

Lilian Frederique Adriana van den Bos

# Improving Communication between GPs and Patients within an eHealth app

Master's thesis in Master in Interaction Design

Supervisor: Mari Bjerck

June 2023



Lilian Frederique Adriana van den Bos

# **Improving Communication between GPs and Patients within an eHealth app**

Master's thesis in Master in Interaction Design  
Supervisor: Mari Bjerck  
June 2023

Norwegian University of Science and Technology  
Faculty of Architecture and Design  
Department of Design





## Abstract

This thesis centres around enhancing the existing HelsaMi app in Health Region Central Norway, specifically focusing on improving communication between general practitioners and their patients through user interface design. As society becomes increasingly digitised, and the elderly population is growing, the reliance on digital solutions is growing, including eHealth services. HelsaMi, developed by Helseplattformen, is one such solution; however, it currently lacks certain functionalities and falls short in terms of user-friendliness.

This study describes the process of identifying the needs and wants of expected users by doing extensive background studies and theoretical analysis. These resulted in requirements in building, or rebuilding a platform to improve the communication between general practitioners and their patients. Various methods to research possible users have highlighted the positive impact of eHealth services on patients and their desire for more intuitive and user-friendly apps. Through surveys and interviews, patients have expressed the need for features such as messaging platforms for direct communication with general practitioners, convenient appointment scheduling, and effective symptom tracking. These findings underscore the importance of addressing these areas of improvement in the design of the HelsaMi app.

After conducting these user studies and establishing musts for the design, two personas were created, and they helped with creating the four different features, each of which had its own “How Might We” questions. All these helped to better understand the problem to be solved. All collected information was put into a prototype. All subsequent prototypes were tested with users and stakeholders, to create the best possible prototype.

After incorporating valuable input and feedback from users and stakeholders, the result is a comprehensive design proposal for HelsaMi. It is important to note that additional user testing and refinement may be necessary before these features can be implemented successfully.

### **Keywords:**

Health literacy, Universal Design in Health, User-Centred Design, eHealth

## Sammendrag

Denne Masteroppgaven har som hovedfokus å forbedre den eksisterende HelsaMi-appen i Helse Midt-Norge, med spesiell vekt på å forbedre kommunikasjonen mellom allmennleger og deres pasienter gjennom brukergrensesnittsdesign. I takt med samfunnets økende digitalisering og økningen i antall eldre mennesker, øker også avhengigheten av digitale løsninger, inkludert e-helse-tjenester. HelsaMi, utviklet av Helseplattformen, er en slik app, men den mangler for øyeblikket visse funksjoner og oppfyller ikke kravene til brukervennlighet.

Denne studien beskriver prosessen med å identifisere behovene og ønskene til forventede brukere gjennom grundig bakgrunnsstudier og teoretisk analyse. Dette har ført til konklusjoner om hva som bør forbedres når man bygger eller gjenoppbygger en plattform for å forbedre kommunikasjonen mellom allmennleger og deres pasienter. Forskjellige metoder for å undersøke potensielle brukere har fremhevet den positive effekten av e-helse-tjenester på pasienter og deres ønske om mer intuitive og brukervennlige apper. Gjennom spørreundersøkelser og intervjuer har pasienter gitt uttrykk for behovet for funksjoner som meldingsplattformer for direkte kommunikasjon med allmennleger, enkel avtaleplanlegging og effektiv sporing av symptomer. Disse funnene understreker viktigheten av å ta tak i disse forbedringsområdene i designet av HelsaMi-appen.

Etter disse brukerstudiene og etableringen av viktige krav for designet, ble det opprettet to personas som hjalp meg med å utvikle de fire ulike funksjonene, hvor hver av dem hadde sine egne “Hvordan kan vi” spørsmål. Alt dette hjalp meg med å forstå problemet som skulle løses bedre. All innsamlet informasjon ble deretter brukt til å utvikle en prototype. Alle påfølgende prototyper ble testet med brukere og interessenter for å skape den best mulige prototypen.

Etter å ha inkorporert verdifulle innspill og tilbakemeldinger fra brukere og interessenter, resulterte dette i et omfattende designforslag for HelsaMi. Det er viktig å merke seg at ytterligere brukertesting og justering kan være nødvendig før disse funksjonene kan implementeres på en vellykket måte.

### **Nøkkelord:**

Helsekompetanse, Universell utforming i helse, Brukerorientert design, e-helse

## Preface

This report is a thesis for completing the Master's degree in Interaction Design (MIXD) at the Norwegian University of Science and Technology in Gjøvik. This project was done in the spring of 2023. Through the course of this master, I have learned various methods of design techniques, some of which are used in this report. As my personal interests is healthcare , I wanted to concentrate on a project related to health. As I have stated more than one time in this report; eHealth has become very popular in the health world. With the growing elderly population and people with poor health literacy, the products need to be easily accessible for all.

The main goal of this thesis was to improve the communication between GPs and their patients, however, this thesis can also help other designers working on health apps. They can learn from the requirements and findings presented in this thesis to enhance their own designs. This report describes the research methods, obtained data, and results. I hope with this report HelsaMi improves and other designers can learn about this topic. This report describes the research methods, obtained data, and results to get to this goal. I also incorporated illustrations from FreePik (pch.vector, 2020) as a decoration, with the aim of making the report more enjoyable to read through.

## Acknowledgements

I would like to express my deepest gratitude and appreciation to all those who have supported and contributed to the completion of this Interaction Design Master's thesis.

First and foremost, I would like to extend my heartfelt thanks to my supervisor Mari Bjerck, for their invaluable guidance, expertise, and continuous support throughout this research journey. Their insightful feedback, constructive criticism, and encouragement have been instrumental in shaping the direction and quality of this thesis.

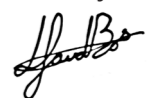
I would like to express my sincere appreciation to all the participants of this study, whose willingness to engage and share their experiences and insights has been crucial in generating meaningful findings. Their contribution has enriched the research and shed light on various aspects of interaction design. An additional thank you to Julia Nemeth, from Helseplattformen, and her colleagues for valuable insights, interest in the project and support.

I extend my gratitude to my friends for their emotional support, motivation and wonderful memories. A special thanks to Muthita Torteeka for the necessary distractions.

I would like also like to thank my family. My mom and dad for their long-standing support and for always believing in me. My sister Karlijn van den Bos for proofreading and revising and my cousin, Marijke Scholte-Wijnstra, for bringing me this subject.

Completing this Interaction Design Master's thesis has been a transformative and rewarding experience, and it would not have been possible without the support and collaboration of all the individuals mentioned above. I am truly grateful for their involvement and commitment to this research.

Thank you,



Lilian Frederique Adriana van den Bos

# Content

|   |            |  |  |
|---|------------|--|--|
| Abstract  | II         |  |  |
| Sammendrag  | III        |  |  |
| Preface   | IV         |  |  |
| Acknowledgements  | V          |  |  |
| <b>Chapter 1 Introduction and Background</b>              | <b>8</b>   |  |  |
| 1.1 Introduction  | 9          |  |  |
| 1.2 Background  | 10         |  |  |
| 1.2.1 The Role of Smartphones in Healthcare               | 10         |  |  |
| 1.2.2 Digital health services in Norway                   | 12         |  |  |
| 1.2.3 Mobile health applications in Norway                | 14         |  |  |
| 1.2.4 Safety and Ethics in eHealth                        | 20         |  |  |
| 1.3 Collaborating Partner                                 | 21         |  |  |
| 1.3.1 Helseplattformen                                    | 21         |  |  |
| 1.3.2 Helseplattformen and Epic                           | 23         |  |  |
| 1.4 Preliminary Research Question                         | 25         |  |  |
| 1.5 Aim for the Thesis                                    | 26         |  |  |
| 1.6 Structure   | 27         |  |  |
| <b>Chapter 2 Theoretical Approach</b>                     | <b>28</b>  |  |  |
| 2.1 Health literacy                                       | 29         |  |  |
| 2.2 Universal Design in Health                            | 34         |  |  |
| <b>Chapter 3 Methods</b>                                  | <b>38</b>  |  |  |
| 3.1 Discover  | 40         |  |  |
| 3.2 Define  | 42         |  |  |
| 3.3 Develop   | 43         |  |  |
| 3.4 Delivery and Discussion                               | 45         |  |  |
| 3.5 Limitations   | 46         |  |  |
| 3.6 Ethical Considerations                                | 48         |  |  |
| <b>Chapter 4 Discover</b>                                 | <b>50</b>  |  |  |
| 4.1 Previous Study of Users of eHealth Services in Norway | 51         |  |  |
| 4.2 Insights from Survey                                  | 53         |  |  |
| 4.3 Second meeting with Helseplattformen                  | 56         |  |  |
| 4.4 Revised Research Question                             | 57         |  |  |
| 4.5 Insights from Further Interviews and Survey           | 59         |  |  |
| <b>Chapter 5 Define</b>                                   | <b>62</b>  |  |  |
| 5.1 MoSCoW Method for Requirement Prioritisation          | 63         |  |  |
| 5.2 Persona & User Journey                                | 68         |  |  |
| 5.3 How Might We-Questions                                | 73         |  |  |
| <b>Chapter 6 Develop</b>                                  | <b>74</b>  |  |  |
| 6.1 Low-Fidelity  | 75         |  |  |
| 6.2 Mid-Fidelity  | 79         |  |  |
| 6.2.1 Prototype explained                                 | 79         |  |  |
| 6.2.2 Feedback Helseplattformen and Epic                  | 83         |  |  |
| 6.2.3 User Feedback                                       | 84         |  |  |
| 6.3 High-Fidelity   | 86         |  |  |
| 6.3.1 Prototype explained                                 | 86         |  |  |
| 6.3.2 Feedback from Helseplattformen                      | 92         |  |  |
| 6.3.3 Feedback from Users                                 | 93         |  |  |
| <b>Chapter 7 Deliver</b>                                  | <b>96</b>  |  |  |
| 7.1 Features Recommendations                              | 97         |  |  |
| 7.2 Overall Recommendations                               | 101        |  |  |
| <b>Chapter 8 Discussion</b>                               | <b>102</b> |  |  |
| 8.1 Discussion  | 103        |  |  |
| 8.1.2 Universal design                                    | 103        |  |  |
| 8.1.2 Universal design                                    | 105        |  |  |
| 8.1.3 Conclusion of the Discussion                        | 106        |  |  |
| 8.2 Future Work   | 107        |  |  |
| 8.3 Reflection  | 108        |  |  |
| <b>Chapter 9 Conclusion</b>                               | <b>110</b> |  |  |
| <b>References</b>   | <b>114</b> |  |  |
| <b>Appendix</b>   | <b>A</b>   |  |  |
| Appendix A: Consent form                                  | B          |  |  |
| Consent form for survey 1 & interviews                    | B          |  |  |
| Appendix B: Surveys and Interviews                        | D          |  |  |
| Questions for Survey 1                                    | D          |  |  |
| Questions for Interviews                                  | F          |  |  |
| Questions for Survey 2                                    | I          |  |  |
| Appendix C: User Test                                     | N          |  |  |

# Chapter 1

## Introduction and Background

### 1.1 Introduction

Attempts to enhance interaction between hospitals, primary care services, and general practitioners (hereafter GP) are underway in many countries, though with varying success (Tjerbo and Kjekshus, 2005). The Norwegian government has developed a comprehensive plan to sustainably implement patient health services known as the national health and hospital plan. This plan (Helse- og omsorgsdepartementet, 2019 p.7) aims to empower individuals to play an active role in their medical treatment. This is also known as the One Citizen-One Health Record. Patients and their families should be given a voice and treated with respect, and co-creation is encouraged, allowing patients to interact virtually with services and have a say in their design (Helse- og omsorgsdepartementet, 2019 p.7). For instance, the government aims to make communication between GPs and patients simpler by enabling digital conversations between the two groups (Helse- og omsorgsdepartementet, 2019 p.23-24). Furthermore, healthcare personnel shall have easy and secure access to patient information in the One Citizen-One Health Record. Citizens will have access to user-friendly and secure digital services and data shall be available for quality improvement, health monitoring, governance and research. The requirements to make communication better GPs and patients are (Bergland, 2017):

- Access to updated health info
- Individual patient-centric health plans
- Harmonisation of services and overview of quality and resources
- Knowledge and decision support
- Data for analytic, quality, research, policy-making and readiness

In Norway, GPs serve as patients' first point of contact before they can visit the hospital (except in emergencies). Patients must see their GP before they are referred to specialists, who then determine the appropriate course of treatment based on the GP's referral and other factors (Tjerbo and Kjekshus, 2005). As such, GPs play a critical role in the Norwegian healthcare system. To enhance digital communication and improve patient treatment, this master's thesis focuses on the interaction between GPs and patients.

The primary objective of this thesis is to improve the communication between general practitioners (GPs) and their patients by focusing on enhancing the HelsaMi application. HelsaMi is a part of the Helseplattformen system implemented in the Health Region Central Norway, and the ultimate goal is to enhance the health literacy of the patients. By analysing and addressing the limitations of the existing app, the objective was to create substantial improvements that would positively impact the doctor-patient interaction and overall healthcare experience. User-centred design methodologies, such as surveys and interviews, were used to gather data from key stakeholders and experts, which was then used to create the final solutions. This chapter will delve into the broader context of GPs and electronic health, discussing the motivation behind the study, the revised problem statement, user groups, and the final aim of this thesis, the redesigned HelsaMi.



## 1.2 Background

### 1.2.1 The Role of Smartphones in Healthcare

Smartphones have integrated seamlessly into modern life over the past ten years, and this is true even in the field of healthcare, whether it be through eHealth, mHealth, or other welfare technology. Thus, these technologies are securing their position in the healthcare industry. eHealth is the application of information and communication technologies to facilitate or enhance healthcare (Pagliari et al., 2005). In remote and rural areas, eHealth services might be more accessible and take up less time to use than traditional services. It might be a way to easier provide low-cost services to a large number of people. As a result, eHealth services may enhance immediate access, equality of access to quality health information, and self-management, all of which could reduce the demand for healthcare services (Wynn et al., 2020).

Mobile health (mHealth), being a part of eHealth according to the World Health Organisation (WHO, 2011) refers to the use of mobile technologies, such as smartphones and tablets, to deliver healthcare services and information. Applications for mHealth will advance mobile communication technologies and enhance both individual and population health (Roess, 2017). Currently, mHealth apps are used both by GPs and their patients. Apps for mobile health have been used for disease prevention, monitoring, diagnosis, treatment, and support of healthcare services. For example, GPs in Australia do recommend it to their patients. They do so sparingly since it is not much known about the effectiveness or trustworthiness of the apps. They mostly recommend “mindfulness and mental health”, “diet and nutrition”, “exercise and fitness” and “women’s health” apps (Byambasuren et al., 2019). In Austria, younger doctors also use medical apps as an important source of information (Hofer and Haluza, 2019). In other articles (Wattanapisit et al., 2020), health professionals seem to use it for various reasons, these being: communication like health call centres, setting or reminding of appointments, consultation, health monitoring/surveillance and for access to information for health care professionals at the point of care (WHO, 2011). The use of mobile devices in healthcare is considered to alter healthcare delivery, quality, costs, and culture (Meskó et al., 2017). According to a 2018 study (Segui et al., 2018), primary care physicians used a new approach by recommending mobile health apps to their patients and discussing the health information gleaned from the apps during subsequent patient visits.

Apps have the potential to support numerous general practitioner (GP) tasks in general, as indicated by Wattanapisit et al. (2020) who identified 12 primary tasks performed by GPs. These are gathering medical histories, making diagnoses, carrying out some physical examinations, helping with clinical decision-making and management, providing urgent, long-term, and disease-specific care, performing medical procedures, appropriately utilising other professionals and coordinating a team-based approach. Apps could replace nine of these tasks, according to Wattanapisit et al. (2020). These apps have been used in disease prevention and health promotion, diagnosis, treatment, monitoring, and the provision of support for health services; however, they are unable to carry out medical procedures, effectively

utilise other professionals, or coordinate a team-based approach. As such, patients’ health app data could be utilised to improve patient-doctor communication and give an extra source of data for GPs to use during routine consultations. GP-specific training and consultation with GPs in app development may aid in overcoming hurdles to GP usage and marketing of health apps, according to Wattanapisit et al. (2020).

There are technologies available to assist in making diagnosis and physical diagnoses. Near Field Communication, NFC, for example, can be used to monitor human physiological data, like heart rate, and body temperature (Sun et al., 2022). NFC is a technology enabling devices such as phones and smartwatches to exchange small data snippets with other devices and read NFC-enabled cards within close proximity. The underlying technology of NFC bears a strong resemblance to radio-frequency identification (RFID), facilitating seamless data transfer over short distances (Hollington, 2023). Alternatively, accelerometers and gyroscopes can be used as motion sensors to track everyday activities, falls, and sleep habits (Majumder and Deen, 2019). Machine learning and artificial intelligence (AI) may enable robots to learn key abilities as well as develop attitudes and mindsets akin to those of a good doctor (Bravo et al., 2018; Guo and Li, 2018; Wahl et al., 2018).

According to Wattanapisit (2020), Zanaboni and Fagerlund (2020) disadvantages of using mHealth in health care include the cost of technology and infrastructure, information security, lack of regulatory compliance guidelines, and the potential for serving as a workplace distraction. The use of mobile devices harms the doctor-patient relationship when used during a medical interview. In addition to healthcare workers, such as medical students, nurses, and doctors, mobile phones are also used by patients. However, the use of personal smartphones is typically prohibited for employees during work hours. Furthermore, many hospitals face challenges with wireless connectivity, as highlighted by Wattanapisit et al. (2020) and Zanaboni and Fagerlund (2020).

Another disadvantage than those mentioned before is concern that doctors will be increasingly displaced by information technology and that direct patient interaction will be lost in a digitalised atmosphere (Hofer and Haluza, 2019). According to participants in Hofer and Haluza, the usage of medical apps can disrupt the patient-provider relationship. It has been demonstrated, however, that using mHealth apps without a human connection cannot replace seeing a doctor. Important to note is that there were no noticeable variations in the quality of doctor-patient communication between screen-to-screen and face-to-face consultations (Wattanapisit et al., 2020).

## 1.2.2 Digital health services in Norway

According to Helse- og omsorgsdepartementet (2019) and an article in Global Finance ranking the most technologically advanced countries in 2022, Norway is recognised as one of the world's leading nations in terms of technological advancement. They are accustomed to using the internet to find the information they require and to communicate with both public and private parties. In the health and care sectors, Norway has also started to participate in the delivery of digital citizen services. There are digital citizen services that offer information, and services that enable active participation in one's health and treatment (Helse- og omsorgsdepartementet, 2019, p.23-24). In Norway, four digital health services have been implemented, with the use of helsenorge.no. HelseNorge is a public institution website for residents of Norway where they can find health-related information and log in to use the digital services. Those four services include booking of appointments, prescription renewal, contact with the GP about non-clinical inquiries and e-consultation for clinical inquiries (Zanaboni & Fagerlund, 2020). Most used by the residents of Norway is the online booking of appointments, followed by electronic prescription renewal. With these services, it makes it easier for citizens of Norway to prepare for a consultation, and get an overview of who has seen their medical record (Helse- og omsorgsdepartementet, 2019, p.23-24). However, a coherent health and care sector requires new standards for the actors involved as well as strong coordination. It poses challenges to the current organisational, technical, and legal structure (Direktoratet for e-helse, 2022). HelseNorge also offers to change GPs and benefits for patient travel (Helseplattformen, 2022).

The health-related information found on HelseNorge is all quality-assured by many collaborators, like the Direktorat for e-helse and hospitals. It gives the users content on health, lifestyle, illness, treatment and rights and further information on many different topics. The pages for the various topics include helpful links that point you in the right direction as well as more details about who provided the information and whether it was of high quality (Norsk Helsennett, 2022). It also provides real-time video linkage. Real-time video linkage allows patients and doctors to communicate electronically (Norsk Helsennett, 2022). This is to benefit primary care in Norway. It is more convenient, efficient, private and comfortable, especially for those that live remotely or in rural areas (Powell et al. 2017; Wynn et al. 2020).

Services like digital appointment scheduling, referral status updates, and a summary of medicines help patients take more responsibility for their health and, to a greater extent, tailor their interactions with medical professionals to fit virtually seamlessly into their daily lives. Clarifying issues concerning treatment and follow-up as well as other administrative aspects is made simpler by the ability to send digital conversation messages to GPs and practitioners in the specialist healthcare sector (Helse- og omsorgsdepartementet, 2019, p.23-24). For patients at risk of disease worsening, digital home monitoring can help to catch symptoms earlier (Helse- og omsorgsdepartementet, 2019, p.91). This way, health personnel can introduce

preventive measures and reduce the risk of hospitalisation. According to the Helse- og omsorgsdepartementet, the adoption of digital appointment booking has contributed to a decrease in the percentage of appointments when the patient does not show up from 5% in 2013 to 3% in 2019 (as of October), with variations within different specialist areas.

The use of digital services should provide better and more efficient services. However, the digital services of HelseNorge are now reviewed as being generally slow and not very intuitive as researched by Zanaboni and Fagerlund (2020). Making these health apps more user-friendly requires reforming work processes, but would in turn enhance the effectiveness of GP work (Kivekäs et al. 2016). Many patients may not find digital services relevant if they are unable to navigate or utilise the technology due to their individual limitations or constraints according to Becker (2014). An offer must be made to the patient that takes into account both their needs and functional level. Additionally, not all medical conditions can be treated and monitored using digital means. Likewise, newer tools are not always better than older ones. It too must be a priority to avoid having the same task performed both "analogue" and "digitally" as a result of the introduction of technology. In the mind of the user, GP or patient, apps and digital solutions in the healthcare context should always be convenient. It should also be taken into account that the user will want to be in control and be better informed about certain aspects, like data about their health (Becker et al., 2014). The Involving GPs in the app development process improves long-term app utilization and effectiveness. Their input and feedback, especially regarding accessing patient data during consultations, are valuable for designing user-centred health apps (Nguyen et al., 2019).

