Patient makes appointment with GP – triage questionnaire
   The patient makes an appointment at their GP's office. When doing so, they are presented with a triage questionnaire to fill in, which automatically determines appropriate appointment length based on the patient's symptoms. The patient can then plan in the appointment at a time that works for them.

3. Automatic appointment with triage and patient receives appointment confirmation
   The patient receives an appointment confirmation once the appointment has been added to the GPs information system.

Consult at GP

4. Patient explains symptom and GP examines patient
   This step is the same as it would be currently. The patient goes to their GP's office, then explains their symptoms. The GP examines the patient.

5. GP gives diagnosis and explains treatment options to patient
   The GP tells the patient what their diagnosis is, and their treatment options. They also discuss options for referral, such as location and preferred specialist.

6. GP and patient decide about the treatment plan together
   Once the patient understands their options, they take some time discussing them with their GP, stating their values and wishes surrounding their treatment.

7. GP processes diagnosis on HiS and patient sees this on their PGO
   When the GP processes the diagnosis on their information system, the patient can see this in their own digital health environment. This aids information processing and retention, as it gives them space to understand their diagnosis in their own time. Additional information is provided as well, depending on the type of diagnosis or recommended treatment.

8. Automatic referral to ENT clinic
   In the future, the referral document does not need to be made by hand by the GP, rather is sent automatically. Specialists have access to the patient's medical data when accepted for referral, so it is no longer necessary to determine which information the specialist needs to see in the referral letter.

Consult at ENT Clinic

9. Automatic appointment preparation on ZiS
   Once again, automation is applied here, automatically making it possible for the patient to plan their appointment once referral has been approved.

10. Patient receives triage questionnaire
    The patient fills in another triage questionnaire before making their appointment, to fill in any missing information and answering clinic-specific questions. This makes it possible to determine appointment duration.

11. Patient plans appointment, determined by outcomes triage questionnaire
    The patient plans an appointment with the appropriate duration dependent on their answers on the questionnaire.

12. Appointment information on patient portal
    Any important information about the patient's appointment is available on their patient portal and personal medical data system.

13. Patient does hearing test at home, results automatically in HiS and ZiS
    Due to advancements in technology, it is possible for a patient to administer their hearing test from their own. The results are synched automatically in the hospital information system and the GP information system.

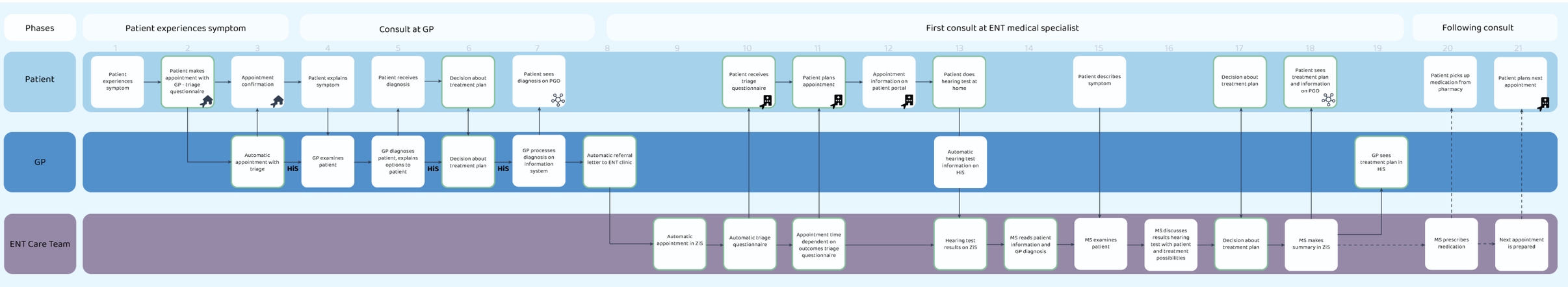


Figure 42: Future Patient Journey Blueprint

14. MS reads patient information and GP diagnosis

Due to the distribution of administrative tasks across actors, medical specialists have more time to spend on patients. This means that they can properly take the time to review a patient's file before a consult.

15. Patient describes symptom and MS examines patient

This step did not change in comparison to now. The patient explains their symptoms and specifies where necessary. The medical specialist examines the patient.

16. MS discusses results hearing test with patient and explains treatment possibilities

After the physical exam, the medical specialist discusses the hearing test results with the patient. They also explain treatment possibilities and outcomes.

17. Patient and MS make decision about treatment plan together

The patient and medical specialist then decide on a treatment plan together.

18. MS makes summary of appointment on ZiS, patient sees this on their PGO

When the medical specialist makes a summary of the appointment on their information system, this data is automatically synched with the patient's system.

19. GP sees appointment outcomes on HiS

The GP can also see the outcomes of the medical specialists diagnosis and treatment plan through the use of the shared data space.

Following Consult

20. MS prescribes medication and patient picks this up from the pharmacy

If medication is necessary, the medical specialist sends a subscription to the pharmacy that the patient can pick up.

21. The next appointment is prepared and patient plans appointment

If more appointments are necessary, this is discussed with the medical specialist, and automatically made available for the patient. Appointment time is discussed beforehand.

Jonelle Ooms - 2024

08
Validation

This chapter provides an overview of the evaluation of the final design. This includes validation with stakeholders, recommendations for implementation and finally the relevance of this research.