Norwegian citizens residing in different regions had varying access to services in 2019, as highlighted by the Helse- og omsorgsdepartementet (2019, p.23-24). However, it is considered unfavourable that these regions have disparate access, as ideally, they should all have equal access to services. The objective set for 2023 was to achieve uniform access across all regions, but as of May 2023, it cannot be confirmed whether this goal has been accomplished. These differences per region were:

- Health Region North: Access to patient records and access log, referral status, an option to display hours, some notification and option to change hours, sending of summons via access
- Health Region Central Norway: Option to display hours, some notification and option to change hours
- Health Region West: Access to patient records and access log, referral status, information about contact doctor and course coordinator, possibility to show hours, some notification and possibility to change hours, dialogue between therapist and patient in certain departments and for cancer course coordinators
- Health Region South-East: Access to patient records and access log, sending of summons.

## 1.2.3 Mobile health applications in Norway

The ability of patients to see their medical records and confirm the accuracy of the information increases patient safety when medical data are accessible digitally. Additionally, the patient's ability to see who has viewed the information on them helps to protect their privacy. By utilising common platforms, the health and care industry will be able to access more services, interact and navigate between service levels more easily, and share and access health data more widely (Helse- og omsorgsdepartementet, 2019). HelseNorge is the main platform used in Norway for patients to connect with their doctors. As stated, **HelseNorge** (Figure 1.1) supplies information and self-service solutions where residents can log in for, among other things, a digital dialogue with their GP, test results and an overview of their medicines. At HelseNorge, both public and private actors contribute by integrating their record systems, video solutions, chatbots and health-promoting apps. HelseNorge is initially only a website and is used by a total of 386 GP offices (out of 1542 offices) (Direktoratet for e-helse, 2022). It now has an app that is mainly used to log in to the HelseNorge website. It gives access to new messages and events, and a variety of public services that help you follow up on your health as well. The app is only available in Norwegian but the website also offers English (Norsk Helsenett, 2023). Helsenorge uses BankID for logging in, which is acclaimed as the highest security level and verification method in Norway.

Helseplattformen, implemented in the health region of Central Norway, serves as a solution for GPs and aims to replace numerous existing systems. It facilitates the sharing of documented patient data across different levels and enables distribution to patients and residents. Within Helseplattformen, there is an application called HelseMi. Integration with approximately 80 national solutions or systems used

in primary and specialist healthcare allows for seamless information exchange. Additional functionalities of Helseplattformen include a common medication list that is regularly updated, a dynamic medical records review providing comprehensive central patient information, a problem list offering an overview of the patient's current diseases/conditions (both chronic and acute), and critical information such as allergies and the patient's GP.

Helseplattformen developed an application for the "normal" user called **HelseMi** (figure 1.2), which is only used in Central Norway. (Helseplattformen, 2022). HelseMi is an entrance to digital health services. It is available to those who are a patient or a user of municipal health and care services in Central Norway and their relatives. The services the users can access through the app are:

- See appointments, change and book in some cases
- Get access to medical record information, an overview of diagnoses, allergies, vaccines and medicines
- Write to healthcare professionals and get answers in the app/web solution
- Video consultations
- Overview of test results
- Participate in research
- Give access to relatives or see the records of those who have given you a power of attorney

The app is accessible to everyone over the age of 16 who is a patient at hospitals, municipalities and GPs or who uses the medical record solution. The app is also used with BankID and therefore secure and easy to log in to.

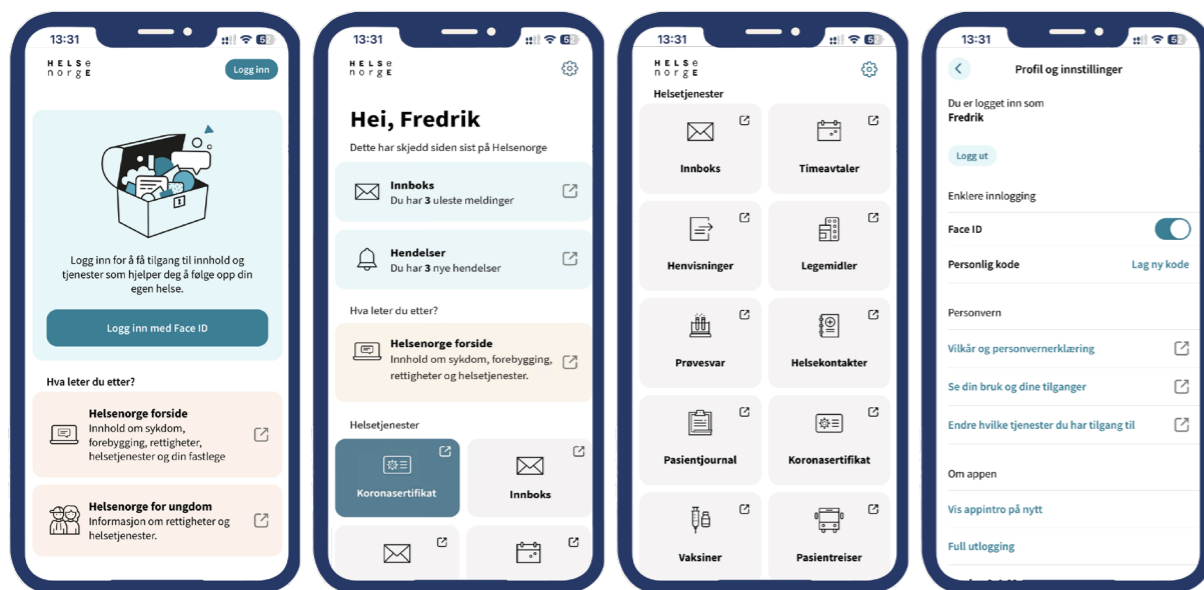


Figure 1.1: HelseNorge



Figure 1.2: HelseMi

**MyDignio** (Figure 1.3) or Dignio Connected Care (Dignio, 2023), is a remote care solution highlighted by Helseplattformen in E-helsetrender: Utviklingstrekk, 2022 (Direktoratet for e-helse, 2022). Its purpose is to improve patient healthcare and play a role in creating a sustainable healthcare system. The patient app MyDignio allows patients to learn and manage their health conditions better with healthcare professionals being far away. It can be adapted to each patient and used on both tablets and smartphones. The app gives the patient an overview of their measurement history, self-treatment plan and daily tasks. The patient can also communicate with healthcare personnel via messages or video. The solution should promote health competence and self-treatment through access to information, own data, history and records. The app is made for triage so that the patients who need it the most get help first. The information can also help relatives better understand the patient's state of health. The services available are:

- Measurements, for example, blood pressure, spirometer, and pulse oximeter.
- Video
- Chat function
- The Healthcare professional will get a notification if the results are abnormal, and the doctor can then further decide what to do.
- History of the patients
- Information page
- Digital self-management plan connected with daily tasks

MyDignio is the patient app (Dignio, 2022) that communicates with Dignio Prevent, a solution used by healthcare professionals for remote care. Dignio's solution uses encrypted software in a cloud provided by Amazon, one of the world's largest cloud solution providers.

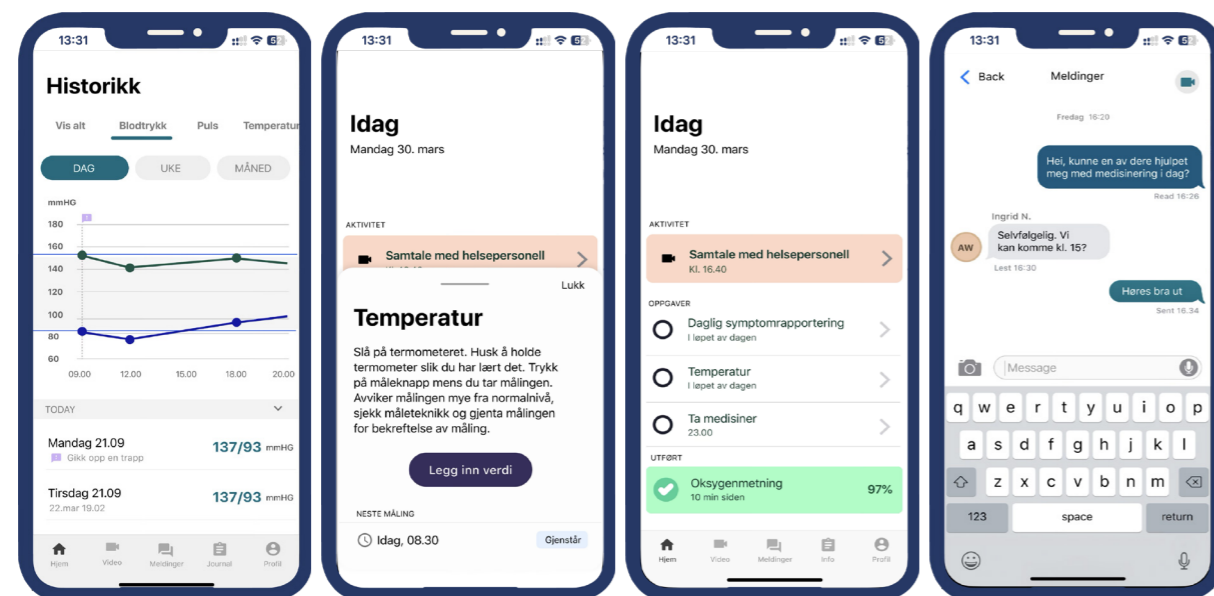


Figure 1.3: MyDignio

The app **PatientSky** (Patient Sky AS, 2022) is for people to get in touch with healthcare professionals. According to their App store page healthcare professionals can decide what kind of services are available. These can include:

- Online appointment booking.
- Overview of future and previous appointments.
- Booking and completion of video consultations directly in the app.
- Chatting with your practitioner or asking general inquiries to the clinic.
- Getting an overview of unpaid and paid invoices.
- Personalising your profile so it is easier for your healthcare professional to know you.
- Getting notifications if something new has happened.

The PatientSky app (Figure 1.4) uses BankID for logging in, which is acclaimed as the highest security level and verification method in Norway. In the App Store, it is mentioned that the app supports Norwegian, Swedish, English, Polish, Russian and Arabic languages.

**Heia meg** (Figure 1.5), similar to MyDignio, gives your daily cheers and helpful tricks to help users better their health. Heia meg lets you choose which changes you wish to make - and reminds you every day what you've started. The app is developed by Apt and the Norwegian Directorate of Health and is in the same family as Slutta and Gå10. Slutta (Figure 1.6) is the app for Norwegians to quit using snus or to quit smoking. Gå10 (Figure 1.7) is a tool for people who need a bit more exercise and need a little push. The app helps you set goals and track your progress. Gå10 tracks the minutes you are out walking and gives you motivation (Helsedirektorat, 2022, Helsedirektorat, 2023).

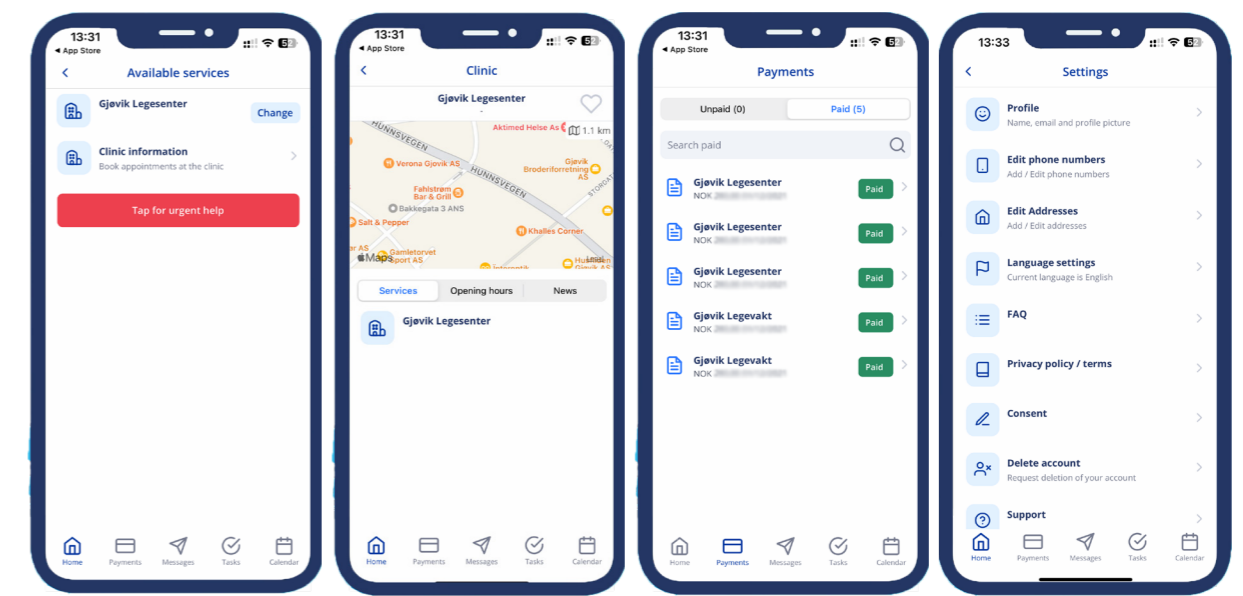


Figure 1.4: PatientSky

**HelseRespons** (WTW AS, 2019) is another Norwegian app where the user can order appointments, and prescriptions or make other inquiries to your GP. In this app the user can find their doctor's office, however, it costs 6NOK per message you receive from the doctor's office, usually two messages per order (Figure 1.8).



Figure 1.5: Heia meg



Figure 1.6: Slutta



Figure 1.7: Gå10

**Youwell** (2022) is another company that developed an application to help crew members on board who are in charge of medical care, deliver medication, or provide first aid on-board feel more confident and supported in dealing with medical issues. The Mariners Medico Guide in the Youwell app gives practical, symptom-based advice on how to deal with on-board medical issues. It can be used on a desktop or mobile device, enabling user access to medical guidance even in remote parts of a ship. Especially, the guide of which body parts are hurting or in pain and a guide to medical topics are unique for this app. Besides, the fully indexed information about diseases and injuries is close to what HelseNorge has online with their professional health information and self-service solutions but available on the app (Figure 1.9).

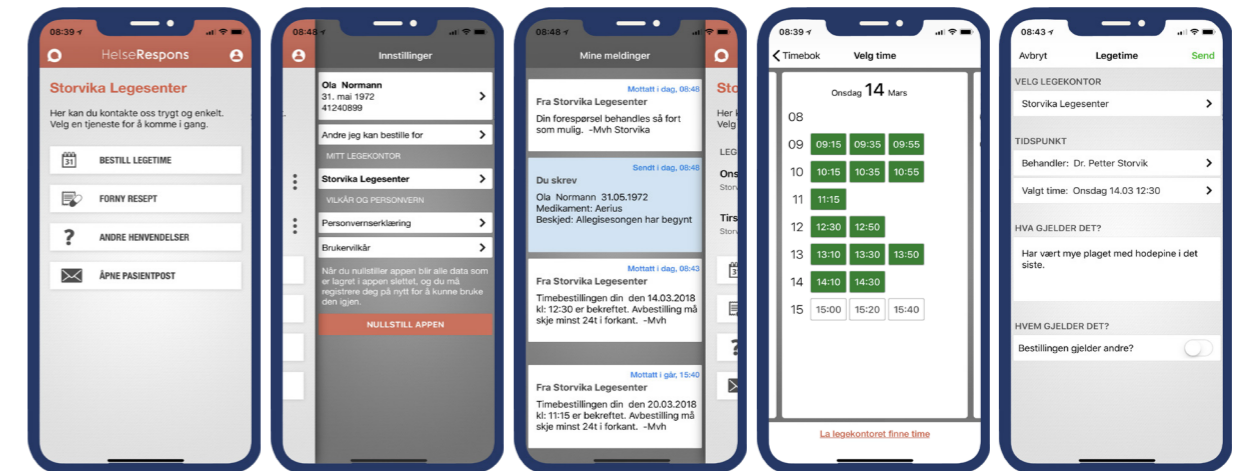


Figure 1.8: HelseRespons

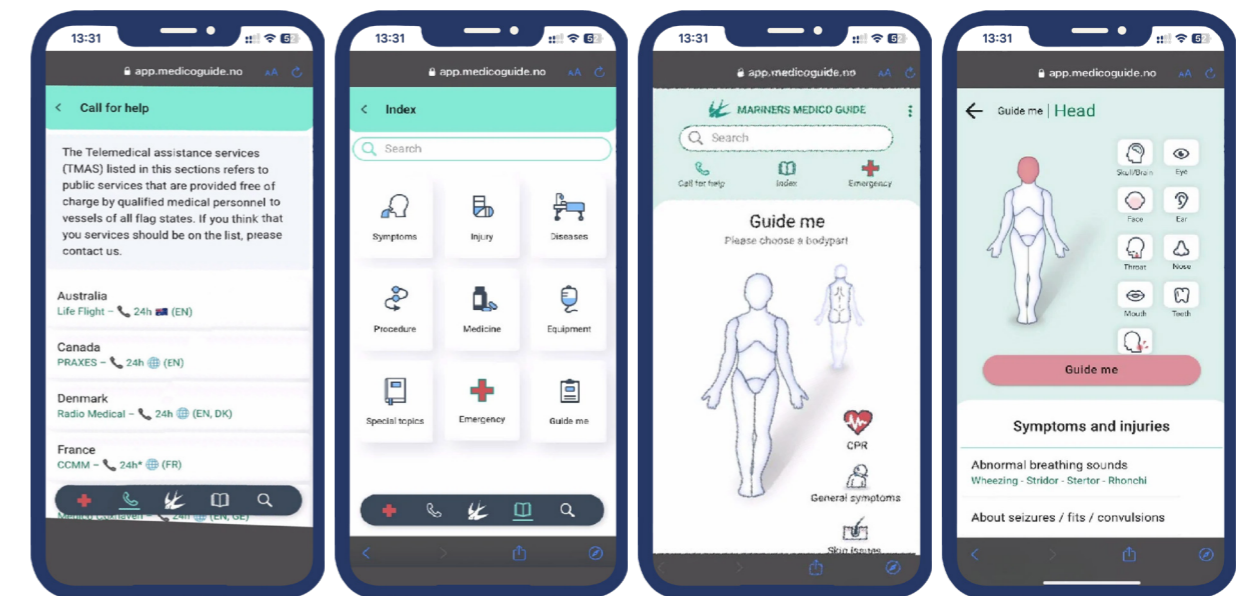


Figure 1.9: Youwell

## 1.3 Collaborating Partner

### 1.3.1 Helseplattformen

Helseplattformen is a company responsible for the introduction and future management of a joint electronic patient record and patient administrative system for the entire health service in Central Norway and has mostly worked on systems between GPs and hospitals (Direktoratet for e-helse, 2022). It is introduced by the Trondheim municipality and has allowed health personnel and patients to have better interaction and dialogue. Helseplattformen has a significant role in many innovation projects aimed at developing health services. One such project is HelsaMi, which has a great potential for providing digital services to patient groups in need of frequent contact with health services, particularly for personalised follow-ups. Helseplattformen is responsible for implementing a new electronic patient record solution in Central-Norwegian hospitals and municipalities in spring 2022 (Helseplattformen, 2022).

Helseplattformen is owned by Helse Midt-Norge RHF and several municipalities (Helseplattformen, 2022). The service is responsible for introducing and managing an electronic patient record for Central Norway. The goal of Helseplattformen is to provide a shared platform for health organisations, municipalities, GPs, and other private actors, where they can view real-time changes in the patient's documents and health information (Helseplattformen, 2022).

HelsaMi is a digital platform developed by Helseplattformen, Epic Systems, and Central Norway health organisations. It is a citizen portal that provides numerous options for health and care services in Central Norway. HelsaMi is accessible via mobile phones, tablets, and browsers through their website. It has been used by around 100,000 residents in Central Norway since its launch in May 2022 (Helseplattformen, 2022).

Anyone in Central Norway can use HelsaMi by obtaining a user account, although most residents already have one due to prior involvement with health and care providers. Users can also access the accounts of others, such as children or relatives, with their permission. HelsaMi is used only when patients need it, but access to adequate health care is available to everyone. The user is registered as a non-active user before logging in for the first time and can converse in the same way as before (Helseplattformen, 2022).

HelsaMi is created following universal design principles and is written in easy-to-understand language, which is also in line with the new language act from 2022. A lot of effort has been put into ensuring that HelsaMi is easily comprehensible for Norwegian users both in terms of practicality and language (Helseplattformen, 2022). During the interview the colleagues of Helseplattformen stated that through extensive user testing and consultation with expert users from a diverse age group ranging from 18 to 80 years, they arrived at several user-friendly language variants. Clear and simple language is a crucial aspect of HelsaMi, as it aims to be a citizen's portal (Helseplattformen, 2022).

### 1.2.4 Safety and Ethics in eHealth

Mobile health applications play an important and distinct role in the future of healthcare, but given the sensitive nature of health information, patient concerns, and institutional responsibilities, ensuring security and confidentiality is crucial (Ruland, Brynhi et al., 2008). Nonetheless, the rapidly evolving technologies and the potential vulnerabilities of the technology's business components raise questions about its safety and reliability, as highlighted in research by Byambasuren et al. (2019). E-prescription is one of these rapidly changing technologies. It speeded up and facilitated GP practice activities. Which offers GPs the opportunity to better their services and enhance patients' safety (Kivekäs et al., 2016). Patients have been using printouts to share information gathered in health apps with GPs. Providing a structured communication channel, such as integrating data entered into a health app with electronic patient files, could ensure that all essential patient data is available to GPs regardless of their direct encounters with the patient. However, security, accuracy and coverage concerns regarding personal patient data may occur. On the other hand, patients with chronic diseases can easily share symptoms with their GPs (Nguyen et al., 2019; Gilbert et al., 2020). Because of safety issues, the Directorate for eHealth (own translation from Direktoratet for e-helse) has proposed principles for how such an interaction between HelseNorge and solutions in the service should work. The service must ensure citizens an overview, up-to-date information and access to digital tools while safeguarding privacy.