8.1 Evaluation

To research whether the strategic and tactical roadmaps were clear to stakeholders of the digital transition of patient- care professional interaction, validation sessions were conducted. During these sessions, stakeholders are shown the strategic roadmap, and were asked to summarise their conclusions. This made it possible to determine the clarity of the roadmap, and if it correctly communicates the future vision to the reader. These validation sessions were done with the following stakeholders:

- Member of RdGG Supervisory Board
- Director of Finances RdGG Board
- Manager of ICT and Information Management
- Program Manager Functional Management, focus ICT and HiX implementation
- Innovation Advisor
- Advisor Quality & Safety, focus digitalisation
- ENT Medical Specialist

8.1.1 Setup

Each validation session was planned to take between 30 minutes and an hour. The stakeholders were first shown the synthesis map, to demonstrate the complexity of the implementation of digital interactions within a hospital and to summarise the research conclusions. The participants were then shown the strategic roadmap and given some time to read through it. Then they were asked to summarise the map and explain their thought process surrounding the roadmap for the digital transition of patient- care professional interaction.

During the sessions the following questions were asked:

- Which steps do you think need to be taken to implement more digital interaction at the RdGG?
- Do you think that the steps in the roadmap are feasible to implement to facilitate the digital transition of patient – care professional interaction?

Following these questions, overall comments and questions were discussed. This made it possible to determine whether the roadmap would be clear for stakeholders that were not directly involved in the project, and whether those stakeholders think the identified goals are relevant for the organisation to aim towards.

8.1.2 Results

The interviewed stakeholders thought the synthesis map was a good visualisation of issues they recognised from within the organisation. They recognised the necessity for digitalisation, while also highlighting the need for all relevant parties to take part in the digital transition of patient – care provider interaction. It was mentioned that it will be difficult to implement change in a hospital, as people tend to be resistant to change.

It was suggested when specifying this strategy for the company, to research how medical specialists want to be involved with digitalisation, and whether they want to be considered when looking for feedback. Digitalisation should be made fun for care professionals to work towards, rather than another chore they must add to their long list of tasks.

It is also a good idea to highlight the importance of legislation changes, as they have a large influence on the way care is provided. While the hospital cannot directly influence the legislation changes, they can collaborate with others to influence the way in which the legislation is implemented.

8.2 Implementation Recommendations

To reach the goal of shared person-centred care supported by technology in the future, a strategy is needed that simultaneously implements a bottom-up and a top-down approach to transition to digital patient - care professional interaction at the RdGG. Management needs to take responsibility to streamline the transition process, while at the same time also stimulating care professionals to aid the transition through collaboration on the development of new technology.

Care professionals are a notoriously difficult group to convince of a change, especially concerning a change in their working procedure. To facilitate this, it is important to give care workers the feeling that their concerns are being considered. This requires an open mindset from both care professionals and policy staff, as both groups have the tendency to make assumptions about one another.

Another recommendation is to hire a team who specialises in digital transitions, including – but not limited to – a (process) designer, a marketing or communication specialist and a data analytics specialist. This team should be inspiring to the staff at RdGG, so once again open-mindedness is a must. When doing so, there should be regular check-in's to determine whether the projects are on track and whether the goals set are still relevant for the company.

When implementing new technology, it is also important to include a few projects with quick visible positive change to demonstrate to both care professionals and staff that the initiative is working. Positive outcomes will inspire motivation to continue working on processes that take longer to implement.

8.2.1 Roadmap Implementation Conditions

Legislation was determined to be an influential barrier for the implementation of digitalisation. As it is not something the hospital can directly address when facilitating the digital transition of interaction in healthcare, it was not included in the roadmaps. Legislation change is however a condition for the implementation of this strategy, as it has such a big influence on the provision of care.

It will not be possible to implement the changes suggested in this project without a legislation change in privacy and security medical data, and legislation surrounding the interoperability of medical systems. If companies do not want to make it possible to share medical data, it should be addressed fundamentally by the government. How medical data is shared directly impacts the quality of care provided.

To make a legislation change, it is suggested to take the following steps:

1. Seek collaboration with other hospitals, compile evidence that suggests that the current legislation is hindering the provision of care.

2. Work together to make a law amendment proposal, emphasising the importance of this subject. This is not something that should be disregarded when a cabinet is elected every four years.

Legislation has an enormous influence on care professionals' ability to provide quality care. It should support the provision of care, rather than forming a barrier for it.

8.3 Relevance

8.3.1 Relevance for RdGG

During validation conversations with relevant stakeholders, it was determined that this project has added value for the hospital. While there were suspicions surrounding the barriers of the implementation of digitalisation at the hospital, there was no concrete analysis that demonstrated where these barriers are and how to address them. This project visualises aspects of the problem in such a way that it becomes clear to stakeholders where the barriers lie, and which steps could be taken to facilitate the digital transition of patient – care provider interaction.

The strength of a designer in a traditional work environment such as a hospital, is that a designer connects the views of all relevant stakeholders when designing a solution to a problem, rather than making assumptions about the needs of the consumer. This means that the final design is more likely to be adopted by the consumer, as their perspectives are included in the design.

The aim of this strategy is not for the hospital to take over the exact steps in the roadmap. These are merely suggestions to reach the goal of the digital transition of patient – care professional interaction. This strategy is meant to demonstrate the importance of setting a single, clear goal to aim towards, with examples of steps that could be taken to reach the goal. As the organisation has a better indication of what would be best for it, it is recommended to take the basic steps from this project, then apply them in the best way for the company. When doing this, it is important to continue to use consumer feedback and input when designing and implementing a new strategy for the digital transition of patient – care professional interaction.