The use of smartphones in healthcare raises several risks such as loss of privacy, poor-quality patient data, and inappropriate clinical management (Wattanapisit et al., 2020). To address these risks, standards for accessibility, privacy, accuracy, and ethical obligations must be met. In Hofer and Haluza (2019) it is said that 8% of doctors avoid using medical apps during patient contact due to ethical concerns. However, smartphones play a crucial role in medical care and can efficiently facilitate communication and data collection. The use of privately owned mobile devices to store patient data raises practical, ethical, and legal concerns regarding safety and confidentiality. This may lead to increased regulation. A survey of German doctors showed that only 5% store and process patient data, despite the reliability of the technology not being doubted. There is a need for suitable conceptual, legal, ethical, and social frameworks (Hofer and Haluza, 2019).

Helseplattformen is working on enhancements for GPs as is discussed during a first interview with Helseplattformen. At the moment GPs have a lot of platforms available so Helseplattformen is trying to convince them that theirs is the best platform to work with since it works also with the hospitals and the municipalities. The platform Epic Systems itself is not very flexible with changes but additions to the template might be welcome.

This thesis represents a collaborative effort with Helseplattformen. While this research benefited from the insights and contributions of Helseplattformen the findings and conclusions presented herein are the result of independent analysis and decision-making. The primary findings for this study were derived from independent research, data collection, data analysis, and interpretation of results. It should be noted that the input from Helseplattformen, particularly from the product manager, innovation coordinator, and senior advisor at the department of medicine and analysis, was taken into account during biweekly meetings. Where I provided updates on the thesis, while they provided valuable guidance and feedback, allowing for a comprehensive understanding of their specific needs and preferences. Their insights and opinions on the design were considered, but ultimately, the primary findings of this study were independently derived from the perspectives and experiences of the users themselves.

### 1.3.2 Helseplattformen and Epic

As mentioned in the introduction, Helseplattformen, the collaborating partner, plays a significant role in this thesis. Therefore, it is crucial to delve deeper into Helseplattformen and Epic, as they have encountered challenges. Helseplattformen for example has recently faced negative publicity. More than 16,000 letters, including crucial appointment invitations to hospitals, failed to reach their intended recipients. According to Helseplattformen's CEO, Torbjørn Vanvik, this issue stemmed from an error in selecting the incorrect letter template. Such errors could have been prevented through training and the implementation of user guidelines (Thobroe & Ørnhaug, 2023). It even went so far as the insufficient records of Helseplattformen might have led to a death. According to an article of Svendsen & Thobroe (2023) a patient was admitted to a hospital to be investigated for a low blood percentage and a possible haemorrhage. The patient in question was at risk of a stroke and therefore, was on blood thinners. The doctors stopped the blood thinners because of the symptoms. Later he was admitted to the hospital again because he suffered a major stroke, but now the record did not show any documentation of the previous admission to the hospital and the patient died. Because of poor documentation, the exact cause is not quite known, as County doctor Jan Vaage said. Vaage also stated; it is difficult to answer whether it is due to the problems with Helseplattformen. But what we see is that they have not been able to document properly and that probably has a clear connection with Helseplattformen (Svendsen & Thobroe, 2023).

The hospital director at St. Olav, Aasved, states that after Helseplattformen was put into use (November 2022), they have registered a significant increase in the number of reported patient-related incidents. There have been no recorded incidents where patients have died as a result of Helseplattformen. But incidents have been recorded where it cannot yet be ruled out that Helseplattformen is a contributing factor, like in the example of Svendsen & Thobroe (2023).

Besides poor documentation and patients not receiving letters, there have been many other challenges since Helseplattformen (Svendsen & Thobroe, 2023), such as:

- References and epicrisis do not arrive where they are supposed to
- The system makes it difficult to handle medicines
- Creates cumbersome work for doctors, secretaries and employees in several departments
- Critical errors for those who work with radiology examinations
- More new errors are reported than the Health Platform can resolve
- Employees are overworked and tired

Helseplattformen and HelsaMi are supplied by Epic Systems, which are used in more countries mainly by hospitals. In an article by Hertzum and Ellingsen (2019), implementations in the UK and Denmark were researched to see where difficulties may lie when implementing this in Norway. In the UK it was implemented at Cambridge University Hospitals (CUH) and went live on October 26th 2014. It was implemented

## 1.4 Preliminary Research Question

to replace paper records that would span all clinical areas. However, in the period immediately after it went live, CUH recorded several problems, including complete access to patient's medical history, disruptions to pathology services, and four hours of unplanned downtime, among others. Six months after go-live, the Care Quality Commission rated CUH services as "inadequate" on four out of six parameters due to staff shortages and limitations in Epic. The implementation also contributed to overspending. However, two years after go-live, CUH services improved to a rating of "good" except with respect to responsiveness. Epic eliminated paper records and improved patient safety by reducing the risk of misidentification. In Denmark, similar problems were found after go-live, including an increase in adverse events, technical difficulties, and problems in the user interface. The implementation process was criticised for inadequate training, testing, benefits estimation, and follow-up, with problems continuing for many months. The benefits estimation in the business case predicted that the financial benefits of Epic would surpass the investment by 2022, with an expectation that the productivity dip after go-live would only last three weeks, but the basis for this optimistic estimate was unclear.

Different articles in the Netherlands also showed that Epic had difficulties there. In 2013 it was implemented in the Dutch hospital, Radboud University Medical Center (Radboud UMC) (Dorresteijn, 2014). The system had to replace paper records, same as for the UK, and it had to make the system more automated. In an article from 2014, doctors, nurses, and patients are reporting a decline in the quality of care at Radboud UMC, since the introduction of Epic (Dorresteijn, 2014). Doctors were unable to access their patient's medical records, patients were not called in for appointments or procedures, and mistakes were made in patient records, leading to delays and confusion. Some patients had to undergo procedures multiple times due to system errors. Staff also reported difficulties with the system, including slow results and unclear distinctions between medical and nursing appointments. The hospital acknowledges the issues but says they are working to improve the system and that the benefits of Epic are already visible in some areas (Dorresteijn, 2014). This, however, is an article from 2014 which is almost 10 years ago since at the date this is written, there are no other articles about the status now. But Epic was in 2018 used in 10 hospitals (Bukman, 2018).

Despite the previous experiences of implementing Epic and the desire for additional functions in Norway, Helseplattformen stated in an interview conducted during this thesis that this solution remained the most favourable among others.

The preliminary research question of this thesis is to scale up the existing platform of HelsaMi and improve communication between GPs and their patients with a focus on the user experience. The preliminary research question emphasises the importance of structuring information effectively, avoiding information overload, and improving navigation for elderly individuals through techniques like card-sorting exercises and standardised icons. By implementing these recommendations, the thesis aims to deliver an enhanced user experience, setting a precedent for improved design practices in the broader field of health applications.

The preliminary research question:

**"How can the existing HelsaMi app in Health Region Central Norway be improved, specifically regarding the user interface design, to enhance communication between GPs and their patients?"**

The research uses a variety of methods, including surveys, interviews, focus groups, and observational studies, to collect data from different stakeholders, such as patients, healthcare providers, administrators, and policymakers. The findings of this research are used for the design of parts of the HelsaMi app in Central Norway. The research question has been adjusted according to the needs of the users and the stakeholders, which is further elaborated in Chapter 4.



## 1.5 Aim for the Thesis

The purpose of my master's thesis is to improve communication between GPs and patients through user interface design. A GP acquaintance had expressed a need for an application that could make communication with patients easier between them and their patients. My thesis sought to support Norway's pioneering work in applying digital solutions to the healthcare industry. While mHealth and eHealth technologies had played a crucial role in healthcare delivery, it was crucial to maintain the personal touch and human interaction in healthcare. My thesis focused on the user experience and accounted for the limitations of certain medical conditions and patient abilities.

After investigating the existing digital solution HelsaMi and consulting with experts, I revised the research question of my thesis to scale up the HelsaMi platform and improve communication between GPs and patients. By enhancing communication between GPs and patients, my thesis contributes by improving HelsaMi, the application from Helseplattformen to empower individuals to play an active role in their medical treatment at the GPs office, or even before they go into the GPs office.

## 1.6 Structure

The structure of this thesis is as follows, the first chapter provides an introduction to the topic and background information. It starts with an introduction to the thesis. Where the background section discusses the role of smartphones in healthcare, digital health services and mobile health services in Norway, and safety and ethics in eHealth. The chapter also introduces the collaborating partner, Helseplattformen. It concludes with the preliminary goal and the aim of the thesis. The second chapter delves into the theoretical approach for the research. It explores the concept of health literacy and its importance in healthcare. It also discusses universal design in health and its application in improving the accessibility and usability of health-related technologies.

Chapter 3, contains the research methods in the thesis are outlined. It covers the discovery phase, defining the research scope, the development process, and the delivery and discussion of the findings. The chapter also addresses the limitations of the study and the ethical considerations taken into account during the research.

Afterwards the thesis delves into the results of this thesis with first Chapter 4, Discover. This chapter focuses on the findings derived from previous studies on users of eHealth services in Norway. It presents insights obtained from surveys and describes the second meeting with Helseplattformen. The chapter discusses the revised goal based on the gathered insights and includes further insights obtained from interviews and surveys. Next follows Chapter 5, which discusses the creation of personas and user journeys, as well as formulating "How Might We" questions to address specific design challenges. Chapter 6 covers the development phase of the research. It discusses the creation of low-fidelity prototypes, followed by mid-fidelity prototypes. Feedback received from Helseplattformen, Epic, and users is incorporated into the design process. The chapter further explores the creation of high-fidelity prototypes, incorporating feedback from Helseplattformen and users. In Chapter 7 the recommendations for features and overall recommendations are presented these are derived from the research. It outlines the key features that should be included in the final design and provides an overview of the overall recommendations for the improved app.

This thesis closes with a discussion and a conclusion. In the discussion, the findings and recommendations are discussed in detail. It includes a discussion of the research outcomes, suggestions for future work, and personal reflections on the research process. The final chapter of the thesis provides a comprehensive conclusion summarizing the main findings and contributions.

# Chapter 2

## Theoretical Approach

### 2.1 Health literacy

Nutbeam (2000) defines health literacy as a term used to describe various outcomes in health education and communication activities that aim to improve physical, mental, and social well-being. The Centers for Disease Control and Prevention (2023) distinguishes between personal health literacy and organisational health literacy. Personal health literacy refers to an individual's ability to access, comprehend, and apply health-related information and services for themselves and others. On the other hand, organisational health literacy refers to the extent to which organisations equitably enable individuals to access, comprehend, and apply health-related information and services for themselves and others. From a public health perspective, the organisational definition recognises the connection between health literacy and health equity. Health equity is the achievement of the highest level of health for all people, which can only be achieved when everyone could be as healthy as possible (Centers for Disease Control and Prevention, 2023). Improved health literacy is essential for empowerment, as it enhances people's access to health information and their ability to use it effectively. Health promotion activities have been categorised into hierarchies of outcomes, including health and social outcomes, intermediate outcomes, and health promotion outcomes.

According to Nutbeam (2000), health literacy includes cognitive and social skills that enable individuals to access, understand, and use the information for good health. There are three health literacy levels, functional, interactive, and critical, each with different implications for health promotion actions. Jordan (2010) identified seven key abilities that influence health literacy: knowing when and where to seek health information, verbal communication skills, and the capacity to process and retain information.

As this project is especially focused on eHealth the eHealth literacy framework (eHLF) from Norgaard (2015) is proven to be of importance. The eHLF is a seven-domain framework that includes new elements relevant to the dynamics that occur when the system meets the individual. The eHLF is based on Norman and Skinner's Lily Model (Figure 2.1) and Bloom's taxonomy and emphasises the need for eHealth solutions to be tailored to specific user groups and to use multiple media types to cater to different eHealth literacy levels. The involvement of target citizens and healthcare professionals is essential throughout the entire development process.

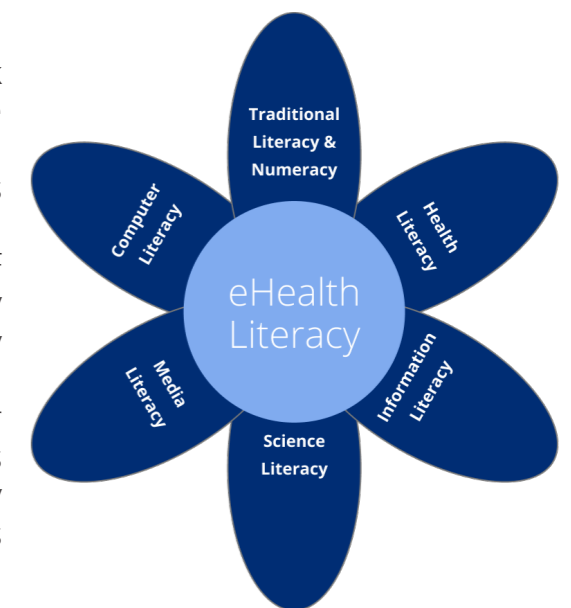


Figure 2.1: Symptom Tracking

The eHLF framework is a key element in the project's design. For this project not all domains are relevant. Four domains that were essential to the project were identified from Norgaard's framework (2015). These domains were the ability to process information, engagement in one's health, and digital services that suit individual needs.

1. The *ability to process information* was about making health information accessible to users. It includes that the design should be presenting information in a user-friendly manner, taking into account health literacy levels and avoiding jargon.
2. *Engagement in one's health* is focused on empowering users to take control of their health. Designing for this domain includes promoting user empowerment and self-management, providing accessible and actionable information about health conditions, navigating the healthcare system, and fostering a sense of responsibility for one's health.
3. *Digital services that suit individual needs*, required the design to be tailored to the user's needs and illness/patient group characteristics. The design needs to be a tailored eHealth solution that can be personalised to their needs and illness/patient group characteristics.
4. *Access to digital services that work*, allows that digital health services were accessible across different devices and platforms. The health platform needs to be both available on the web as well as on the phone, since not everywhere there is good internet, so the design should consider the availability and compatibility of hardware and software, ensuring that digital health services are accessible across different devices and platforms to reach a wide range of users.

Other domains could be included in the project but were not as relevant. First, the ability to actively engage with digital services required users to have basic knowledge and skills to use digital services. This includes that digital health services needed to be easy to use and navigate, taking into account users' varying levels of digital literacy. And secondly, being motivated to engage with digital services, required incorporating incentives such as personalised feedback, rewards, or gamification elements to motivate users to engage with digital health services. Lastly, there is one domain, although important, did not directly relate to the project's focus on interaction design. The domain is about feeling safe and in control focused on data privacy and security (Norgaard et al., 2015).

Patients with varying levels of health literacy have different preferences for obtaining health information. Those with low health literacy tend to rely on healthcare providers for information, while those with higher health literacy and younger patients use various sources, such as the Internet or other written materials (Gaglio et al., 2012; Oedekoven et al., 2019). Participants prefer tailored information that is specific to their health conditions and situations. Patients with low health literacy often prefer face-to-face interactions or easily understandable internet-based information (Chan and Kaufman, 2011). For those with low health literacy, there might be barriers they can

encounter when searching for health information such as a lack of information literacy, computer literacy, and numeracy skills (Chan, 2011). To address these challenges the user needs to be taught how to use the eHealth solution to overcome poor eHealth literacy and thus requires training programs to feel confident and trust the eHealth solution (Gilstad, 2014). For the app to effectively convey health information to its users, Chan (2011) and Gilstad (2014) contend that it must be ensured that health-related concepts are explained in simple terms that are easy to understand. The health information must be verified that it comes from a trustworthy source, such as a health provider or other medical professionals (Jordan, 2010; Gaglio, 2012; Gilstad, 2014; Diviani, 2015; Oedekoven, 2019).

Applications and websites that target the health industry must comply with certain guidelines. Guidelines were found in different articles, including Norgaard's domains, and the results of Gilstad and Chan's user tests. Based on the information in the articles, each requirement was evaluated with what is relevant to interaction design and compared to the findings in previous chapters. To ensure user-friendliness, it is essential to have a clear understanding of the target demographic, enabling insights for further improvement (Chan, 2011; Gilstad, 2014). Using a user-friendly and intuitive interface can also help users make selections easily (Chan, 2011; Gilstad, 2014). And with involving Helseplattformen and other relevant organisations that have members belonging to the target group the development process can ensure that eHealth solutions are aligned with user needs (Gilstad, 2014).

These guidelines found in the different articles were evaluated using the MoSCoW method to prioritise which features must, should, could and won't be included in the design, regarding interaction design. This is called the MoSCoW method. The MoSCoW method is a prioritisation technique to understand the relativeness of certain requirements or guidelines (Agile Business, 2014), in Chapter 5.1 this method is also used. Here the **"must"** are the requirements that must be included in the final design are the features that are relevant to interaction design and can support those with poor health literacy. These points must be feasible for all stakeholders and can help with the communication between a GP and a patient. **"Should"** is for the requirements that should be included in the final design and are the features that indirectly support those with poor health literacy. They may add value to the design and user experience but not directly help with the communication between a GP and a patient. **"Could"** are the requirements that could be included in the final design are the features that are nice to have but have a small impact if left out. These features are desirable but not critical to be included in the design. As this master thesis is focused on interaction design, the requirements that will not be included are those that cannot be solved solely by interface design and are divided under **"Won't"**.

The eHealth literacy framework (eHLF) is a useful tool for designing eHealth solutions that meet the needs of different user groups and health literacy levels. For this project,

four domains of the eHLF were identified as essential: the ability to process information, engagement in one's health, digital services that suit individual needs, and access to digital services that work on different platforms. Patients with low health literacy require tailored information that is specific to their health conditions and situations, and eHealth solutions should be designed in a user-friendly manner, taking into

account health literacy levels and avoiding medical terminology. The involvement of target citizens and healthcare professionals throughout the development process is crucial in ensuring that eHealth solutions are effective in improving health outcomes. These guidelines will be taken into account when creating the final designs for this project.

| MoSCoW Domain                                      | Must   | Should  | Could  | Won't   |
|--|--|---|--|---|
| <b>Ability to process information</b>              | <ul style="list-style-type: none"> <li>Use a user-friendly and intuitive interface (Chan, 2011; Gilstad, 2014; Norgaard)</li> <li>Visualise data with tables and figures to aid comprehension. (Chan, 2011; Gilstad, 2014)</li> <li>Readability, clarity, and ease of understanding for users to find and comprehend relevant health information should be clear. (Norgaard, 2015).</li> <li>Digital health services should be easy to use, navigate, and understand. (Norgaard, 2015).</li> </ul> | <ul style="list-style-type: none"> <li>The user needs a summary to take away after the doctor's visit (Gaglio, 2012)</li> </ul>   |  | <ul style="list-style-type: none"> <li>The user requires training programs to feel confident and trust the eHealth solution, preferably with promoters in the user group (Gilstad, 2014). And provide clear instructions, feedback, and support to users in interacting with the digital platform (Norgaard, 2015).</li> <li>Health-related concepts must be explained in simple terms that are easy to understand (Chan, 2011; Gilstad, 2014)</li> </ul> |
| <b>Engagement in one's health</b>                  | <ul style="list-style-type: none"> <li>Prioritise the patient's role as an active participant in their clinical journey by providing knowledge and skills to approach the healthcare system (Gaglio, 2012; Norgaard, 2015)</li> </ul>  |   | <ul style="list-style-type: none"> <li>Motivate the users to engage with digital services by including incentives, such as personalised feedback, rewards, or gamification elements, to motivate users to actively engage with digital health services and sustain their engagement over time (Norgaard, 2015).</li> </ul> |   |
| <b>Digital services that suit individual needs</b> | <ul style="list-style-type: none"> <li>It must be clear to what demographic the target user belongs, to provide insights for further improvement (Gilstad, 2014)</li> <li>Involve Helseplattformen and other relevant organisations with members of the target group in the development process can ensure that eHealth solutions are aligned with user needs (Gilstad, 2014).</li> </ul>  | <ul style="list-style-type: none"> <li>The participant needs a tailored eHealth solution that can be personalised to their needs and illness/patient group characteristics (Norgaard, 2015).</li> </ul> | <ul style="list-style-type: none"> <li>The user needs access to an eHealth solution that integrates with public services. (Jordan 2010; Norgaard, 2015).</li> </ul>  | <ul style="list-style-type: none"> <li>The health information must be verified that it comes from a trustworthy source, such as a health provider or other medical professionals (Jordan, 2010; Gaglio, 2012; Gilstad, 2014; Diviani, 2015; Oedekoven, 2019).</li> </ul>  |
| <b>Access to digital services that work</b>        | <ul style="list-style-type: none"> <li>It should be available on both desktops, tablets and phones (Norgaard, 2015).</li> </ul>  |   |  |   |

## 2.2 Universal Design in Health

Universal design, as defined by the Center for Universal Design in 1997, is the creation of products and environments that can be used by all people to the greatest extent possible, without the need for adaptation or specialised design. It emphasises the ability of individuals to use and understand a product or service regardless of any impairments they may have. Accessibility is a fundamental condition for universal design, and the 7 Principles of Universal Design, established by a working group of architects, product designers, engineers, and environmental design researchers at The Center for Universal Design, serve as the foundation for this mindset. The 7 Principles of Universal Design include (1) Equitable Use, (2) Flexibility in Use, (3) Simple and Intuitive Use, (4) Perceptible Information, (5) Tolerance for Error, (6) Low Physical Effort and (7) Size and Space for Approach and Use.

Kascak et al. (2014) developed guidelines for designing mobile health applications based on the 7 Principles of Universal Design, with the aim of benefiting all users, particularly the growing elderly population facing chronic diseases. The guidelines become even more crucial considering the significant proportion of elderly individuals who experience disabilities and other barriers, including functional limitations, perceived lack of user skills, limited access to technology, lack of interest, and overall usability issues. These barriers pose challenges to the effective implementation and use of eHealth applications, underscoring the importance of addressing them in the design process. Given the importance of these conditions among older individuals, it is imperative to consider the needs of all older people with disabilities when designing such applications.

Quality of information, including authority, accuracy, bias, and currency, can also be a barrier to eHealth use, with some participants of the study expressing scepticism and lack of trust in online health information. As Huvila et al. (2016) found the current challenge in healthcare is not the lack of available treatments, but rather a deficit of patient involvement and consumer-focused provision of health information. Healthcare providers and health information system developers should not assume equal access and ability to interpret technology-based health information (Huvila et al. 2016).

To achieve greater usefulness and usability, scenarios can describe the motivations and experiences of users as well as the events of human-computer interaction (Carroll 2003). Sutcliffe (2010) also proposes to use a combination of storyboards, scenarios, and prototypes in a user-centred design cycle, to enable users to critique and contribute ideas on their terms. These scenarios, user feedback and needs can then be integrated with design visions and create a better user experience.

The guidelines for creating mobile health applications targeting older adults with disabilities were developed by incorporating Universal Design (UD) principles and existing mobile design guidelines from various articles named by Kascak et al. (2014).

Each guideline was carefully assessed based on its relevance to interaction design and compared to the findings from previous chapters. Using the MoSCoW method, the requirements were prioritised into must-have, should-have, could-have, and won't-have features for inclusion in the design. Three of the seven principles do not apply to mobile interfaces and thus, were taken out of the MoSCoW. Here the **“must”** is for the guidelines the design must abide by in the final design and are relevant to interaction design. These guidelines must be feasible to abide by during the iteration phase. These must-guidelines aim to create usable and easy-to-use interfaces for mobile health applications and improve the overall user experience. **“Should”** is for the guidelines the design should abide by in the final design are the features that are important guides but are not vital. These guidelines, however, would add significant value to the product. **“Could”** are the guidelines the design could abide by in the final design be the features that are nice to have but would have a small impact if left out. These are also guidelines that cannot be immediately implemented by the designer. The guidelines the design won't abide by are in the column marked **“won't”**, and are in the final design the features that are not a priority for this specific time, but the design should have later. These are also guidelines that cannot be immediately implemented by the designer.

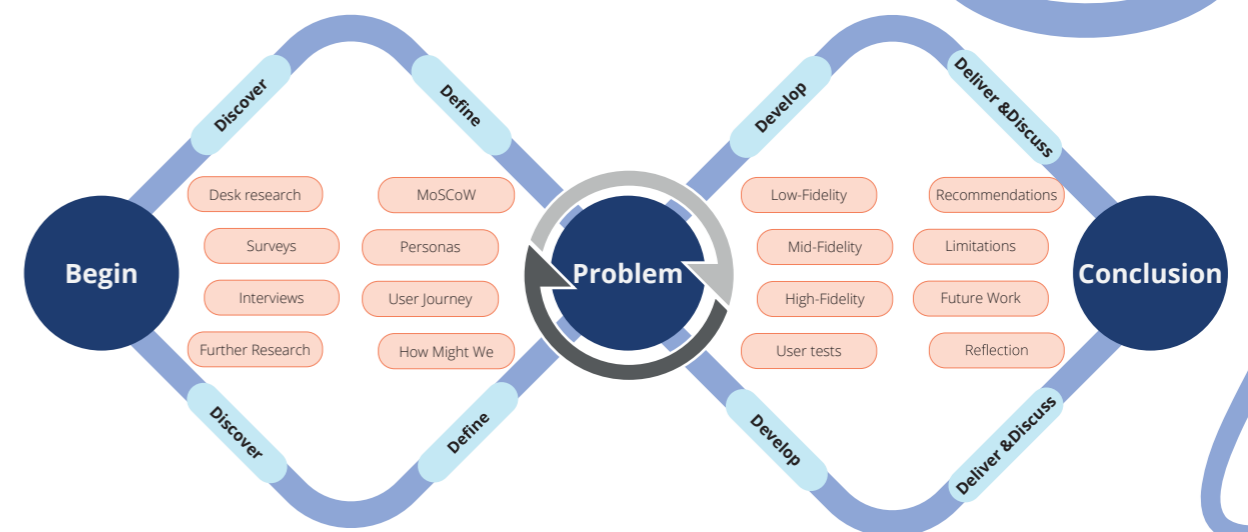
During this project also the universal guidelines need to be abided by since the project is for a wide arrange of target people. To comply with the universal guidelines during all the design stages the target group and stakeholders must be involved. The design also needs to be intuitive and reduce memory overload. These guidelines will be taken into account when creating the final designs for this project.

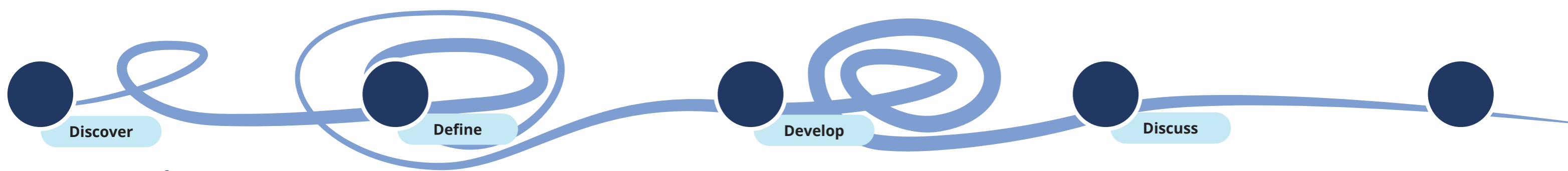
| UD \ MoSCoW                     | Must   | Should  | Could   | Won't  |
|---------------------------------|--|---|---|--|
| <b>Equitable Use</b>            | <ul style="list-style-type: none"> <li>• Avoid specialised design (Kascak et al., 2014).</li> <li>• Accommodate different needs and levels of expertise (Kascak et al., 2014; Sutcliffe et al., 2010).</li> <li>• Make the design appealing to all users. (Kascak et al., 2014).</li> </ul>  |   |   | <ul style="list-style-type: none"> <li>• Ensure fast and secure data saving for easy resumption (Kascak et al., 2014).</li> </ul>  |
| <b>Flexibility in Use</b>       |  | <ul style="list-style-type: none"> <li>• Offer multi-layer interface with shortcuts for frequent users (Kascak et al., 2014).</li> <li>• Use layered architecture to meet diverse user requirements and avoid software duplication (Sutcliffe et al., 2010).</li> </ul> | <ul style="list-style-type: none"> <li>• Provide indicators and sense of accomplishment for next actions (Kascak et al., 2014).</li> </ul>  | <ul style="list-style-type: none"> <li>• Consider touch button location preferences for left- or right-handed users (Kascak et al., 2014).</li> <li>• Include speech input and output for users with dexterity, arthritis, and visual impairments (Kascak et al., 2014).</li> </ul>  |
| <b>Simple and Intuitive Use</b> | <ul style="list-style-type: none"> <li>• Create intuitive interfaces and interactions for efficient task completion (Kascak et al., 2014; Sutcliffe et al., 2010).</li> <li>• Group actions to reduce tedious data entry and information overload (Kascak et al., 2014)</li> <li>• Display large data quantities with overview and drill-down details (Sutcliffe et al., 2010).</li> <li>• Maintain consistency in design elements and language across platforms (Kascak et al., 2014).</li> <li>• Use round-shaped touch buttons for ease of use (Kascak et al., 2014).</li> <li>• Design for top-down interaction to reduce distraction and information overload (Kascak et al., 2014).</li> </ul> | <ul style="list-style-type: none"> <li>• Provide indicators and sense of accomplishment for next actions (Kascak et al., 2014).</li> </ul>  | <ul style="list-style-type: none"> <li>• Give informative and understandable feedback for every user action, such as a beep or error message for invalid inputs (Kascak et al., 2014).</li> </ul> | <ul style="list-style-type: none"> <li>• Allow for personalisation options and enhance contrast and readability (Kascak et al., 2014; Sutcliffe et al., 2010).</li> </ul>  |
| <b>Perceptible Information</b>  | <ul style="list-style-type: none"> <li>• Avoid excessive memorization to reduce short-term memory load during task performance (Kascak et al., 2014).</li> <li>• Design UIs for older adults with minimal attention requirements, considering mobile distractions (Kascak et al., 2014).</li> </ul>  | <ul style="list-style-type: none"> <li>• Consider limited and split attention of older adults for multitasking (Kascak et al., 2014).</li> </ul>  |   | <ul style="list-style-type: none"> <li>• Enhance essential information contrast for improved perception (Kascak et al., 2014).</li> <li>• Use minimum font size 14 for readability (Kascak et al., 2014).</li> <li>• Incorporate hands-free and eyes-free interactions with multiple sensory outputs (Kascak et al., 2014).</li> </ul> |

# Chapter 3 Methods

This chapter covers the methods used in this project. The double-diamond approach was used in the study, along with user-centred design principles. Due to many iterations the project was not a smooth line but more a squiggly line that goes all over the place.

The British Design Council (Elmansy, 2021) created the Double Diamond process to encourage originality and innovation. There are four steps that the design process goes through to transition from the problem space to the solution space (Discover, Define, Develop, and Deliver). During this project the challenges were explored in the first phase, "Discover," using a variety of user-centred design methodologies such as surveys, and interviews. The findings were then analysed using graphic mapping approaches such as affinity diagrams, personas, journey maps, and so on during the "Define" phase. The first two phases were utilised to identify the correct problem statement based on the context. The "Development" phase follows, during which prospective solutions are conceived by producing low-fidelity, mid-fidelity and high-fidelity prototypes. These were evaluated by expected end-users, Helseplattformen and Epic Systems. During the "Deliver" phase, the recommendations for how Helseplattformen should proceed. One more stage was added; the discussion stage where limitations, future work and reflections are discussed. After that, all the stages concluded in the conclusion. All of these stages were not sequential and necessitated several iterations.





## 3.1 Discover

The research began with the first phase of the double diamond, “Discover”. This is the stage to understand the root cause of the problem (Elmansy, 2021). As a base for the potential solution, one can use both qualitative and quantitative methods - such as surveys and analysis of already existing research. The end users are the patients of the GPs who require such a product. Therefore there were first insights gathered from previous research on patients of GPs. Afterwards, more surveys and interviews were held. The Discover step is divergent, which means that all ideas and information are considered and included. This step broadens the view, so there is more space for creativity.

### Desk research

Desk research was conducted by reading various research articles related to the subject to develop an informed perspective on the matter. Through this process, knowledge was gained on how people perceived their communication with GP offices and how the communication and application process could be improved. For this research search the search terms like mHealth, eHealth, General Practitioner were used. These search terms were entered in Google Scholar, ORIA and ScienceDirect. To search for relative information about the users of eHealth services in Norway, articles that were used for the background study were again studied. A total of 40 articles were reviewed, out of which seven were selected for the desk research based on their inclusion of eHealth services in Norway.

### Survey 1

In order to gather further information on the topic, a survey was devised. Surveys serve as a means of gathering data by asking individuals to provide responses to a series of questions or statements, thereby capturing insights into their behaviour, knowledge, and expertise (Sekaran and Bougie, 2016, p. 97). By allowing participants to respond at their convenience without researcher supervision, the online survey received responses from a total of 29 participants. Among the participants, 24 were aged below 35 and 5 were aged 35 or above. There were 20 women and 9 men included in the survey. The primary objective of the survey was to ascertain participants’ perceptions regarding their communication with GP offices and gather suggestions for potential improvements in the application and communication process. The survey questions can be found in Appendix B.

### Interviews

During the research process, a series of interviews were conducted to gather primary information related to the refined research question, which focused on enhancing the HelsaMi app to prioritise the active participation of patients in their clinical journey, leading to benefits for both patients and GPs. An interview can be defined as a “...

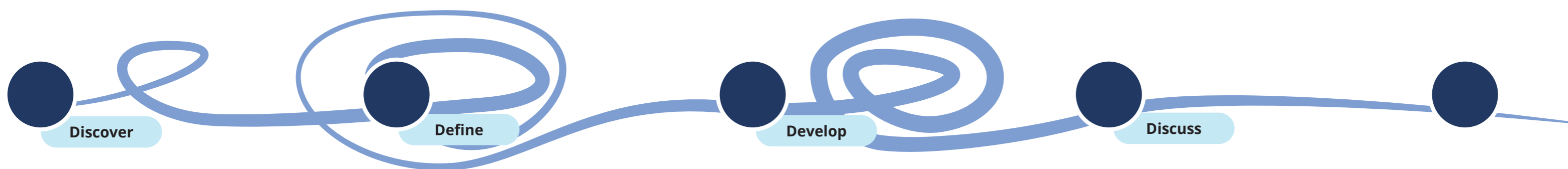
guided, purposeful conversation between two or more people” (Sekaran and Bougie, 2016, p. 113). The interviews were semi-structured, which means that in addition to having questions prepared, one also asks follow-up questions (Stickdorn et al., 2018, p 122). This can be very beneficial, as one might discover new and associated aspects along the way. An answer to one question might lead to several new questions, which can provide unexpected but useful insights. The interview questions are added in Appendix B. Three participants were interviewed. Two of them are caregivers to someone in their close family and thus answered to make their relatives and their lives easier when communicating with the doctor or GP. The other interviewee was the district manager (male, 45-50) of the Norwegian Cancer Society.

### Survey 2

This survey is also based on the redefined research question, to enhance the HelsaMi app to prioritise the active participation of patients in their clinical journey, leading to benefits for both patients and GPs. The participants need a tailored eHealth solution that can be personalised to their needs and illness/patient group characteristics following the requirements based on what was found in the paragraph on health literacy. In this further research, the goal is to find out what real users need from an application that communicates with their doctors and GPs. The participants that filled in the survey were filling it out for themselves. Five out of the six were women, and of those women, two were over 65, two were under the age of 35 and one was between 35 and 44. The survey questions can be found in Appendix B.

Interviews and surveys were conducted with health personnel and potential users to gather their experiences and opinions. Despite sending out numerous invitations for interviews and surveys, the response rate was limited, resulting in a smaller sample size. Further limitations of the study are addressed in section 3.5.





## 3.2 Define

In this section, the data collected during the discovery stage will be discussed. During this phase, insights gathered from different research methods were defined and narrowed down to a set of challenges that needed to be addressed. Therefore, various methods were used to summarise, cluster and map the insights to identify the exact problem area.

### MoSCoW

In “Define” the MoSCoW method is used to prioritise guidelines that are set by the previous analyses and the interviews and surveys. The MoSCoW method is used to prioritise which features must, should, could and won’t be included in the design. The MoSCoW method is a prioritisation technique to understand the relativeness of certain requirements or guidelines (Agile Business, 2014).

### Personas & journey map

Personas are created using the information from the desk research and surveys, which also provide insight into what should be included in the new pages for the app. Two personas were developed using the interview and survey information. These personas offer a perception of what needs to be incorporated into the new design framework (Ku and Lupton, 2022). With the interviews, survey and personas also two journey maps are created. “A journey map is a visualisation of the process that a person goes through to accomplish a goal” as said by Gibbons (2018). A journey map is essentially a time line with a sequence of actions that the persona can go through. However, also the user’s thoughts and feelings are added to build a story (Gibbons, 2018).

### How might we

How might we- questions were set to create a wide range of actionable ideas with trigger questions. The first step is to look at the statements that are in the personas and were in the MoSCoW. These statements then are rephrased by adding “How Might We” at the beginning. With these questions, brainstorming can start and will result in ideas (Design Kit n.d.).

## 3.3 Develop

In the define stage, the data was narrowed down to specific problems and design frameworks.

### Low-Fidelity

The initial sketches were created as a preliminary exploration of design alternatives, using pencil and paper as tools. These sketches served as a foundation for the development of the mid-fidelity prototype in Figma.

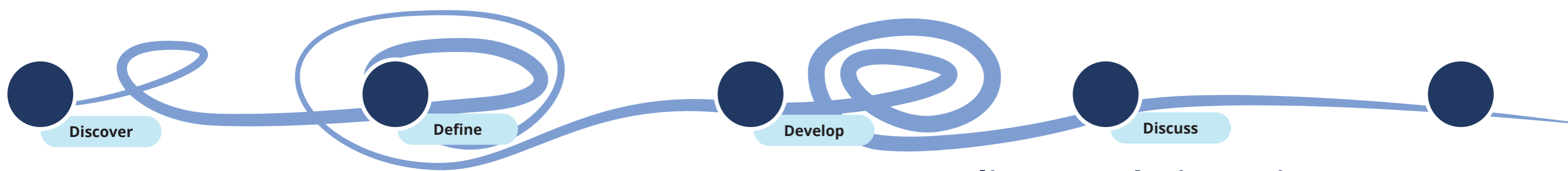
### Mid-Fidelity

The mid-fidelity prototype is a mock-up of the new design interfaces that includes potential improvements. This prototype was used to apply solutions that solved the “how might we” questions and explore possible user interface design variations for the new solutions. Throughout the prototyping process, it is crucial to maintain consistency between the design elements used in the prototype and the overall look and feel of the existing product. However, in this mid-fidelity prototype, not all the links worked as how they would work in the real application. Users needed to access different flows for the different feature solutions. Figma web application was used as the tool for creating the high-fidelity prototype.

### User test Mid-fidelity

The mid-fidelity prototype is evaluated by both Helseplattformen employees and Epic Systems developers to ensure its compatibility with the current application. Additionally, expected end-users test the prototype to confirm its intuitiveness and ease of use while meeting their needs. Three potential users were interviewed, and all of the users have participated in a survey or interview before. The user testers were two students from Trøndelag, part of Health Region Central Norway, under the age of 30 and an older lady over 65. They were encouraged to think aloud during the user tests. The app should accommodate different user communities with diverse needs and levels of expertise, which is why people from different generations and different insights were interviewed for the user tests. The user test questions can be found in Appendix C.

By actively listening to user feedback and integrating their valuable insights, HelsaMi can evolve into a patient-centric solution that improves engagement, adherence, and overall satisfaction. Continuously iterating and refining the user experience based on user feedback ensures that healthcare solutions remain dynamic, relevant, and effective in meeting the evolving needs of patients and healthcare providers. This collaborative approach ensures that the solutions will be incorporated into the current product, delivering an enhanced user experience.



## 3.4 Delivery and Discussion

### High-fidelity

Based on user feedback, the mid-fidelity prototype was tailored to create a high-fidelity prototype. The high-fidelity prototype includes all features integrated and connected to enable users to access them seamlessly. Figma web application was used as the tool for creating the high-fidelity prototype.

### User test High-fidelity

The High-fidelity prototype was afterwards also evaluated, this time by employees of Helseplattformen. Whom have contact with users or those that have a good grasp on what HelsaMi and Helseplattformen is now. It is subsequently also test by expected users. This time only two users responded, one district manager (male, 45-50) of the Norwegian Cancer Society, and a student under the age of 30. The same questions were asked as with the mid-fidelity prototype, only there was more flow between the features. They were again encouraged to think aloud during the user tests. The app should accommodate different user communities with diverse needs and levels of expertise, which is why people from different generations and different insights were interviewed for the user tests.

Elmansy (2021) highlights the importance of the “Deliver” and “Discussion” phases in refining ideas for a final product.

In the “Deliver” phase, we place significant emphasis on incorporating feedback from Helseplattformen and anticipated end-users to formulate conclusive recommendations. These recommendations serve as the final product, providing Helseplattformen with valuable insights for redesigning HelsaMi. The recommendations serve as a guide for further improvements and enhancements to ensure the successful implementation of the redesigned platform.

In the “Discussion” phase, the research question undergoes a thorough review. This review primarily examines whether the features adequately address the research question and assesses how the design facilitates patient empowerment and enhances the universal design of the application. Additionally, future areas of focus are identified, and a reflective analysis of the progress achieved in the preceding months is conducted.

## 3.5 Limitations

In any healthcare project, it is inevitable to encounter limitations that test skills, adaptability, and perseverance. The specific limitations include working with Helseplattformen, collaborating with GPs, and working with a company not based in Gjøvik. Through these challenges, I learned valuable lessons about resilience, problem-solving, and effective collaboration.

One of the limitations was the task of working with Helseplattformen, a system that has been negatively portrayed in the media. Due to its many recent failures when they brought both Helseplattformen and HelsaMi on the market. It was especially hard receiving designs of their current application. I only received the desktop website and not the mobile application. Since this report is focused on the mobile application, this was especially hard. The focus is laid on the mobile application since users interact more with their phones nowadays than with a desktop website. The only way I could thus move forward was to use the application from Epic Systems that is used in the Netherlands at Radboud UMC, an application that I do have access to as a Dutch citizen. This application from Radboud UMC differs from HelsaMi a little bit. Nevertheless, I acknowledged that I could still contribute by attentively listening to the users and exploring the resources available to me. By doing so, I could offer a practical and effective solution tailored for phones and tablets, ensuring that the needs of the users were met.

The goal before I started writing was to work with GPs. However, working with GPs presented unique limitations due to the availability of GPs, they are hard-working people that barely have time to see patients, due to their demanding jobs. Therefore, the focus of this master's thesis after the first survey was shifted to focus more on the patients, potential users, representatives of patients and caregivers, and how they interact with GPs. This was at the same time more in line with the goal for Helseplattformen. Even just focussing on the experiences of health workers and people that needed health workers, health personnel and other potential users. Even though the focus was shifted to the patients, the contact with user committees still went on laboriously. A lot of invitations for both interviews and for the survey were sent out, nevertheless, only a few responded. The ones who responded did have valuable information.