8.3.2 Relevance for Strategic Design

The insights from this research support previous literature conducted on digitalisation in the healthcare domain. The main theoretical relevance is the use of synthesis mapping and system analysis to support the theoretical evidence in application during the digital transition of healthcare. While the information exists in the academic world, the information obtained is not applied during the digital transition in hospitals in real life. Synthesis mapping can provide a visual guide for hospital management to understand the bottlenecks and facilitators during the implementation process of the digital transition of patient – care provider interaction, after which a strategy can be designed that fits stakeholder interests.

Synthesis mapping combines theoretical research with the current context, visualising the complexity of a healthcare system without over-complicating it for the reader. It can be a valuable tool for designers when designing for complex systems and can be used in service design to analyse the system in such a way that brings clarity to others surrounding the influential points in a system.

8.4 Limitations and Future Research Recommendations

There are a few limitations that should be mentioned surrounding this project. First, this project was conducted by one researcher. This means that the conclusions made during the analysis are dependent on the previous experience and world view of the researcher. The design of a synthesis map is once again specific to the researcher's perspective and knowledge at a point in time during the research. This research is an exploratory research, and while it is indicated that 5-10 interviews give a sufficient perspective on the subject at hand, it is recommended to conduct a following research on a wider target group to confirm conclusions made in this thesis.

Healthcare is a complex system, with many moving parts and stakeholders with different values and requirements, which means there is a possibility that there are aspects of the digital transition of patient – care provider interaction that were not mentioned during the interviews. As the system is complex, it will require top-down and bottom-up initiatives to inspire a culture change, which could prove to be a challenge when implementing (a version of) the designed strategy.

As the researcher has an external perspective on the hospital system, it is possible that there are internal factors that would influence the implementation of the designed strategy that were not considered in this project. Any future projects should take this into account.

Finally, due to the scope of the project, not all influential factors on the system could be considered. For future research this would mean for example to conduct a more detailed analysis on the affect legislation has on the provision of healthcare in the Netherlands. It is possible that the legislation does not properly support the transition towards the future of healthcare provision. Another future research recommendation is to include the perspectives of multiple transmural health journeys into the analysis.

09
Wrap Up

The final chapter of this thesis contains a reflection on the process of conducting this research, looking back at the steps taken

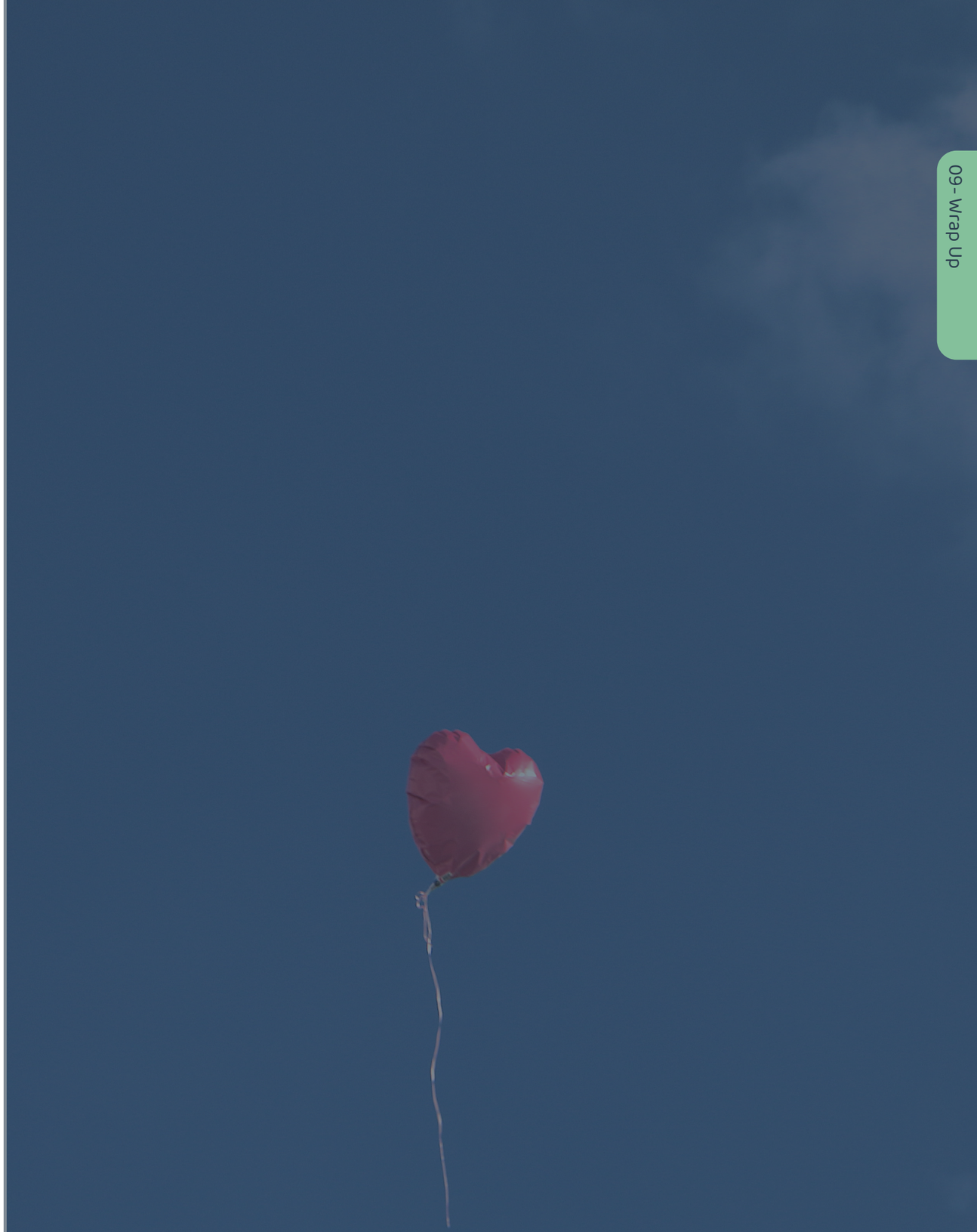
Reflection

When I started this project, I had no idea where it would take me. It began with an idea to improve a patient's communication with their care providers and expanded to include the complete (digital) interaction with their care providers during their health journey.

During this project I expanded my knowledge on designing for complex socio-technical systems, working in the healthcare environment, visualising complex data and communicating this complex data with others. I learned to work with a new technique (to me), synthesis mapping, which turned out to be the most important and valuable part of my project. When used in combination with methods I have learned during my studies, I have managed to complete a graduation thesis that I am proud of. I hope to continue working with- and designing for complex systems in the future, I think my analytic mindset has added value for the field. This project provided the opportunity to work with methods I didn't previously know, while still allowing me to give my own interpretation of the methods.

My main learning goals concerned understanding and visualising complex systems, which I think I managed to improve. I also developed my skills in illustrator, which wasn't a learning goal I had at the beginning of the project but proved to be a valuable addition to my skillset.

I enjoyed working in the hospital and am looking to continue working in this field of design in the future.



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Appendix

Appendix A: METC procedure document

In confidential appendix.

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Appendix B: Interview Guide

Patiënten

Hoe ervaart de patiënt verschillende fases van de behandeling?
Hoe ervaart de patiënt de communicatie met verschillende zorgverleners?
Hoe ervaart de patiënt het verkrijgen en verzamelen van informatie over hun ziektebeeld en zorgtraject?
Wat is de houding van de patiënt tegenover digitalisering van de informatie-uitwisseling en communicatie?
Wat is de houding van de patiënt tegenover digitalisering van de informatie-uitwisseling en communicatie met hun zorgverleners?

Algemeen

- Kunt u met mij even de stappen van uw behandeling nalopen?
- Hoe afspraken gemaakt?
- Hoe gecommuniceerd?
- Hoe lang tussen elk onderdeel?
- Wanneer heeft u contact opgenomen met uw huisarts?
- Hoe heeft u toen gecommuniceerd met uw huisarts? -> Hoe heeft u de afspraak gemaakt?
- Gebruikt u apps om uw gezondheid bij te houden? Denk aan Health op iPhone, een stappenteller, of smartwatch.

Bij de huisarts

- Heeft u de mogelijkheid om digitale systemen te gebruiken bij de huisarts?
- Kan u online vragen stellen, afspraken maken of wijzigen?
- Gebruikt u deze platform wel eens?
- Zou u willen dat er meer digitale mogelijkheden zijn bij de huisarts? Denk aan E-consulten, online afspraken maken of herhaalrecepten aanvragen.
- Krijgt u wel eens informatie van de huisarts?
- Hoe krijgt u informatie van de huisarts?
- Wat vindt u van de huidige communicatiemethodes met de huisarts?
- Wat zou u veranderen aan de communicatie met de huisarts?

Op het Reinier

- Hoe ervaart u het contact in het RdGG?
- In welke format heeft u communicatie met het ziekenhuis? Denk aan brieven, telefoontjes, online in het patiënten portaal van het Reinier.
- Wat vindt u van de hoeveelheid informatie die u meekrijgt in het ziekenhuis?
- Wat zou u veranderen aan de informatie-uitwisseling met het ziekenhuis?
- Wat vindt u van de huidige communicatiemethoden met het ziekenhuis?
- Wat zou u veranderen aan de communicatie met het ziekenhuis?
- Wat vindt u van het digitaal maken van onderdelen van uw behandeling? Hierbij kunt u denken aan het krijgen van digitale informatie, of het gebruik van digitale middelen, zoals videobellen en het patiënten portaal.

Zorgverleners in RdGG en huisartsen

Hoe ervaart de zorgverlener de behandeling van patiënten?
Hoe ervaart de zorgverlener de communicatie met patiënten?
Hoe ervaart de zorgverlener het verstrekken van informatie over het ziektebeeld en zorgtraject van patiënten?
Wat is de houding van de zorgverlener tegenover digitalisering van de informatie-uitwisseling en communicatie?
Wat is de houding van de zorgverlener tegenover digitalisering van de informatie-uitwisseling en communicatie met andere zorgverleners en met patiënten?
Wat beschouwt de zorgverlener als belemmering voor digitalisering van informatie-uitwisseling en communicatie?
Wat denkt de zorgverlener dat nodig is voor digitalisering van informatie-uitwisseling en communicatie?