But still, operating within the health sector brings about its own set of limitations, such as stringent regulations, privacy concerns, and ethical considerations. To navigate these limitations, the surveys and interviews that were asked did not go into any health impairments of the participants. In addition, I obtained approval from Sikt to conduct the research. This collaboration with Sikt allowed for the necessary permissions and support to carry out the study effectively and ethically. The approval from Sikt ensured that the research followed the required protocols and adhered to the necessary guidelines for data collection and analysis. This collaboration enhanced

the credibility and validity of the study, providing a solid foundation for the research findings and conclusions.

Besides, collaborating with a company located outside Gjøvik presented challenges related to communication, coordination, and cultural differences. To overcome these limitations, I used Teams, E-mail and Figma to effectively communicate and present ideas with people that are located in Trondheim. By developing strong lines of communication I successfully navigated the challenges posed by working with a company and users not based in Gjøvik.

Afterall, limitations are a natural part of any project, and they can either hinder or enhance our work. As I navigated through the various limitations, I learned to be patient, cautious, and resourceful. By recognising my limitations and adapting to them, I was able to deliver a valuable contribution to the project and enhance my skills and knowledge.

## 3.6 Ethical Considerations

When conducting research involving human participants, it is crucial to consider ethical considerations, especially when vulnerable users, such as people that regularly go to the doctor's office, are involved. In this project, participants were fully informed about the research and how their data would be handled confidentially. They were also treated anonymously and had the option to withdraw from the study at any time without consequence. To ensure that the data was handled ethically, the project was assessed by Sikt - Norwegian Agency for Shared Services in Education and Research. All data collected were anonymised before being presented to outside stakeholders and were deleted completely when the thesis was delivered. No one is called by name only by what identified them by gender, job description or relevance to the project. For all methods, the participants were contacted in advance to describe the activities and the expected duration.

When collecting qualitative data, it is preferable to record and transcribe interviews to ensure data accuracy. However, approval from Sikt was obtained before doing so, and a consent form was created in line with Sikt's specifications. The form was for users whose names and other personal data were not relevant to the study and therefore not recorded. Participants were also offered the opportunity to review the transcripts after the interviews to enhance reliability. Transparency was crucial in creating trust between the interviewer and the interviewees. The consent form can be found in Appendix A.



## 4.1 Previous Study of Users of eHealth Services in Norway

Studies deal with eHealth services in Norway, particularly a study by Zanaboni et al. (2020). They surveyed 1037 people that had used HelseNorge at least once. The study revealed that demographic characteristics, attitudes, and the need for health services played crucial roles in predicting the use of Electronic Health Records (EHRs). Patients with moderate or poor health and multiple chronic conditions were found to be more likely to access their records online, which aligns with findings from other studies (Mold et al., 2015; Greenberg et al., 2017). However, older patients and those with lower computer literacy may face barriers to using digital services (Mold et al., 2015). Moreover, the study found that women and individuals with a healthcare professional background were more inclined to use the service, consistent with findings from other eHealth studies. These findings indicate potential opportunities for improving access and utilization of EHRs, particularly for elderly individuals and other patient groups who may be less likely to engage with digital services (Kim et al., 2009; Wang et al., 2013; Mold et al., 2015; Moll et al., 2018; Walker et al., 2019).

Regarding service utilization, Zanaboni et al. (2020) found that approximately 29% of respondents accessed their EHRs online regularly, while another 29% used the service on an as-needed basis. Most users had up to 50 documents available online and utilised the service for health information retrieval, treatment monitoring, and appointment preparation. More than half of the respondents discovered the service while exploring other sections of the national portal, while the remaining users became acquainted with it through other sources. A small percentage of users (15.3%) had contacted the service support. Service utilization was associated with patient characteristics such as health region, age, gender, healthcare professional background, self-reported health, recent doctor visits, and the number of available documents online.

In terms of user experiences, Zanaboni et al. (2020) found that the majority of patients found it easy to access the service and expressed a desire for more available documents. Users reported several clinical advantages, including a better understanding of their health condition, improved control over their health status, enhanced preparation for future hospital visits or admissions, and increased empowerment. Technical difficulties were experienced by only a few users, and concerns regarding information security were also minimal.

Qualitative feedback provided additional insights, with Zanaboni et al. (2020) receiving a total of 268 comments, predominantly positive, about why users would be willing to use the service again. The perceived value of the service was the main reason cited by patients. They appreciated the convenience of accessing their EHRs from the comfort of their homes, where they could easily find all their digital documents and review them in a peaceful environment. Users also valued the ability to read all the information that healthcare personnel documented after their visits, which increased their confidence in understanding the information, identifying errors or misunderstandings, and better

## 4.2 Insights from Survey

preparing for future appointments. Some respondents provided feedback of a more general nature, offering criticism or additional information about their health status.

When Zanaboni et al. (2020) asked about recommending the service to others, 208 respondents provided reasons, with the majority expressing positive sentiments. Users highlighted the need for others to understand their health status and treatment as a key motivator for recommendation. Some users also emphasised that the service could be particularly beneficial for older or medically vulnerable family members who may struggle to manage their health information. However, a small number of users expressed mixed feelings, suggesting that the service may not be suitable for everyone depending on age, computer literacy, or health condition. Users with a healthcare professional background raised concerns about the potential negative impact of open access to health records, particularly for psychiatric patients who may feel unheard or mistrustful of healthcare providers.

In response to the question about any additional comments regarding the service, Zanaboni et al. (2020) received 129 comments. The majority of users shared positive experiences with online access to their EHRs. They highlighted the benefits of increased accessibility, improved patient engagement, and a better understanding of their health condition. However, privacy and security concerns were raised, particularly for specific patient groups such as those with psychiatric conditions. Some users also reported experiencing technical difficulties while using the service and provided suggestions for improvement, including adding new features and enhancing the user interface. The open-ended questions revealed various themes related to document availability, health status information, and technical issues.

Overall, the study by Zanaboni et al. (2020) suggests significant potential for online access to EHRs to enhance the patient experience. However, it also emphasises the importance of addressing concerns related to safety, security, and accessibility to ensure that the service is beneficial and inclusive for all users.

The 29 respondents answered questions about their background, their use of the GP office and how it can be improved. This survey was about the general use of health applications and the communication with GPs, thus not about Helseplattformen. The survey was held in the municipality of Gjøvik, where Helseplattformen is not available. The participants were any age above 18, 24 under 35 and 5 above 35. The difference between the answers between the ages was not that much, however, those under 25 were more likely to use health applications. Nor did gender make a difference, with 20 females and 9 males. Of these 29 participants, 38% use an application to check their health. Most are under 35, and one is above, they use Apple Health, Samsung Health or other health-tracking apps with watches or FitBits. Furthermore, of the 29 participants 59% use HelseNorge. Of the participants, 41% went to the GP in the last half year.

The majority of participants (52%) reported booking their appointments online, while a small percentage indicated booking in person (3%) or by phone (41%). One participant mentioned that the question did not apply to them as it had been more than four years since their last appointment. Interestingly, among the 12 participants who had previously booked appointments by phone, most expressed a preference for online booking when it came to scheduling appointments with general practitioners.

*"I don't really track my health with any of these apps, and I don't have my phone on me at all times. Therefore I believe the data might not be 100% correct."*

- Participant, <25 years old

*"If I am in a situation where I have my GP in front of me, I see no reason as to why I would use an external tool to convey my symptoms when I can talk to them and have them make an unbiased evaluation of my situation."*

- Participant, <25 years old

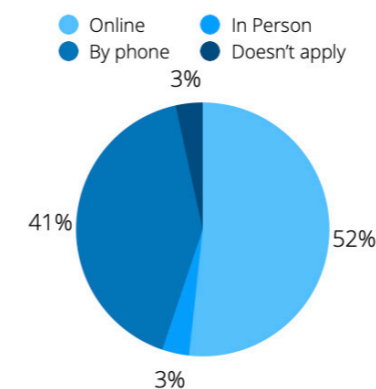


Figure 4.1: How do you normally book your appointments to see a GP?

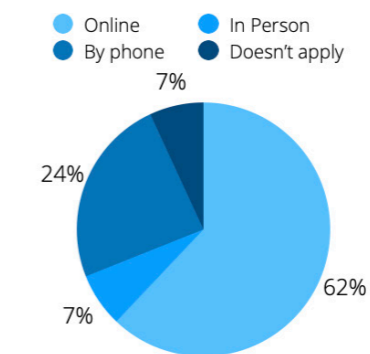


Figure 4.2: Which of the following methods would you prefer to use book appointments at your GP?

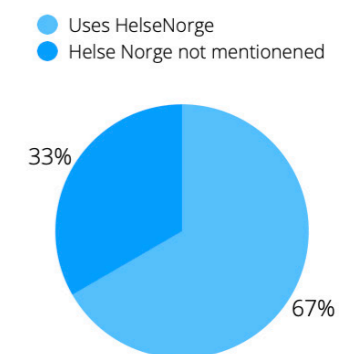


Figure 4.3: Is HelseNorge used or mentioned?

The reasons for not using mobile devices for patient-related work vary, including three participants worried about privacy, two participants worried about too much obsessing over their own health. Three other participants found they could either not find one to satisfaction to them or no knowledge that they exist. Only two participants of the whole survey used mobile devices for patient-related work. In the survey, the most common barriers to getting health apps were lack of knowledge of effective apps (20%), lack of access to mobile devices (23%), lack of interest (22%), and lack of understanding of benefits (19%). Additionally, 16% of participants reported a lack of a trustworthy source to access effective apps.

*"When I'm with the doctor, I don't need the app, I would communicate verbally."*  
 -Participant, 45-54 years old.

When asked about what would encourage them to use health apps more, the participants provided a variety of responses. Seven participants expressed a desire for user-friendly apps that offer reliable data. Additionally, five participants explicitly mentioned their reluctance to pay for open-source options or the need for additional hardware. Another group of five participants expressed a need for more information regarding the benefits and necessity of using health apps. Four participants stated that they would only consider using a health app if their GP recommended it. Two participants who were already using health apps did not provide a specific reason. On the other hand, two participants explicitly stated their refusal to use health apps under any circumstances. One participant expressed a desire to directly transmit data from the app to their GP. Lastly, the remaining three participants expressed uncertainty regarding what factors would motivate them to use health apps.

*"I think doctors should encourage their patients to use them, and for doctors to have more knowledge of it. I think if I were to present health app data to my doctor they wouldn't have enough knowledge of it or know what to do with it."*  
 - Participant, <25 years old

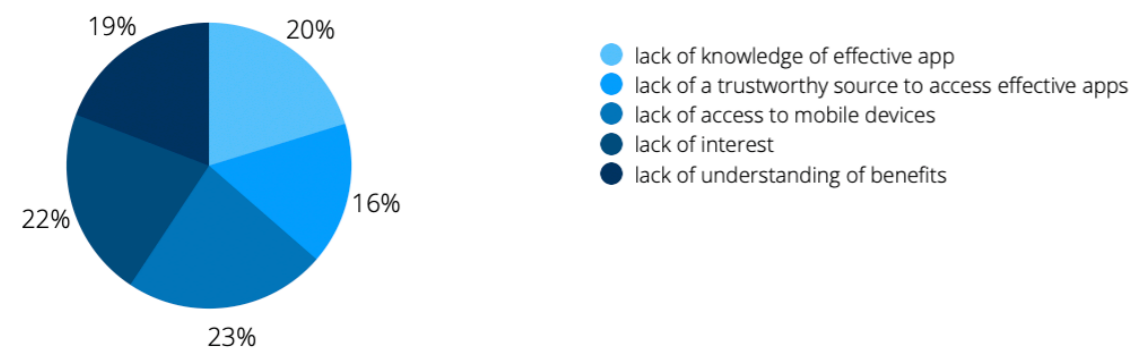


Figure 4.4: Why are these prospective users not using health applications now?

Over 30% of the participants thought it is not very easy to not at all easy to get in contact with their GP, 34% thought it was fairly easy 10% had not tried and 24% of the participants did not fill it in. Furthermore, 31% of the participants reported experiencing a delay of a few days before receiving a response from their GP.

In response to the question of whether there is anything they would like that would greatly facilitate and ease communication between them and the GP, 16 respondents want a messaging platform or chat tool to communicate directly with their GPs from their phones without a queue. Or at least an easy way to communicate lifestyle diaries to their GP to help the GP see issues in their lifestyles. An overall easier way to track your symptoms from the start. One of which wanted also a simpler way to schedule appointments as asked by 12 participants. They preferred a platform with fewer details and more graphics for online communication alternatives. Graphics can also help in communicating where symptoms lie.

*"Your overall health, and also a way to track your symptoms and how you feel. If one day your heart rate and HRV indicate that your health is poor, your doctor may be able to determine what's wrong if it's connected to the symptoms you're having."*  
 - Participant, <25 years old

*"If I had to convey my health issue via an app instead of in person, I would expect to be able to choose what area is problematic in more detail after first choosing a body part shown in the picture."*  
 - Participant, 25-34 years old

The image in Figure 4.5 was also included in the survey. 19 of the participants would find it helpful to have such a silhouette in the app. The function of the picture was said to appear to be a tool to help users identify and describe their health issues related to different body parts. It allows users to select a body part and then specify the location of their symptoms or pain. Users can use this information to communicate with their healthcare providers or find information on how to handle their symptoms. The tool, as said by the same 19 participants, may provide additional guidance and information on the body.

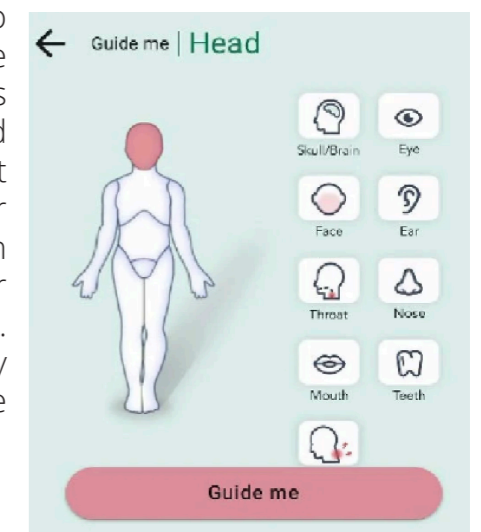


Figure 4.5: Silhouette

## 4.3 Second meeting with Helseplattformen

A second meeting followed with more members of Helseplattformen. Including, a person responsible for the GP product and electronic medical record solution, like the interface and system used by GPs. During this meeting, the topic of health literacy was discussed, highlighting the significance of empowering users throughout their clinical journey. By giving users greater control over their journey, GPs could potentially reduce their responsibilities. This approach entails offering patients predictability regarding their upcoming follow-ups while simultaneously improving the quality of care provided. Proposed enhancements for HelseMi include the introduction of a time line that displays information about appointments, activities, reminders for necessary actions, and even waiting times at the GP's office. However, any improvements made to the app should be advantageous for both patients and doctors, with clear and intuitive visuals.

## 4.4 Revised Research Question

The preliminary research question :

**“How can the existing HelseMi app in Health Region Central Norway be improved, specifically regarding the user interface design, to enhance communication between general practitioners (GPs) and their patients?”**

As written in the background study, the use of smartphones and digital platforms has transformed the healthcare industry. It can provide accessible and efficient healthcare services, particularly in remote areas. The adoption of digital services in the health sector in Norway has brought many benefits to its citizens, with platforms like Helseplattformen and their application HelseMi which provide real-time health information and personalised follow-ups. However, these platforms still have room for improvement in terms of user-friendliness.

In a previous study, the majority of patients found it easy to access an eHealth service and they reported clinical advantages, including a better understanding of their health condition, easier control of their health status, better preparation for future hospital visits or admissions, and increased empowerment. Same for the survey where most participants used health-tracking apps, and/or HelseNorge actively. In the survey, the majority preferred booking appointments online. Participants suggested that better and more user-friendly apps, reliable data, and open-source platforms, among other things, could encourage the use of health apps. Additionally, participants expressed a desire for a messaging platform or chat tool to communicate directly with their GPs, as well as an easier way to schedule appointments and share lifestyle diaries. The survey findings highlight the importance of addressing these concerns, providing better alternatives to improve GP services, and encouraging the use of health apps among patients. However, in both studies, a found concern was around privacy, security, and accuracy of data collected through health apps.

To address these issues, the thesis question was revised to scale up the HelseMi platform by prioritising the patient's role as an active participant in their clinical journey, resulting in advantages for both the patient and GP. This question also provides a more tailored follow-up based on previous conversations with Helseplattformen.

The revised research question for this thesis is:

**“How can the HelseMi app, currently used in the Health Region Central Norway, be enhanced to prioritise the patient's role as an active participant in their clinical journey, resulting in advantages for both the patient and GPs?”**

This research question also encompasses that the new features should improve the health literacy of patients. Thus the design should be presenting information in a user-friendly manner, taking into account different health literacy levels and avoiding jargon. It also should empower one's health, and provide accessible and actionable



## 4.5 Insights from Further Interviews and Survey

information about health conditions. Additionally, the features should be tailored to the user's needs and illness/patient group characteristics. Plus preferably, should be able to be accessible across different devices and platforms, ensuring that digital health services are accessible across different devices and platforms to reach a wide range of users.

This research used various methods, including surveys, interviews and user tests to collect data from different stakeholders, such as patients, care takers, healthcare providers, and other people with different expertises in the health world. The findings of this research are now being used to design parts of the HelsaMi app specifically for Central Norway. It is important to establish standards for accessibility, privacy, accuracy, and ethical obligations to ensure the safety and confidentiality of patient data when developing mobile health apps, such as e-prescription, which offer potential benefits for healthcare, including improved patient safety and increased efficiency for healthcare professionals. However, privacy concerns and ethical obligations must be addressed to fully realise the potential benefits of these apps.

In this round of interviews and surveys, three participants have been interviewed and one survey has been filled out by three participants. The purpose of these interactions was to gather qualitative insights from real users on their needs for an application that facilitates communication with their doctors and GPs. Two participants are caregivers to someone in their close family and thus answered to make their relatives and their lives easier when communicating with the doctor or GP. The other interviewee was the district manager (male, 45-50) of the Norwegian Cancer Society. The participants that filled in the survey were filling it out for themselves. Five out of the six were women, and of those women, two were over 65, two were under the age of 35 and one was between 35 and 44.

The six participants expressed their views on the features they would like to see in an application that can help patients communicate with their doctors and monitor their health progress. They want an application that prioritises the patient's role as an active participant in their clinical journey. As said it should focus on improving communication between patients and healthcare professionals, it also needs to address language barriers and enhance understanding of medical terminology. Since patients and such do not speak in medical terms. The participants stressed the need for two-way communication and transparency

The interviewees stated that they wanted their health information, such as test results and prescription instructions, to be documented in a clear and easily accessible manner. The following can help by being added:

- Medication reminders;
  - The application should provide information on test results, medication changes, and treatment plans in-between visits;
  - Include a medication reminder feature that is easily accessible on the application's home screen.
  - The application should have an easy-to-read medical list of patient's medications, which has to be up-to-date.
  - The respondent would like to receive further treatment plans and drug use information
- Actions the patient can take in-between appointments;
  - The application should provide reminders for exercises or tests that patients need to do in-between visits.
  - Provide patients with the necessary information and support to prepare for doctor's visits and manage their health effectively between visits. As such it should also be if the patient is unable to have the app, the caregiver must get information about the after-care of the disease in an application. Information should be on which training is important, the use of a physiotherapist, and what food is important between visits from their GP.

The interviewees mentioned that it's important to make it easy for patients to track their symptoms and record them in a consistent way over time, to identify patterns and trends. The application should have a symptom-tracking function for mapping symptoms during and after treatment.

- Simple and binary symptom tracking:
  - Graphic presentation by using visual aids such as pain assessment scales can help children and adults better understand and communicate their symptoms.
  - Add a function for forms for patients to fill out, which can help identify their illnesses.
  - Add a feature for patients to take pictures of any symptoms, like a rash, and share them with their doctor.
  - Add a picture of a silhouette to learn more about body parts, certain illnesses and health-related stuff.

All participants, both from the interview and the survey, were also really interested in a messaging platform. A feature to immediately talk with the doctors should allow patients to send messages to their doctors between visits, to address concerns or ask questions. It needs to provide a way for patients to interact with their doctors, ask questions and receive advice. Another finding from the interviews and surveys is that the participants wanted a time line, for both history and the future. This feature should allow patients to track their medical history and progress over time. This can be very helpful for both patients and healthcare providers in identifying trends and making informed decisions. And a time line that looks into the future can help the caregivers and patients look what they are in for. The history part can include a diary where patients can record their symptoms and their severity. For example, this can be a calendar, which following the participants should also include appointment reminders, with clear information about appointments. The application should for all appointments provide clear information about the purpose of appointments and procedures to manage expectations and help patients prepare for them. The application should also have a feature to schedule appointments and waiting times at the doctor's office. However, individuals do not want to get bad news via an application or website, as the district manager of the Norwegian Cancer Society, mentioned, this information needs to come from the doctor personally.

It is also important for the interviewees that users can personalise their settings and reminders can make the application more user-friendly and increase adherence to medication and treatment plans. Users should also when wanted, in the beginning, get demonstrations or tutorials to help them learn how to use the application. The application should be user-friendly and easy to use for patients who may not be familiar with the technology. It must be ensured that the application is easy to navigate, intuitive and easy to use, even for those with limited functional ability.

One of the interviewees suggests that the app should provide information about different services, local activities, treatment centres, and rehabilitation centres that patients can use to help themselves in their health treatment. The application should at all times provide clear and structured information on different resources available for patients to help themselves.

In conclusion, the guidelines for redesigning such an application encompass several key features. These include implementing simple and binary symptom tracking, utilizing graphic presentations, incorporating appointment and medication reminders, enabling two-way communication with doctors, and ensuring the privacy and safety of user data. Moreover, it is crucial to prioritise user-friendliness, accessibility, and personalization to cater to the specific needs and preferences of the target audience. By following these guidelines, an application can be created that effectively meets the requirements of its users.