Contact met patiënten
- Hoe ervaart u de behandeling van patiënten?
- Hoe ervaart u de interactie met patiënten?
- Hoe ervaart u het delen van informatie met patiënten?
- Hoe doet u dit?
- Wat zou u vinden van digitaal contact met patiënten?
- Gebruikt u nu al digitale communicatiemethoden?
- Hoe ervaart u dat? Zou u iets aan de digitale communicatie willen veranderen?
- Hoe verwacht u dat communicatie met patiënten in de toekomst zal plaatsvinden?
- Zijn er bepaalde dingen die u echt zou willen zien gebeuren in de toekomst op communicatiegebied?

Contact met zorgverleners
- Wat zijn de huidige methodes van communicatie met andere zorgverleners?
- Hoe verloopt dat?
- Wat zou u willen veranderen aan de communicatiemethodes met andere zorgverleners?
- Wat zou u vinden van het digitaal delen van informatie?
- Hoe verwacht u dat communicatie tussen zorgverleners in de toekomst zal plaatsvinden?
- Zijn er bepaalde dingen die u echt zou willen zien gebeuren in de toekomst op communicatiegebied?

Digitaliseringsmedewerkers

Hoe ervaart de werknemer het werken aan digitalisering van de zorg?
Wat beschouwt de werknemer als belemmering voor digitalisering van de zorg?
Wat denkt de werknemer dat nodig is voor digitalisering van de zorg?
Hoe denkt de werknemer dat zorgverleners aankijken tegen digitalisering van de zorg?
Hoe denkt de werknemer dat patiënten aankijken tegen digitalisering van de zorg?
Hoe ervaart de werknemer interacties met zorgverleners omtrent digitalisering?

Algemeen
- Wat is uw functie omtrent digitalisering in de zorg?
- Hoe ervaart u het werken aan de digitalisering van de zorg?
- Waar denkt u dat digitalisering van de zorg door wordt tegengehouden?
- Wat denkt u dat nodig is voor de digitalisering van de zorg?
- Hoe zal de zorg volgens u eruit zien in de toekomst?

Implementatie
- Wat denkt u dat zorgverleners vinden van de digitalisering van de zorg?
- Zou de zorg, volgens u, toekomstbestendig kunnen zijn zonder de implementatie van digitalisering?
- Wat denkt u dat patiënten vinden van de digitalisering van de zorg?
- Gebruiken de patiënten vaak de aanbevelen applicaties denkt u?
- Hoe ervaart u contact met zorgverleners over digitalisering van de zorg?
- Zijn zorgverleners bereid om nieuwe digitaliseringsmogelijkheden uit te proberen of te implementeren?
- Komen er veel initiatieven vanuit zorgverleners omtrent digitaliseringsmogelijkheden?
- Worden die dan geïmplementeerd?

Appendix C: Patient Information Flyer

Onderzoek:

Digitalisering in de zorg: patiënten digitaal verbinden voor toegankelijke zorg tijdens transmurale zorgpaden

Waarom wordt dit onderzoek uitgevoerd?

Tijdens het zorgproces krijgt een patiënt met veel verschillende communicatie-methoden en (digitale) systemen te maken. In dit onderzoek wordt gekeken naar het gebruik van digitale mogelijkheden in de zorg. Hierbij ligt de nadruk op de digitale uitwisseling van informatie en communicatie tussen patiënten en zorgverleners. Dit onderzoek is een samenwerking tussen het Reinier de Graaf Gasthuis en de Technische Universiteit Delft.

Wat houdt dit onderzoek in?

Besluit u na het lezen van de informatiebrief om mee te doen aan dit onderzoek en heeft u het toestemmingsformulier ondertekend? Dan wordt er een interview ingepland van 30 minuten. Dit interview wordt gepland voor of na een afspraak die u al heeft staan in het RdGG, zodat u niet extra hoeft te reizen.

In het gesprek zullen de volgende onderwerpen besproken worden:

- Wat vindt u van de communicatie gedurende uw behandeling?
- Hoe ervaart u het contact in het RdGG?
- Wat vindt u van het digitaal contact met uw zorgverleners?
- Wat is uw mening over digitale middelen, zoals videobellen en het patiëntenportaal?

Ook als u nu geen digitale middelen gebruikt, willen we graag weten wat u vindt.

Wat gebeurt er met mijn gegevens en wat ik tijdens het interview vertel?

Het interview zal worden opgenomen met een geluidsrecorder. Deze geluidsopnames worden daarna omgezet in anonieme tekst. De gelduidsopnames worden hierna verwijderd. In de resultaten kan niemand terugzien dat het over u gaat. Al uw gegevens blijven vertrouwelijk.

Reinier de Graaf

Appendix D: GP Information Flyer

Onderzoek:

Digitalisering in de zorg: patiënten digitaal verbinden voor toegankelijke zorg tijdens transmurale zorgpaden

Waarom wordt dit onderzoek uitgevoerd?

Tijdens het zorgproces krijgt een patiënt met veel verschillende communicatie-methoden en (digitale) systemen te maken. In dit onderzoek wordt gekeken naar het gebruik van digitale mogelijkheden in de zorg. Hierbij ligt de nadruk op de digitale uitwisseling van informatie en communicatie tussen patiënten en zorgverleners. Dit onderzoek is een samenwerking tussen het Reinier de Graaf Gasthuis en de Technische Universiteit Delft.

Wat houdt dit onderzoek in?

Besluit u na het lezen van de informatiebrief om mee te doen aan dit onderzoek en heeft u het toestemmingsformulier ondertekend? Dan wordt er een interview ingepland van 30 minuten. Dit interview wordt gepland op een moment dat voor u het beste schikt.

In het gesprek zullen de volgende onderwerpen besproken worden:

- Wat vindt u van de communicatie gedurende de behandeling van een patiënt?
- Hoe ervaart u het contact met het ziekenhuis bij verwijzing?
- Wat vindt u van het digitaal contact met uw patiënten?
- Wat is uw mening over digitale middelen, zoals videobellen en patiëntenportalen?

Ook als u nu geen digitale middelen gebruikt, willen we graag weten wat u vindt.

Wat gebeurt er met mijn gegevens en wat ik tijdens het interview vertel?

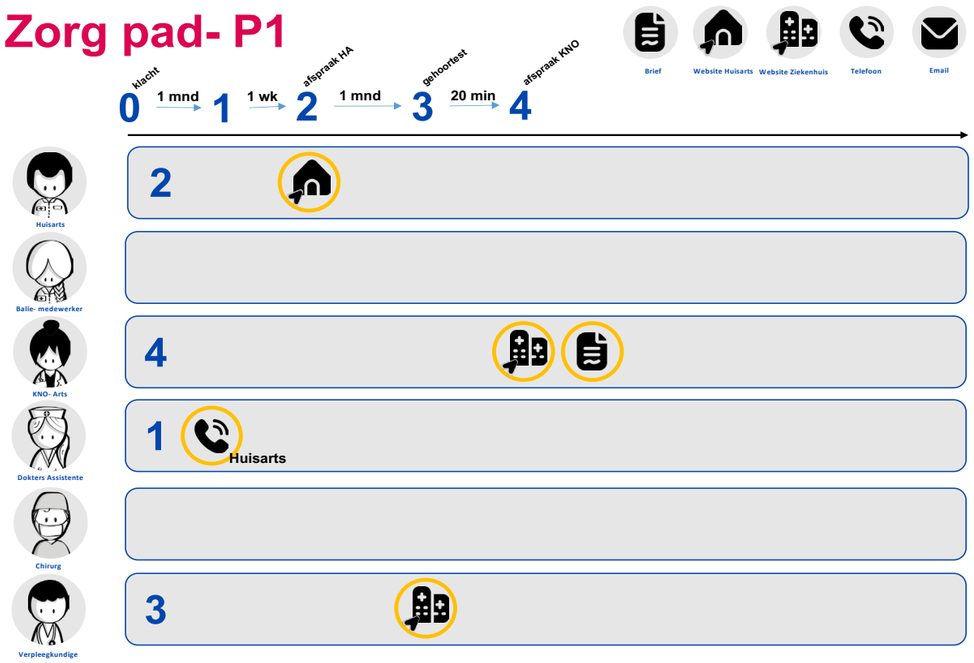
Het interview zal worden opgenomen met een geluidsrecorder. Deze geluidsopnames worden daarna omgezet in anonieme tekst. De gelduidsopnames worden hierna verwijderd. In de resultaten kan niemand terugzien dat het over u gaat. Al uw gegevens blijven vertrouwelijk.