## 5.1 MoSCoW Method for Requirement Prioritisation

Based on the users' information and health literacy analyses, each requirement was evaluated using the MoSCoW method to prioritise which features must, should, could and won't be included in the design.

### **Must:**

The requirements that must be included in the final design are the features that are relevant to interaction design, can support those with poor health literacy and are features the target users require. These points also help in prioritising the patient's role as an active participant in their clinical journey by providing knowledge and skills to approach the healthcare system (Gaglio, 2012; Norgaard, 2015). These points must be feasible for all stakeholders and can help with the communication between a GP and a patient.

### *Design opportunities*

- Provide a universal means of use for all older adults to avoid specialised design (Kascak et al., 2014).
- Clear and structured information on different resources available for patients to help themselves
  - Ensure consistency across platforms and devices in terms of design elements and language (Kascak et al., 2014).
  - Minimise short-term memory load by avoiding excessive memorisation during task performance (Kascak et al., 2014).
  - Design UIs with minimal attention requirements, considering distractions in the mobile environment for older adults (Kascak et al., 2014).
  - It should be available on both desktops, tablets and phones (Norgaard, 2015).
- User-friendly and accessible interface: The application should be easy to navigate, intuitive, and user-friendly, even for patients who may not be familiar with technology or have limited functional ability. As is also mentioned by Chan (2011) and Gilstad (2014)
  - Ensure intuitive interfaces and interactions for easy use and efficient task completion (Kascak et al., 2014; Sutcliffe et al., 2010).
  - Design the system to accommodate different user communities with diverse needs and levels of expertise (Kascak et al., 2014; Sutcliffe et al. 2010).
  - Consider aesthetics and fun in the design for enjoyment (Kascak et al., 2014).
  - Use familiar round-shaped touch buttons for ease of use (Kascak et al., 2014).
  - Design for top-down interaction to reduce distraction and potential information overload (Kascak et al., 2014).
  - Visualise data with tables and figures to aid comprehension. (Chan, 2011; Gilstad, 2014)

### Features

- Medication reminders: The application should provide reminders for medication changes and treatment plans, and have an easily accessible medication reminder feature on the home screen.
  - Medication reminders
  - Easy-to-read medical list of medications
- Two-way communication with healthcare professionals: The application should allow patients to send messages to their doctors in between visits to address concerns or ask questions.
  - The messaging platform for patients to communicate with doctors in-between visits
- Symptom tracking: The application should have a symptom-tracking function for mapping symptoms during and after treatment, with a simple and binary symptom-tracking feature.
  - Symptom-tracking function for mapping symptoms during and after treatment
  - Provide clear and structured information on different resources available for patients to help themselves.
- Time line feature for tracking medical history and progress over time, including appointment reminders and clear information about appointments
  - Appointment reminders and scheduling: The application should include appointment reminders and allow patients to schedule appointments and manage waiting times at the doctor's office.
  - Information on test results, medication changes, and treatment plans in-between visits
  - Actions patients can take in-between appointments, such as reminders for exercises or tests
- Provide appropriate information displays with an overview and drill-down details for large data quantities (Sutcliffe et al., 2010).

### Should:

The requirements that the final design should abide by are the features that are important guides but are not vital. These guidelines, however, would add significant value to the product.

### Design opportunities

- Design with consideration for limited and split attention in older adults who may need to focus on multiple tasks simultaneously (Kascak et al., 2014).
- Provide a multi-layer interface that allows users to start with a limited set of features and progress to higher layers as needed, with short cuts for frequent users (Kascak et al., 2014).
- Use a layered architecture in the system design to accommodate different requirements from diverse user communities and avoid duplication of software processes (Sutcliffe et al., 2010).

- Design the interface to provide a sense of accomplishment, completion, and indicators for the next group of actions (Kascak et al., 2014).

### Features

- The user needs a summary to take away after the doctor's visit (Gaglio, 2012)
- The participant needs a tailored eHealth solution that can be personalised to their needs and illness/patient group characteristics (Norgaard, 2015). Personalisation settings and reminders for increased user-friendliness and adherence to medication and treatment plans
- Function for patients to fill out forms to help identify their illnesses
- Feature for patients to take pictures of symptoms and share them with their doctors
- Feature for patients to learn more about body parts, certain illnesses, and health-related information through pictures or silhouettes
- Feature for scheduling appointments and waiting times at the doctor's office

### Could:

The requirements that the final design could abide by are the features that are nice to have but would have a small impact if left out. These are also guidelines that cannot be immediately implemented.

### Design opportunities

- Allow for variations in older adults' preferences, skill levels, and usage patterns. (Kascak et al., 2014).
- Provide system feedback for every operator action, such as a beep or error message for invalid input values. Feedback should be informative, substantial, and understandable (Kascak et al., 2014).

### Features

- Information about different services, local activities, treatment centres, and rehabilitation centres for patients to use in their health treatment
- Motivate the users to engage with digital services by offering incentives for using the system. (Norgaard, 2015)
- The user needs access to an eHealth solution that integrates with public services. (Jordan, 2010; Norgaard, 2015).
- Provide information about different services, local activities, treatment centres, and rehabilitation centres that patients can use to help themselves in their health treatment

### Won't:

The requirements that the final design won't abide by are the features that are not a priority for this specific time, but the design should have later. These are also guidelines that cannot be immediately implemented by the designer.

### Design opportunities

- Ensure fast and secure data saving for easy resumption without a loss (Kascak et al., 2014).
- Allow for personalisation options, including customisation and pre-set configurations of displays, and design for content transformation (Kascak et al., 2014; Sutcliffe et al., 2010).
- Consider preference for touch button locations for left- or right-handed users (Kascak et al., 2014).
- Enhance contrast for essential information against the background for improved visual, auditory, and cognitive perception (Kascak et al., 2014).
- Use a minimum font size of 14 to enhance readability (Kascak et al., 2014).
- Incorporate hands-free, eyes-free interactions, and provide sound and tactile outputs in addition to visual displays (Kascak et al., 2014).
- Consider speech input and output as a viable alternative for older adults with dexterity issues, arthritis, and visual impairments (Kascak et al., 2014).

### Features

- Delivering bad news, which should come from the doctor personally
- The user requires training programs to feel confident and trust the eHealth solution, preferably with promoters in the user group (Gilstad, 2014). Demonstrations or tutorials for users who are unfamiliar with the technology
- Health-related concepts must be explained in simple terms that are easy to understand (Chan, 2011; Gilstad, 2014)
- The health information must be verified that it comes from a trustworthy source, such as a health provider or other medical professionals (Jordan, 2010; Gaglio, 2012; Gilstad, 2014; Diviani, 2015; Oedekoven, 2019).
- Privacy and safety of user data

These design opportunities and features aim to create usable and easy-to-use interfaces for mobile health applications, improve the overall user experience, and improve communication between patients and GPs.



## 5.2 Persona & User Journey

Using the interviews and the survey as a guide, two personas were developed, which incorporated the MoSCoW points wherever possible.

### Anne Lillevik - Patient

The patient persona, Anne Lillevik, may not be representative of all the patients a GP sees, but the design needs to be universal, and inclusive of all as said in Chapter 2. This persona is chosen, because of its (dis-)abilities as an older person. As is shown by the surveys and interviews most people go very few times to the doctor's office only when they have serious symptoms of pain. This patient, Anne Lillevik, has had breast cancer but is now declared fully clean. She now uses HelseNorge to check up on her health records but calls to make appointments. She uses the hospital's health platform and application to access patient notes from doctors directly in real time. She also takes other medication for her heart and cholesterol.

Anne has had a mix of positive and negative experiences with health apps during her journey. For example, she found that there were too many steps to follow, **too few illustrations, or long texts**, which made it difficult for her to understand and use the app. Additionally, she struggled to understand the purpose of using a health app and the medical terminology used by her doctor. However, she found the **reminders for exercises and tests** helpful in managing her health between visits. The app's after-care feature would help her communicate more effectively with her GP, **receive medication reminders**, and keep track of her health goals. The inclusion of a silhouette picture to learn more about the human body and health-related topics would also be beneficial. Moreover, she expressed a desire to continue living independently and going on walks with her family and friends. Overall, the individual hopes to feel better after each visit to the GP and manage her health effectively with the aid of a user-friendly health app.

### Anne Lillevik- Patient



**Age:** 76  
**Gender:** Female  
**Work:** Pensioner  
**Place of living:** Trondheim  
**Languages:** Norwegian, English  
**Status:** Widow  
**Children:** Two  
**Grandchildren:** Four

#### Bio

Anne is retired but still lives on her own. She goes to once a year to the GP. She has had breast cancer, but is declared clean. She uses HelseNorge to check up on her health records, but calls for appointments. She uses the hospital's health platform and application to access patient notes from doctors directly in real time. She also takes other medication for her heart and cholesterol.

#### Scenario

Anne has for a month now pain in her knee. Her knee is stiff and especially when she has to stand up it hurts. She is an older so she does not often use applications, but would use them if they are easy to navigate and easy to use, even for those with limited functional ability.

#### Frustrations

- Too many steps, too few illustrations and too long texts
- Don't know what the benefit is of getting a health app
- Doesn't understand the terminology that the doctor uses

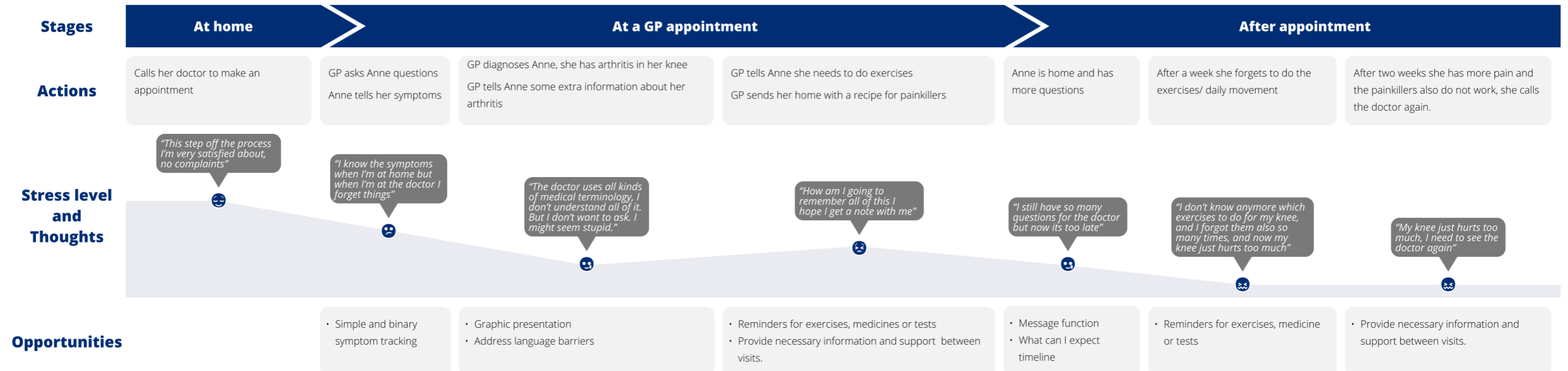
#### Needs

- Reminders for exercises or tests that patients need to do in-between visits
- Aftercare of the disease in an application that helps them better communicate with their GP.
- Support to prepare for doctor's visits and manage their health effectively between visits
- A picture of a silhouette to learn more about body parts and health-related stuff
- Medication reminders I do not forget my medication.

#### Goals

- Would like to live alone as long as possible
- Would like to still go on walks with her family and friends
- Would like to feel better again after a visit to the GP

*"Doctors do not provide enough information and I do not understand all those medical terms"*



## Madelen Jensen- Caregiver

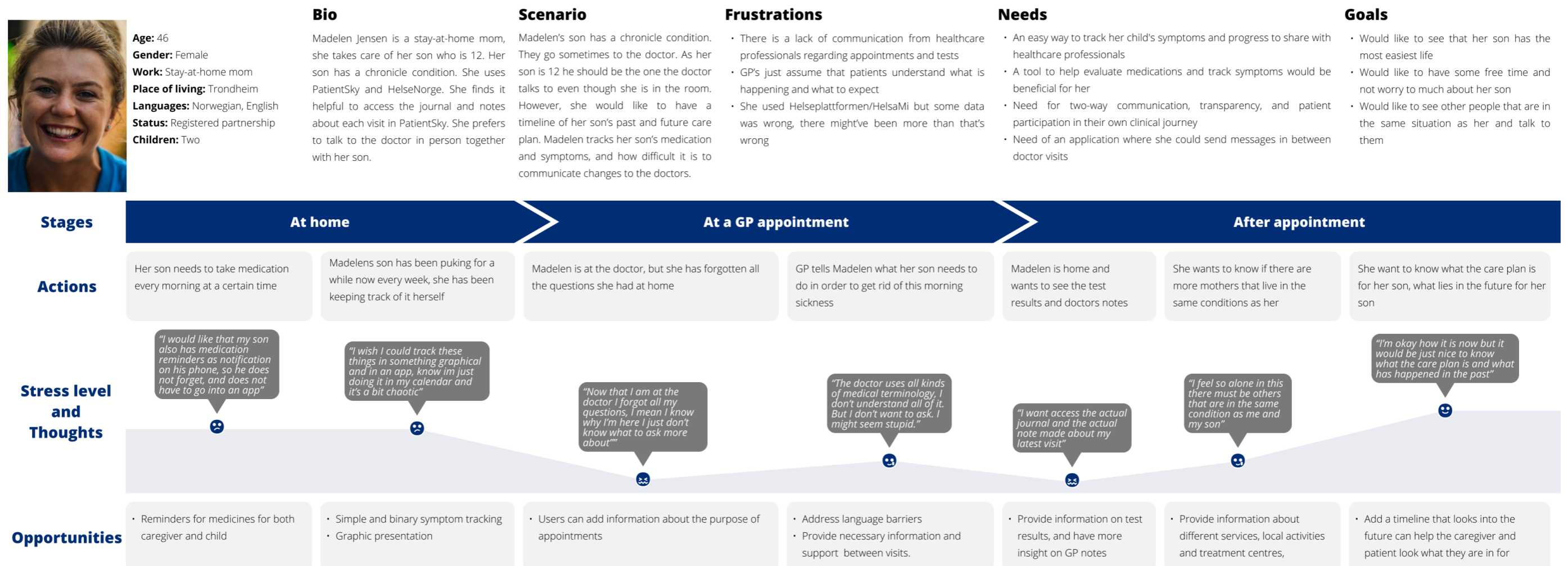
The caregiver, Madelen Jensen, is loosely based on Løvemammaene, a group of parents of chronically ill children in Norway. However, a caregiver could also be a daughter or partner of an ill elderly. These people go more often to the doctors and want to have a good overview of the health records of their next of kin. Madelen Jensen is a stay-at-home mom, she takes care of her son who is 12. Her son has a chronicle condition.

The lack of communication from healthcare professionals has been a challenge for Madelen, with GPs often assuming that she and her son understand what is happening and what to expect. While using Helseplattformen/HelsaMi, the individual encountered some incorrect data, indicating a need for better accuracy in healthcare records. To address her needs, Madelen requires an **easy-to-use tool to track her child's symptoms and progress and share them with healthcare**

**professionals.** Additionally, a tool to evaluate medications and track symptoms would be beneficial for her and her son. She also emphasises the importance of **two-way communication, transparency, and patient participation in their clinical journey.** Therefore, an application where she could send messages in between doctor visits would be valuable. Her goals include ensuring her son has the easiest life possible, reducing her worries and stress, and connecting with other individuals who are in similar situations as theirs.

## Madelen Jensen- Caregiver

*"I would like to get actual patient notes from the doctors directly in true time"*



## 5.3 How Might We-Questions

From the analysis of Personas, User Journeys, and the MoSCoW analysis, it was determined that several key features should be incorporated into the new design. These features can be categorised into four main areas, each addressing specific needs and requirements of the users.

The first feature is the implementation of push notifications and reminders. By enabling push notifications, users can receive real-time alerts and stay engaged with the platform, enhancing their overall experience.

The second feature focuses on enhancing communication between users and the general practitioner (GP) through messaging capabilities. By integrating a messaging system within the design, users will have a convenient channel to communicate directly with their healthcare provider.

The third feature entails the inclusion of a symptom tracking functionality. This feature enables users to monitor and track their symptoms over time, providing them with valuable insights into their health conditions.

Lastly, the fourth feature involves the incorporation of a comprehensive treatment plan. This feature aims to provide users with a centralised location to access and manage their personalised treatment plans.

By incorporating these four features into the new design, the platform will offer users a more comprehensive and user-friendly experience.

To conclude this chapter, some “How Might We” questions were formulated. These questions served as a guide throughout the rest of the design process, helping to create the final product. There are four main features to be created:

### Feature 1: Push notifications and reminders

- How might we create an after-care feature in the health app that enables effective communication with the GP, medication reminders, and tracking of health goals for patients?

### Feature 2: Messaging with the GP

- How might we improve communication between healthcare professionals and patients/caregivers to increase transparency, and patient participation, and reduce stress and worries?
- How might we improve messaging with GPs to allow patients to easily send messages and photos to their doctor?

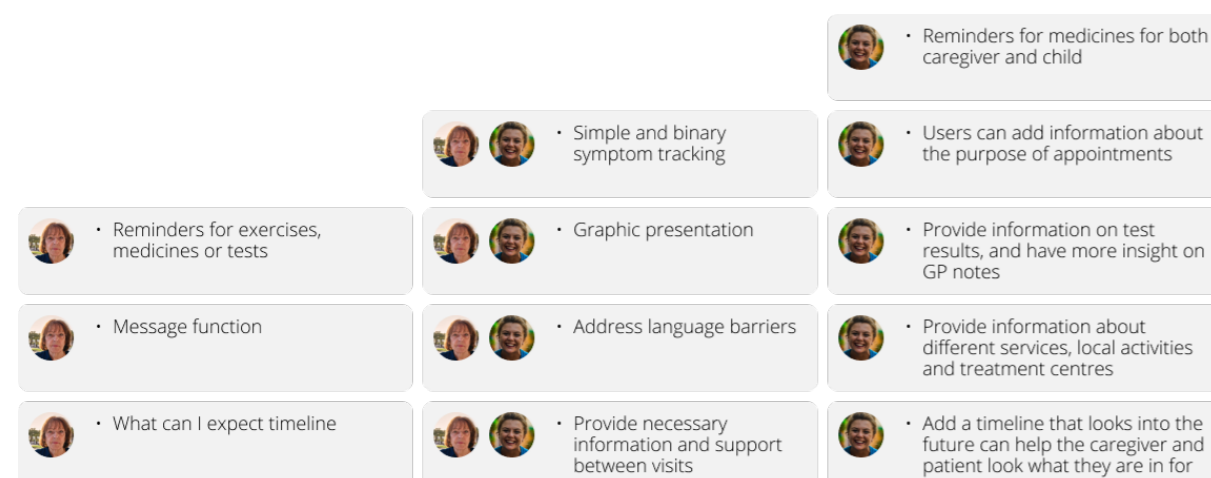
### Feature 3: Symptom tracking

- How might we design a symptom-tracking feature that allows patients to easily input and track symptoms over time, with a focus on timing, and provides the information to the doctor during consultations?

### Feature 4: Treatment plan

- How might we create a patient-friendly treatment overview and tracking feature that pulls information from online resources and educates patients based on their diagnoses?

By addressing these “How Might We” questions, the design process can progress effectively, leading to the creation of a comprehensive health app that fulfils the needs and expectations of its users.





## 6.1 Low-Fidelity

For each of the four features, rough sketches were made as first concepts to illustrate briefly how each feature might be used in the application. These designs are based on how the app now appears because Helseplattformen requested that the application's appearance be kept consistent with Epic's current design.

The application itself already has a feature for the next of kin so they can access the next of kin's HelsaMi. Where they just click on another person in the app, then as a parent you have full control over your child. If the patient is older than 16, they need to give consent for their next of kin to access their data.

### Feature 1: Push notifications and reminders

- Provide necessary information and support between visits
- Reminders for medicines for both caregiver and child
- Users can add information about the purpose of appointments

The first feature, push notifications and reminders is depicted in Figure 6.1 in the first sketch. This can help personas by reminding them what to do and when to do it. At the moment, the feature for tasks already exists but it is not prominent in the app. Also adding notes for the visit should help with effective communication between the patient and GP.

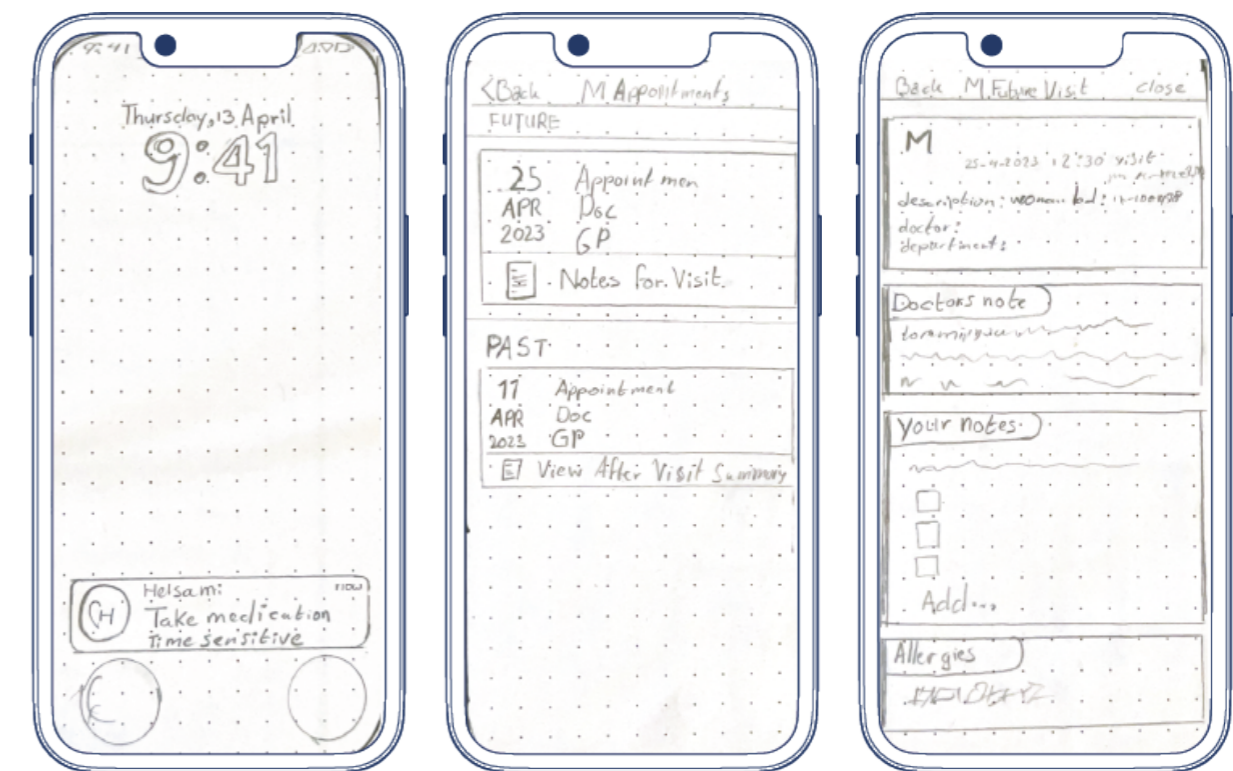


Figure 6.1: Push Notifications and Doctor's notes

The push notifications the user can immediately see in their notification centre on their lock screen. In the app, they can see these reminders under their menu. They can also add themselves tasks here and they can be added by their doctors. On the second sketch is the appointment tab where the user can see past and future appointments, if the user clicks on “notes for visit” The user can add notes themselves for the visit, this way the user can easily access the notes at the doctors visit and not forget all the things at the doctor’s office. Both functions would help them with their after-care and enable effective communication with the GP, medication reminders, and tracking of health goals for patients.

### Feature 2: Messaging with the GP



The second feature, messaging with the GP, is depicted in Figure 6.2. This can help personas if they have more questions when they are at home. It can help with non-emergency questions to the GP.

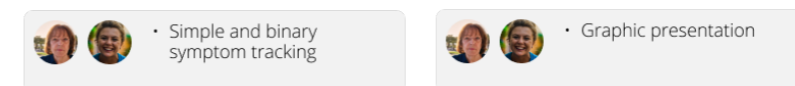
The message function is to direct message your GP, however on the suggestion of Helseplattformen there can only be one message sent since otherwise the GP gets too many messages, which is shown on the second sketch with an information frame. On this second sketch, the user also sees to whom they can send a message, when they click on that the user will go to the third sketch. The third sketch shows the user that they can add a subject, they can add their question and they can add a photo to add more context. This should help with improving communication between



Figure 6.2: Messaging with the GPs

healthcare professionals and patients/caregivers to increase transparency, and patient participation, and reduce stress and worries, by allowing patients to easily send messages and photos to their doctor.

### Feature 3: Symptom tracking



The third feature, simple and binary symptom tracking, is depicted in these three sketches. This feature should help both personas where they can add their symptoms or the ones of their next of kin. The feature should help patients who have complained of having trouble tracking symptoms over time and not necessarily remembering it when talking with their doctor.

The first image has two tabs, past and future. In past, you can see a calendar with the function to click on a date and add symptoms. When symptoms are added it is shown by a dot under the date, a date that is clicked will be encircled, and a fat date is “today”. If after the date where the symptoms happened is clicked, the user can click on the “+” to add symptoms, see the second sketch. This should allow patients to easily input



Figure 6.3: Symptom Tracking

## 6.2 Mid-Fidelity

### 6.2.1 Prototype explained

After a meeting with Helseplattformen, it was decided to make the prototype in higher fidelity. During the process of prototyping the new application, it is essential to ensure that the design elements used in the prototype are consistent with the overall look and feel of the current product. This includes the use of appropriate fonts, colours, and other design elements. By matching the design of the prototype with the look and feel of the current product, designers and developers can ensure that it fits in with the current product. This helps to ensure that the solutions will be included in the current product.

In addition to the overall design elements, it is also important to consider the usability and functionality of the application during the prototyping process. This prototype is evaluated by employees from Helseplattformen and developers from Epic Systems to ensure it fits in with the current application. Furthermore, expected users also tested the prototype to ensure that it is intuitive and easy to use, while also meeting the needs of the end-users.

#### Feature 1: Push notifications and reminders

- Reminders for exercises, medicines or tests
- Provide necessary information and support between visits
- Reminders for medicines for both caregiver and child
- Users can add information about the purpose of appointments

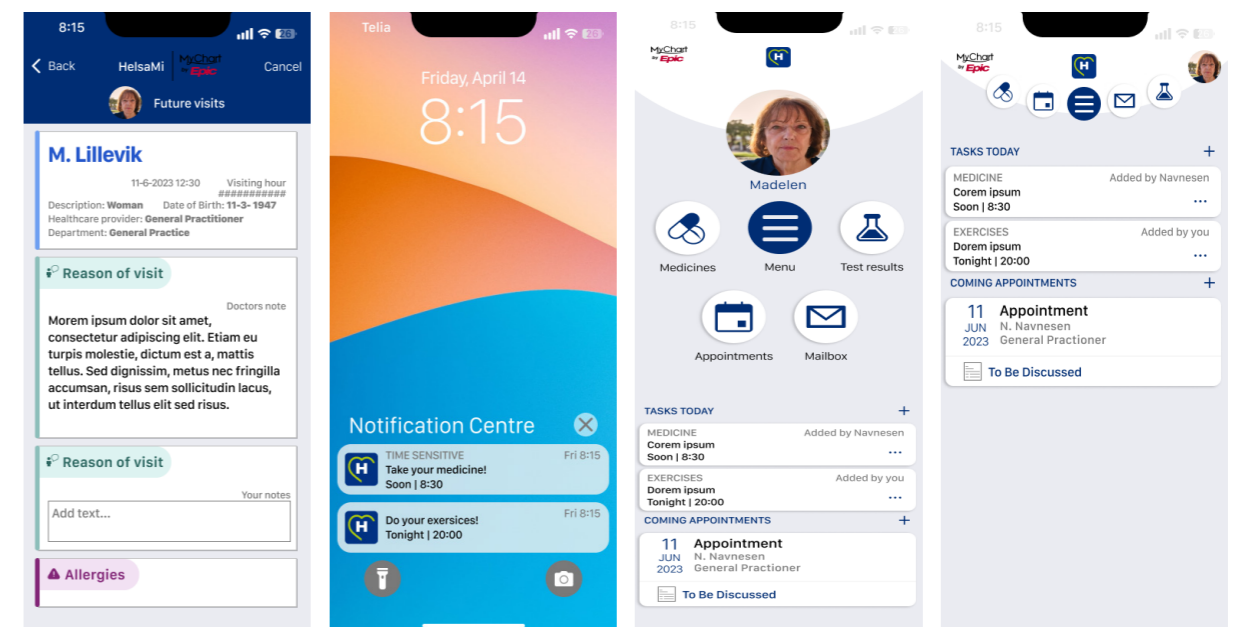


Figure 6.5: Push Notifications and Doctor's notes

and track symptoms over time, and the patients could show the information to the doctor during consultations. Under the calendar and symptom tracking on the first sketch, a list of past appointments is shown. In the last image, a new way is shown to track the symptoms. This time a week's calendar. The past, present, and treatment plans are all separate tabs.

#### Feature 4: Treatment plan

- What can I expect timeline
- Add a timeline that looks into the future can help the caregiver and patient look what they are in for

The fourth feature, the treatment plan, is depicted in Figure 6.4. This can help personas with looking into what they are in for. This feature should help users with educating themselves on what is to come. The information can be gathered from HelsoNorge or Saint Olavs Hospital.

The treatment plan is here placed under the "future" tab since it has information about future treatments that the user might undergo. Information that should be here is; what kind of treatments can be expected, what can be expected of the treatment, possible side effects, and more. This follows up on the question: How might we create a patient-friendly treatment overview and tracking feature that pulls information from online resources and educates patients based on their diagnoses?

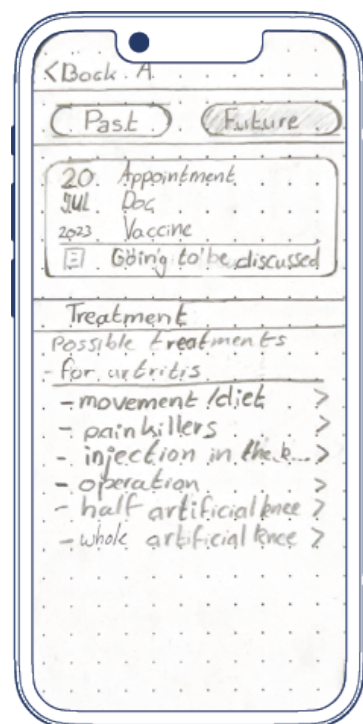


Figure 6.4: Treatment plan

This feature should solve the “how might we” question of: How might we create an after-care feature in the health app that enables effective communication with the GP, medication reminders, and tracking of health goals for patients? Therefore the notifications are shown in the notification centre of the user’s lock screen. In the app’s main menu, the “tasks today” and “coming appointments” are displayed under the menu. If subsequently, the user clicks on “To Be Discussed” the user comes to a new page, where the user can add notes about what they want to discuss and see what the doctor wants to discuss.

## Feature 2: Messaging with the GP



This feature should solve the “how might we” question of: How might we improve communication between healthcare professionals and patients/caregivers to increase transparency, and patient participation, and reduce stress and worries? And: How might we improve messaging with GPs to allow patients to easily send messages and photos to their doctor? In the current solution, there is only one button to send a message, if you click on that button you can choose if you want to message your healthcare provider (appointment, treatment, medicines, results or other (medical) questions) or more general questions. The new design has an extra button to directly message the GP. When clicked the user can choose who they want to message, there are however some conditions. Afterwards, the user can add a subject, they can add their question and they can add a photo to add more context. What follows is a summary and the conversation with the GP, this can always be found in the main mailbox.

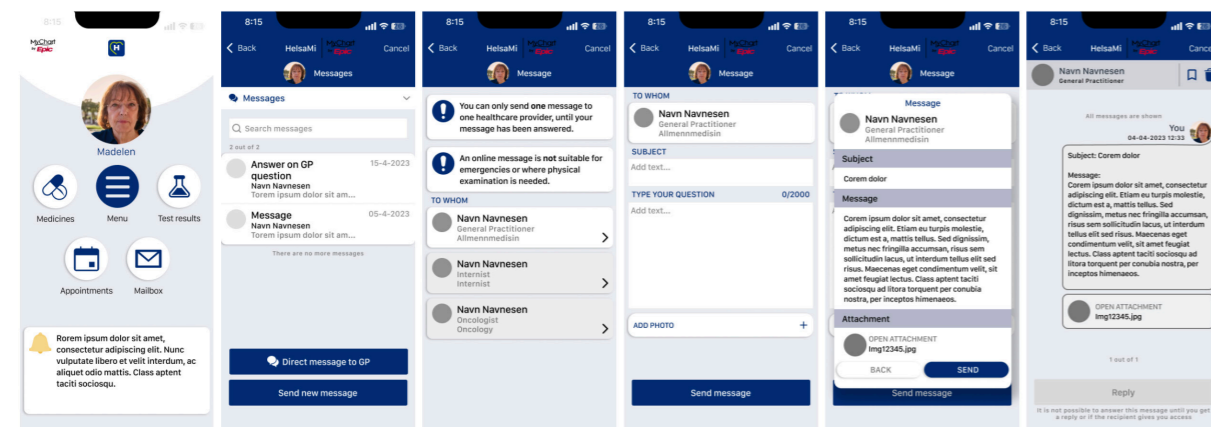
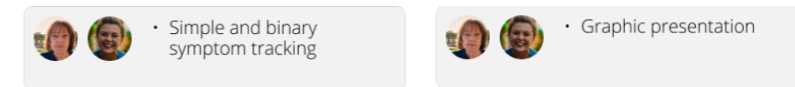


Figure 6.6: Messaging with the GPs

## Feature 3: Symptom tracking



This feature should solve the “how might we” question of: How might we design a symptom-tracking feature that allows patients to easily input and track symptoms over time, with a focus on timing, and provides the information to the doctor during consultations? The first and second images show symptom tracking with a calendar. This calendar shows the date that the user has selected, this date is encircled with a blue circle. The dates when symptoms happen have a lighter blue circle. Underneath the user can add symptoms if they click on the “+”, which subsequently opens the symptom pop-up (third image). In this pop-up, they can add their symptoms by choosing from a list or adding their own symptom if they cannot find it. While the first image has two tabs, future and past the second and fourth both have four tabs, symptoms, past, future and treatments. Since the first has only two tabs the past appointments are shown under their (past) symptoms. The second and fourth images have under their (past) symptoms a summary of when their symptoms happened. In the fourth image, instead of a month calendar a week calendar is shown, to give a different feel.

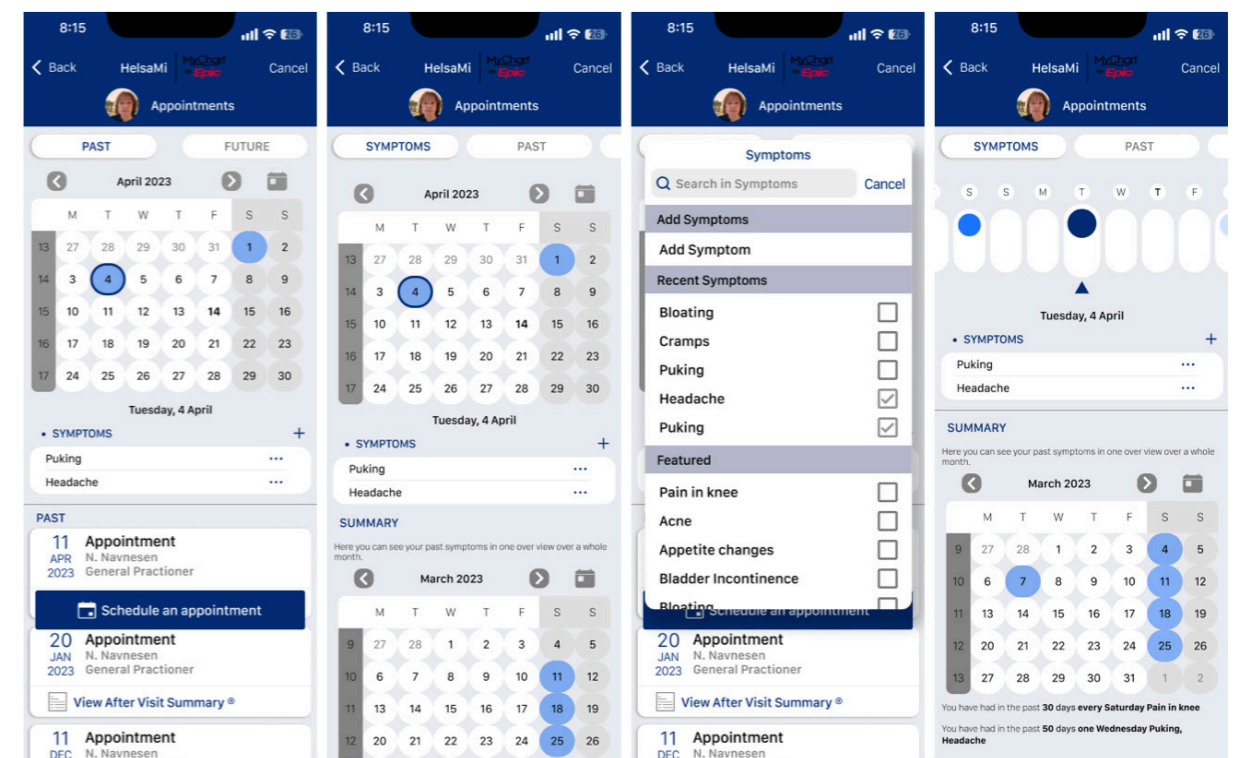


Figure 6.7: Symptom Tracking

## Feature 4: Treatment plan

- What can I expect timeline
- Add a timeline that looks into the future can help the caregiver and patient look what they are in for

This feature should solve the “how might we” question of: How might we create a patient-friendly treatment overview and tracking feature that pulls information from online resources and educates patients based on their diagnoses? As said before there are two different variations of amount of tabs. The first has Past and Future, and the second has symptoms, past, future and treatments. In the first variation, the Future tab has also the treatments in their tab. The second variation has a separate tab for this. In this tab, as said before, are the treatments that the user might undergo. Information that should be here is; what kind of treatments can be expected, what can be expected of the treatment, possible side effects, and more.

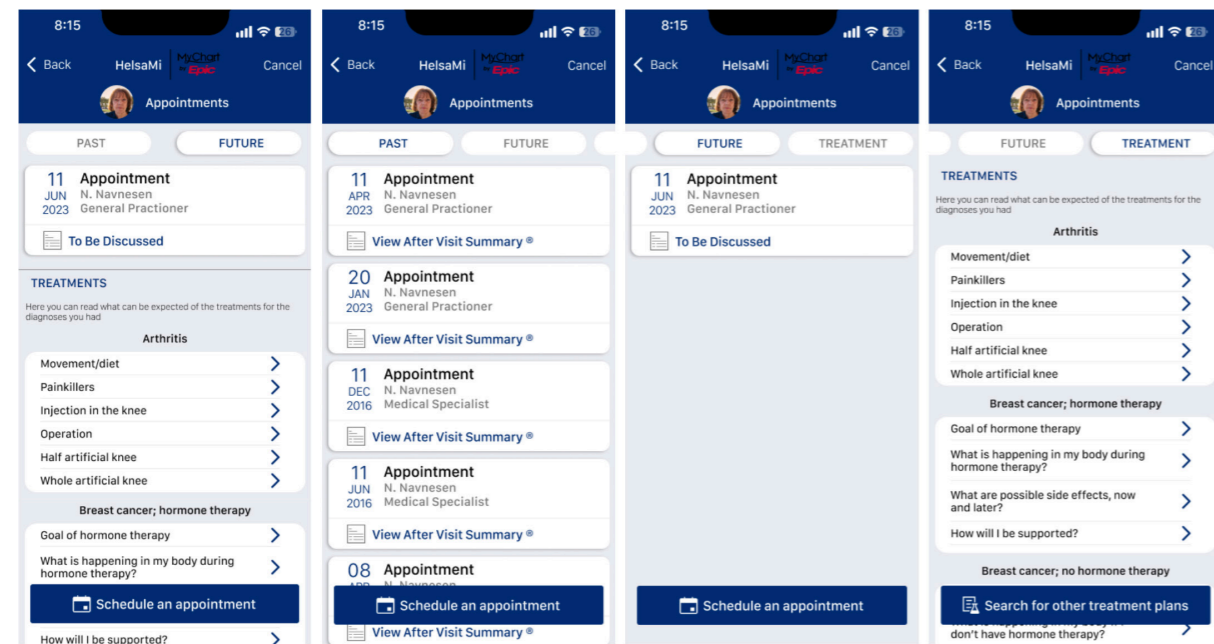


Figure 6.8: Treatment plan

## 6.2.2 Feedback Helseplattformen and Epic

The general feedback from Helseplattformen and a developer of Epic Systems was that there may be too much information overload. A patient-facing tool that aids in memory recall could be more useful if it includes more details and is timed appropriately. Additionally, a symptom checker or self-triage feature can help put specific symptoms and recommend the next course of action. Therefore, including these features in a patient-facing tool could provide a more comprehensive approach to patient care. The feedback also emphasised the need for more visual aids and simplified medical terminology in the health app to improve patient understanding.

It was suggested that treatment plans could be more graphical and presented in a time line. The feedback raised questions about how information about treatments is assigned to patients, whether it is assigned by a care provider or is general information from a database. There were also questions about how the medication is assigned to patients and what goes into managing the tasks that the patient is reminded to complete.

It is important to consider how this information is presented to the other end, including caregivers, physicians, and clinicians, as there is a risk of overwhelming them with too much information. However, the importance of having functionality for patients is also recognised. Finally, the feedback suggested the use of a diary or a graphical representation of a diary where patients can list their situations for themselves or their children.

## 6.2.3 User Feedback

Three potential users were interviewed, and all of the users have participated in a survey or interview before. The user testers were two students from Trøndelag, part of Health Region Central Norway, under the age of 30 and an older lady over 65. During testing the current menu and message system were shown so the participants can get a feeling of how the current app works. The participants had some general feedback about the current app:

- The text is too small, according to two participants
- The menu items are unclear, and too much as said by all participants.
- The text is sometimes hard to see because of the lack of colour difference between the background and text, as said by the older participants

Afterwards, the four new features were tested the points out of the user tests are summarised below.

### Feature 1: Push notifications and reminders

The participants said about the push notification centre is nice and useful to have, the interface has big buttons and is mostly easy to understand. However, the elderly participant mentioned she did not directly know that you could scroll on the home page. The participants suggest adding an extra option to immediately contact the GP and include emergency numbers and quick access to doctors' contact information. The participants also reacted to the function "To Be Discussed", this should be called notes in their opinion. It also does not have to be a separate screen but should expand underneath the information about the appointment. The notes should have a different heading for the doctor or yourself. These notes should be noted in bullet points so it's easy to understand for both parties. There is also no need for the patients' details such as the user's birthday or name, as perceived by the participants since they already know this of themselves. There were however some differences of opinion if the allergies should be on this expandable form or not. But a big thing is that the appointment time is missing, which needs to be added. And the participants want to control that they can set when they get the messages beforehand or that they can add it to their own calendar with just a click of a button.