Interesse? Stuur een mail naar J.Ooms@rdgg.nl

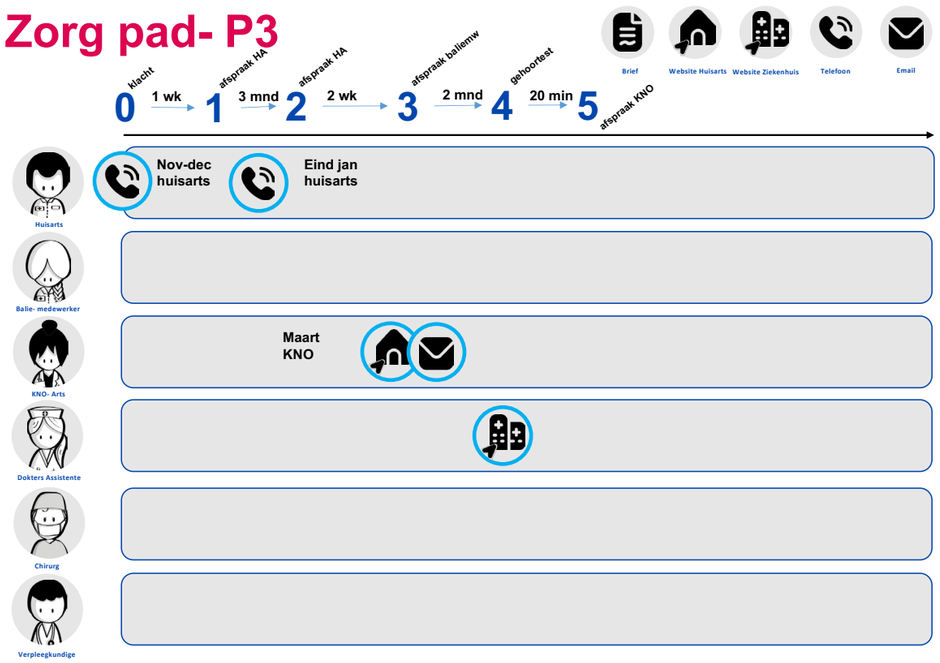
Reinier de Graaf

Appendix E: Filled-in Interview Patient Journeys

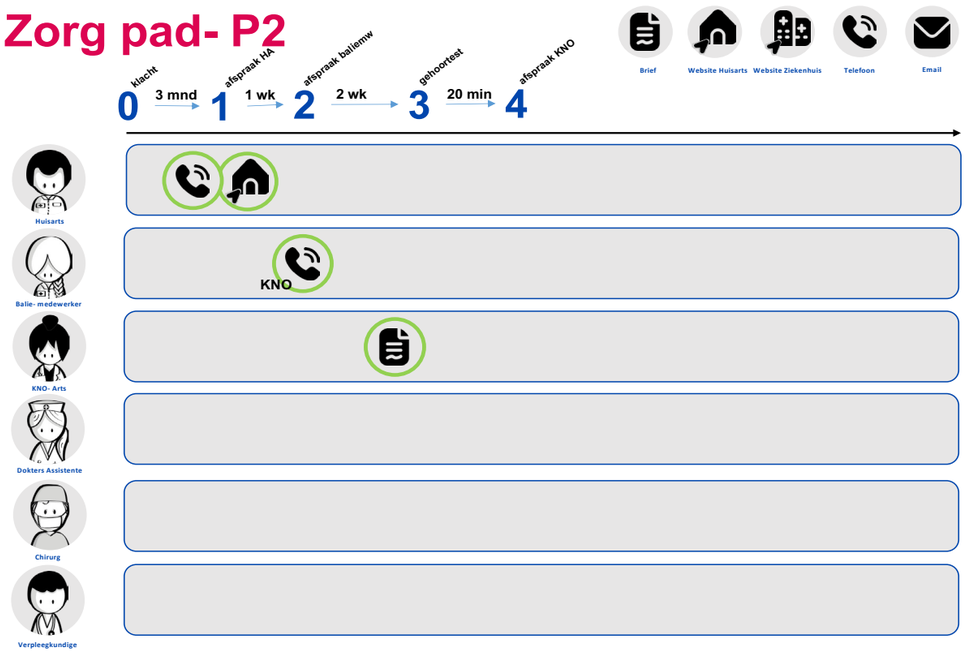
Zorg pad- P1



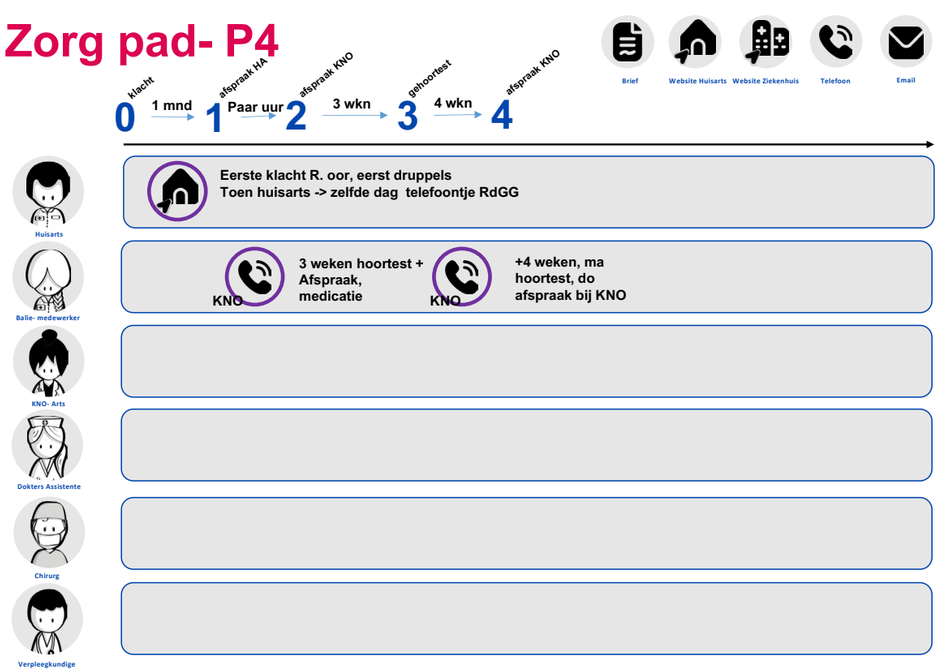
Zorg pad- P3

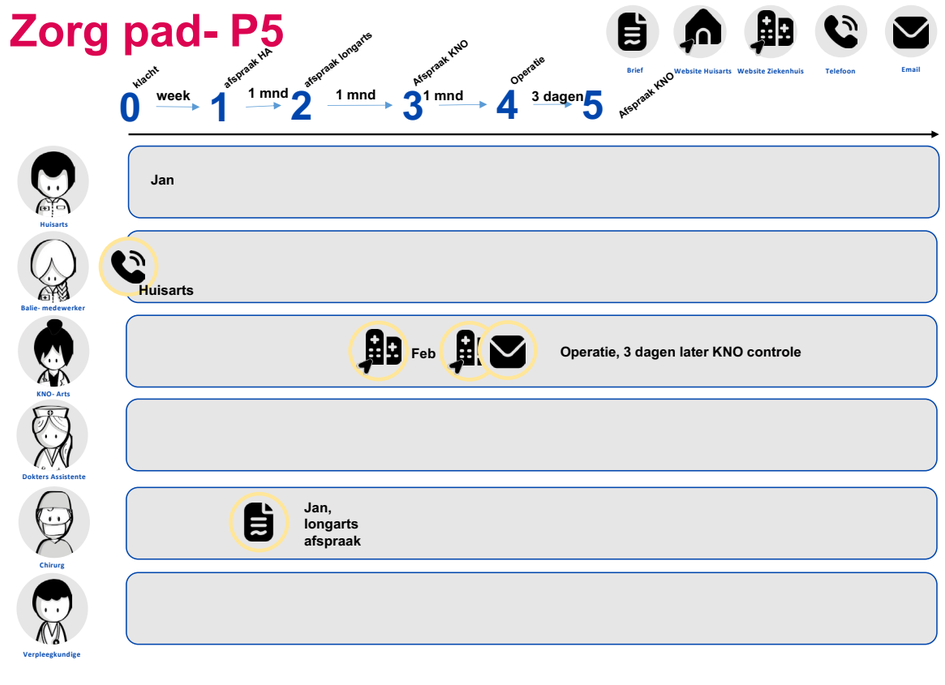


Zorg pad- P2



Zorg pad- P4





Appendix F: Project Brief

DESIGN FOR our future

TU Delft

Personal Project Brief – IDE Master Graduation Project

Name student Jonelle Ooms **Student number** 5024412

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT
Complete all fields, keep information clear, specific and concise

Project title Digital onboarding during the health journey: digitally connecting patients and providing accessible care in transmural health journeys

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

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

With the population expected to keep steadily growing in the coming years, health care consumption will grow along with the population. There are however not enough health care resources to be able to provide the care the population will need. This means steps will need to be taken to make the digital transition expand to healthcare. The Reinier de Graaf Gasthuis (RdGG) needs to make these steps towards transitioning to digital healthcare, but as the healthcare system is complex this will require strategic, operational, and behavioural changes (Reinier de Graaf, 2023). Within this graduation project, the transition patient makes at digital level from their GP to the Reinier de Graaf and their care journey following the transition will be studied. This will include the patient's role in using digital possibilities, such as the online environment of the Reinier de Graaf, thereby simplifying the patient's digital communication with the hospital and the patient's care team. A limitation in this project is that healthcare is a complex system with many influential stakeholders and organisations whose opinions need to be considered. The main stakeholders in this project are the patient, their GP, and the outpatient clinic team at the RdGG within one clinic. By creating a strategic design where all parties can view the patient's care path, a holistic overview is created of the patients' care journey, thereby simplifying communication between stakeholders, which is important in transmural health journeys.

Reinier de Graaf Gasthuis. (2023, December 14). Digital onboarding during the health journey: Digital connected patients and accessible, sustainable care during transmural health journeys. Concept Onderzoeksvoorstel. Delft.

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introduction (continued): space for images

click to add picture

image / figure 1

image / figure 2

Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)

A smooth transition of the patient between from the GP to the Reinier de Graaf Gasthuis seems challenging in many ways. The patient has multiple digital systems that they have to manage alongside their personal health journey and any communication with their care team at the hospital. This can be confusing and cause additional difficulty in their health journey (Van Rijckevorsel, 2022). With this project the digital communication between patients and their outpatient clinic team during the transfer of care from GP to the hospital and their care journey at the Reinier de Graaf following transfer will be simplified. By mapping the digital communication and interaction a patient has during transfer, enough insight is created to improve digital care and make care more accessible to patients in a transmural health journey. Within this assignment the following questions should be answered:

- Which digital tools are already used by the patient, at the GP and RdGG? What are bottlenecks/ success factors?
- What are the current bottlenecks in a patient's care journey at the RdGG?
- Are the patients willing to have more digitalisation in health care?
- How can we simplify communication between a patient and their care team?

Van Rijckevorsel, M. (2022, September 23). GoMedFlow: Moving towards a smart hospital: Journey mapping as a facilitator for the digital transformation of healthcare. TU Delft Repository.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Design a strategy for improving the digital communication between patient, GP and care team at the RdGG, during the transfer from GP to a hospital and the following care journey, facing the horizon of digital transformation within the organisation.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

This study is a qualitative exploratory research consisting of the following steps within a double diamond model. It starts with literature research, focussing on digitalisation and shared decision making. Then observations and interviews will be conducted to aid in creating a problem definition and design goal. The analysis of the research will be summarised in a strategic system map depicting the stakeholders and communication between actors. Finally, a strategic system design is created to digitally connect patients and provide accessible care during transmural health journeys. This should make the process easier for the patient to follow, digitalise more of the care journey and facilitate shared decision making.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a ***kick-off meeting****,* ***mid-term evaluation meeting****,* ***green light meeting*** *and* ***graduation ceremony****. 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 course activities).*

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	24th January 2024
Mid-term evaluation	28th March 2024
Green light meeting	29th May 2024
Graduation ceremony	3rd July 2024

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	
For how many project weeks	
Number of project days per week	

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

During my time studying at IDE, someone close to me was ill, and spent quite some time in the hospital. During their care journey I witnessed the care path in hospitals from a patient's perspective, and I was quite surprised how difficult the communication is between patient and care team. This was when I started my Medisign focus during my studies, and I took interest in how the medical system works in the Netherlands. During this project I hope to gain some insights into the decision making process and communication in hospitals regarding a patient's care, and hopefully make some suggestions to improve the system from a patient's perspective.

I have the following learning goals for this project:
1. Create more of an understanding of complex socio-technical systems
2. Learn how to visualise systems and communication
3. Exploring the implementation of health care system innovation
4. Effective information visualisation