### Feature 2: Messaging with the GP

The participants of the user test appreciate the convenience of having a direct messaging feature, although it would be ideal for the feature names to be consistent (e.g., mailbox vs messages). However, the amount of information presented on certain parts of the interface can be overwhelming, particularly when the user has multiple symptoms to report.

To address these issues, a suggestion was made to implement a choice menu for medication-related issues, instead of the subject so that the doctor or doctor's office knows what the message is about. The participants also propose eliminating the confirmation message before sending a message to the GP, which could make the process more streamlined.

Overall, the addition of the direct messaging feature is appreciated by the participants, but improvements to the interface and user experience could further enhance the effectiveness of the GP service. Such as using bold text or other functions to differentiate the sections.

### Feature 3 and 4: Symptom tracking and Treatment plan

The general feedback about the symptom tracking, appointment booking and treatment plans is that it would improve the user experience of the app. The symptom tracking feature would be greatly appreciated since it provides a quick overview of the user's past symptoms and appointments. It also allows users to add more details to symptoms and treatments, enabling more detailed tracking and better communication with doctors. The symptom tracker is especially useful for people with chronic illnesses who need to keep track of their symptoms, whether they occur regularly or irregularly. The calendar view is easy to use and stable, making it an effective tool for scheduling and managing appointments.

Although both the symptom tracker and calendar tools are useful for tracking symptoms, appointments, and treatments, the speaker believes that improvements can be made to the symptom tracking and treatment plan to make them more user-friendly. Firstly, they suggest that the distinction between symptoms and treatments could be made clearer, and it should be easier to add and view symptoms. To improve the usability of the system, the participants believe that separate tabs would be a better way to organise the information. But smaller than in the prototype so it is more visible and easier to navigate. Icons could be used instead of text where possible. The tabs should also be more accessible to users who may not know they can be moved, and the future and past sections should be switched.

The circles on the symptom tracker should also have a description icon or text to explain their purpose, especially for the beginning user. The participants also point out that there is a lack of structural proof in the symptom-tracking system, and suggests making all functions more visible to users. They propose adding visuals, such as silhouettes, to the system, and creating some sort of indication for pain levels. The participants suggest adding a summary view for users with multiple symptoms, but this should be optional and not appear automatically. They also suggest including a way to differentiate between morning and evening symptoms, and adding more information about the symptom itself.

The treatment plan feature allows users to see the goal and expected outcomes of different treatments, helping them to make more informed decisions about their healthcare. To improve the treatments section, the speaker suggests adding a page that lists the most likely illnesses and treatments based on the user's age and health condition. Additionally, the treatments section could be made more targeted and informative by including more detailed information about treatments.

# 6.3 High-Fidelity

## 6.3.1 Prototype explained

### Feature 1: Push notifications and reminders

- Reminders for exercises, medicines or tests
- Provide necessary information and support between visits
- Reminders for medicines for both caregiver and child
- Address language barriers
- Users can add information about the purpose of appointments

Out of the feedback came that the users want an extra option for immediate contact with the GP and emergency numbers, this is added as is shown in the first image. "Mailbox" is changed to "Message" to be more conform with the rest of the application. Instead of only having icons to click add or edit, the text is added to make it clear for the elderly where to click on. And if done with the task the user can slide the task to the left, to mark it complete.

Under tasks today, there is a list of coming appointments, to have it more in sight when they log in. The users can then expand under "Notes", previously called "To Be Discussed", to see their doctor's notes and they can add notes themselves. Allergies are also added, so both doctors can see and they can show these allergies to outsiders. But the redundant patient details from the app are removed.

To add tasks or edit tasks the users can click on the corresponding link, either "ADD TASK" or "TASK INFO". The user will now see a pop-up where the user can choose what kind of tasks they want to add, when they want to add them and if the tasks need to be repeated. For the novice or elderly user, there is also a help button to see what the icons mean in the calendar.

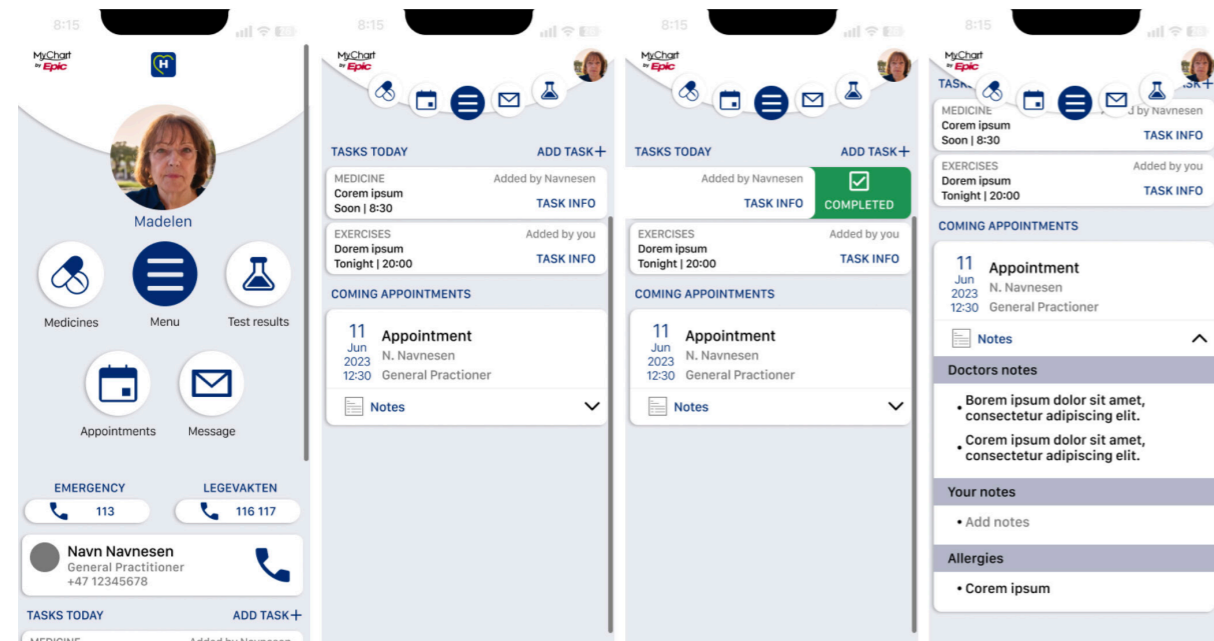


Figure 6.9: Push Notifications and Doctor's notes

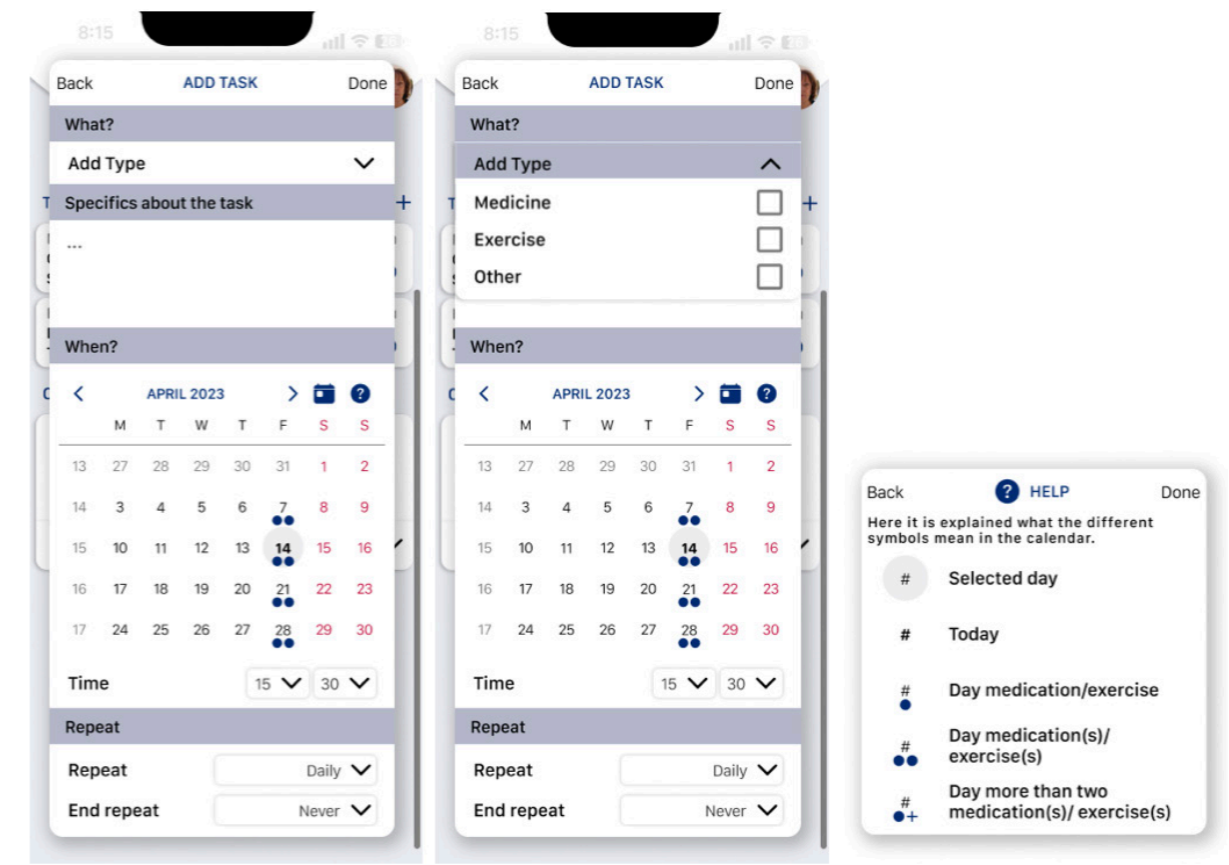
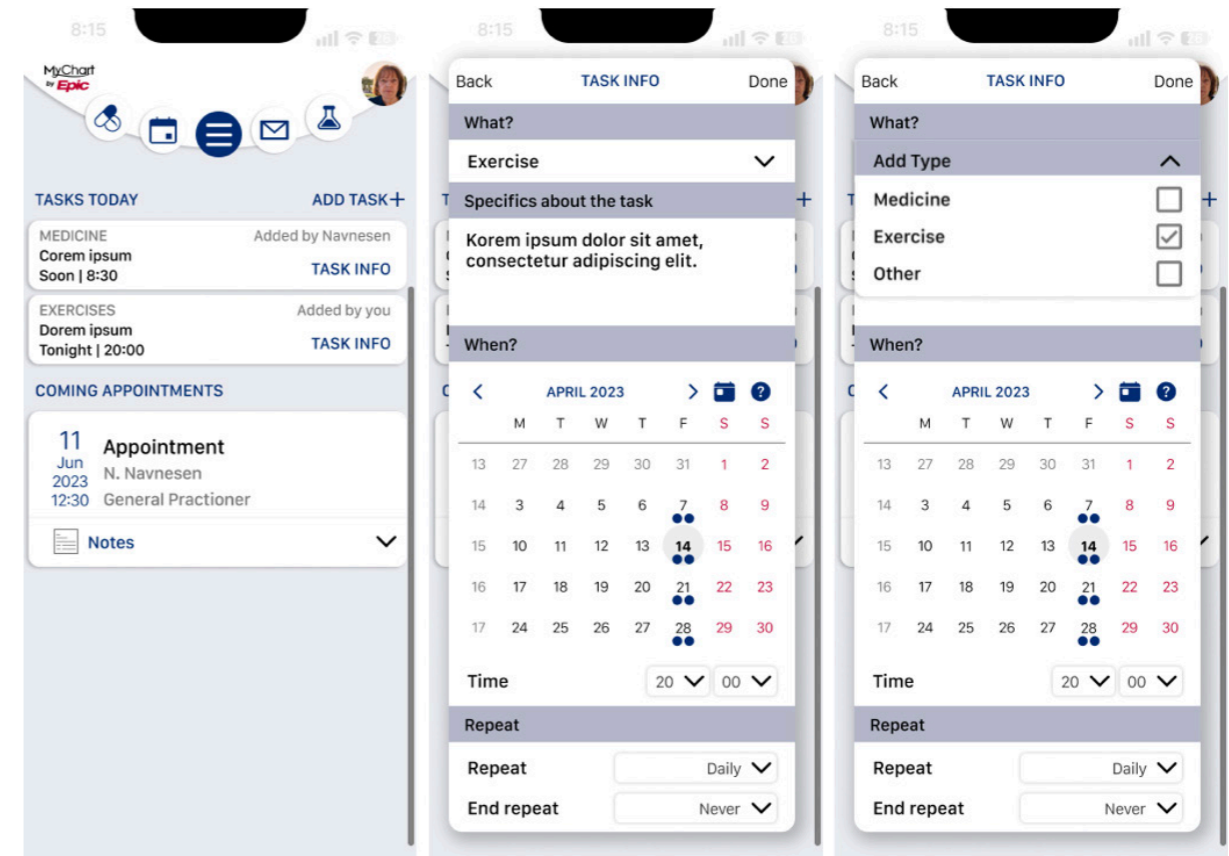


Figure 6.10: Push Notifications Settings and Help menu

## Feature 2: Messaging with the GP



This feature did not need a lot of changes, however, the users requested a choice menu so the doctors when they get a message know what the message is about. Also, the confirmation message before sending a message is removed per request. And instead of another screen, the message is now in a pop-up screen with bold text and the sections are more differentiated. The users, especially if they are not good in the language, can also click on the body part where it hurts to have the location of the issue more clear for the doctor. When the user clicks on send they get the same end screen as before.

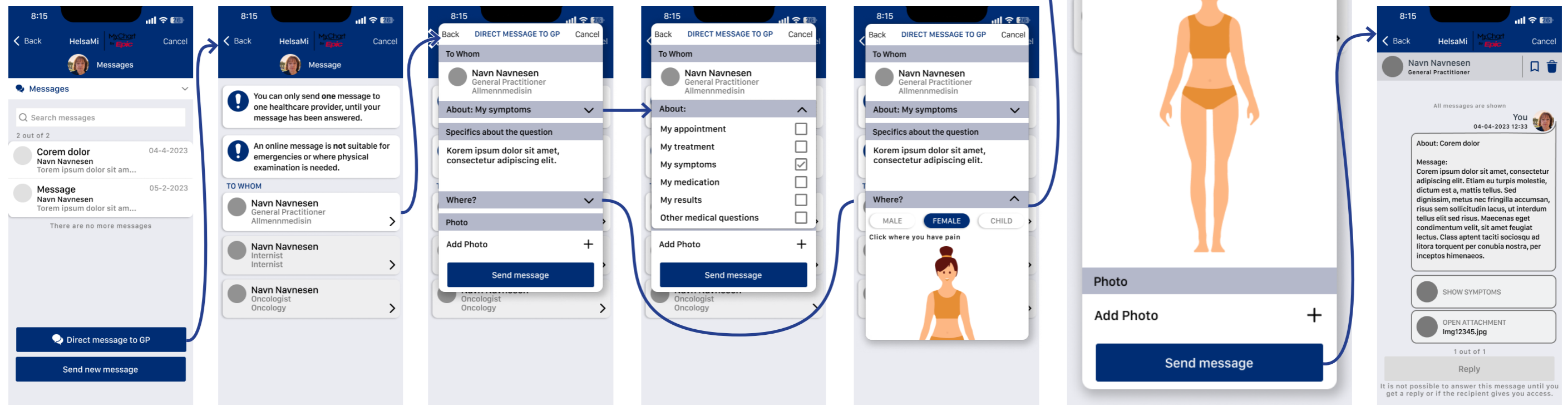


Figure 6.11: Messaging with the GP



### Feature 3 and 4: Symptom tracking and Treatment plan

- What can I expect timeline
- Simple and binary symptom tracking
- Add a timeline that looks into the future can help the caregiver and patient look what they are in for
- Graphic presentation
- Provide information about different services, local activities and treatment centres

Since features 3 and 4 are on the same page, they were evaluated and redesigned together. First, since not all users knew they could scroll horizontally, the tabs are now placed on two lines, with on the first line “symptoms” and “treatment”, and on the second line first “Future” (per request) then “Past” (figure 6.12).

In symptoms, the screen shows the calendar and dates where symptoms have happened. When users don't understand certain symbols they can find the information under help, “?”. For the less advanced user, the user can just add a symptom, fairly easily by clicking on the “+”. They can add already existing symptoms or add new symptoms that are not in the system. The more advanced user can add more data, like when their symptoms happened, what they experienced and where on their body it happened.

If a symptom is added the user can see add when it happened, add notes, and see the summary of past times the symptom occurred. The user can also add a location of where the symptom happened to make it more visually appealing, as requested. The user can select their preferred gender to point out their symptoms, this is because people can relate more to the body type they are familiar with.

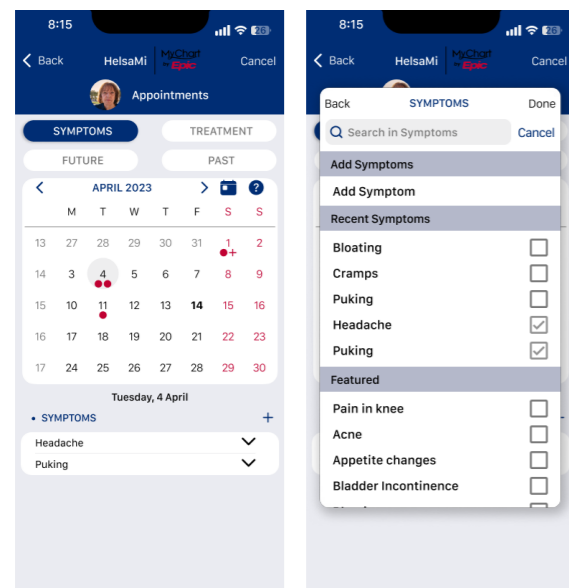


Figure 6.12: Symptom tracking

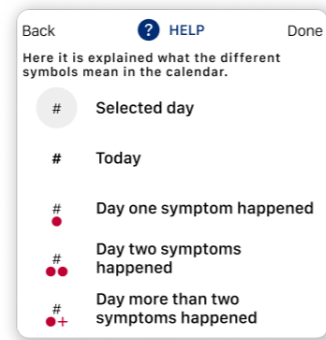


Figure 6.13: Help

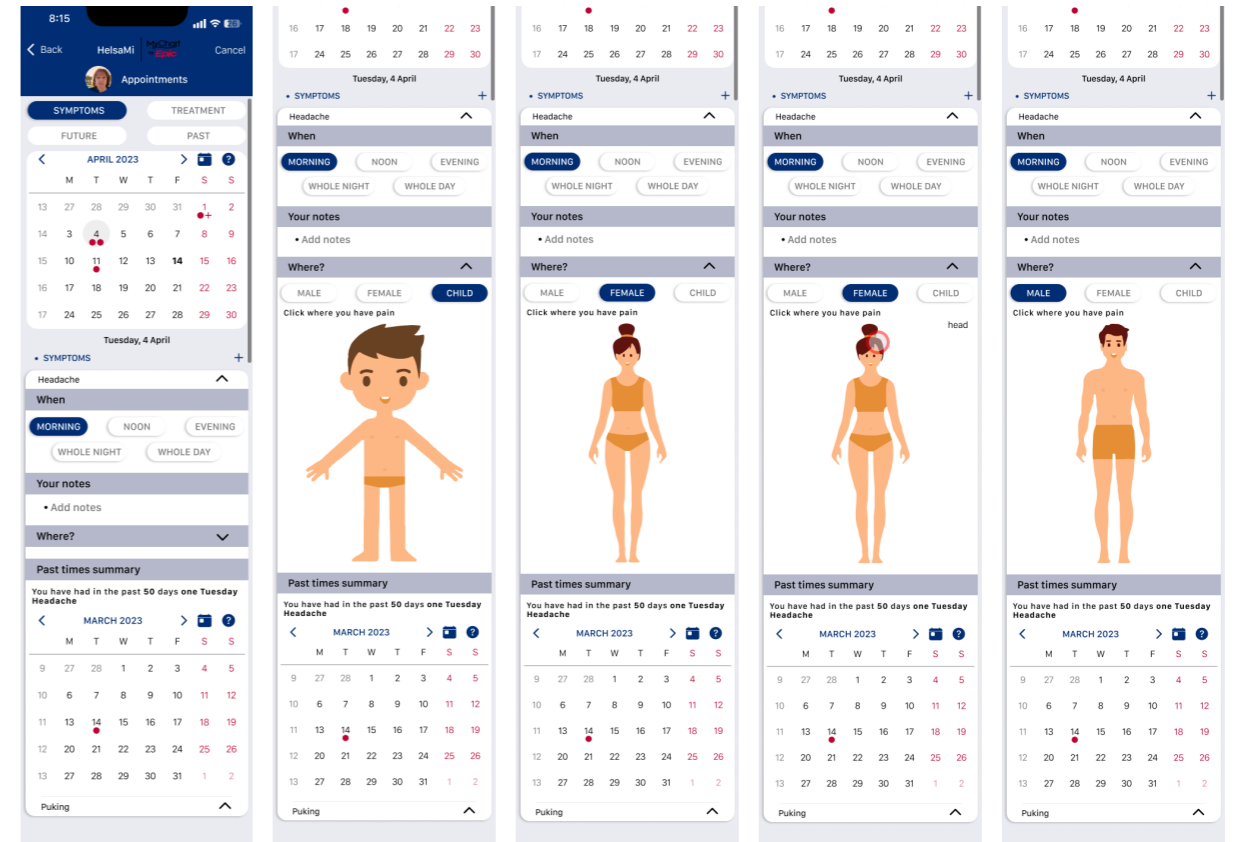


Figure 6.14: Symptom tracking, details

Figure 6.15 shows three pictures that quickly show all the tabs look like, in “Treatment” an extra heading is added where users can find other people or groups that can help them.

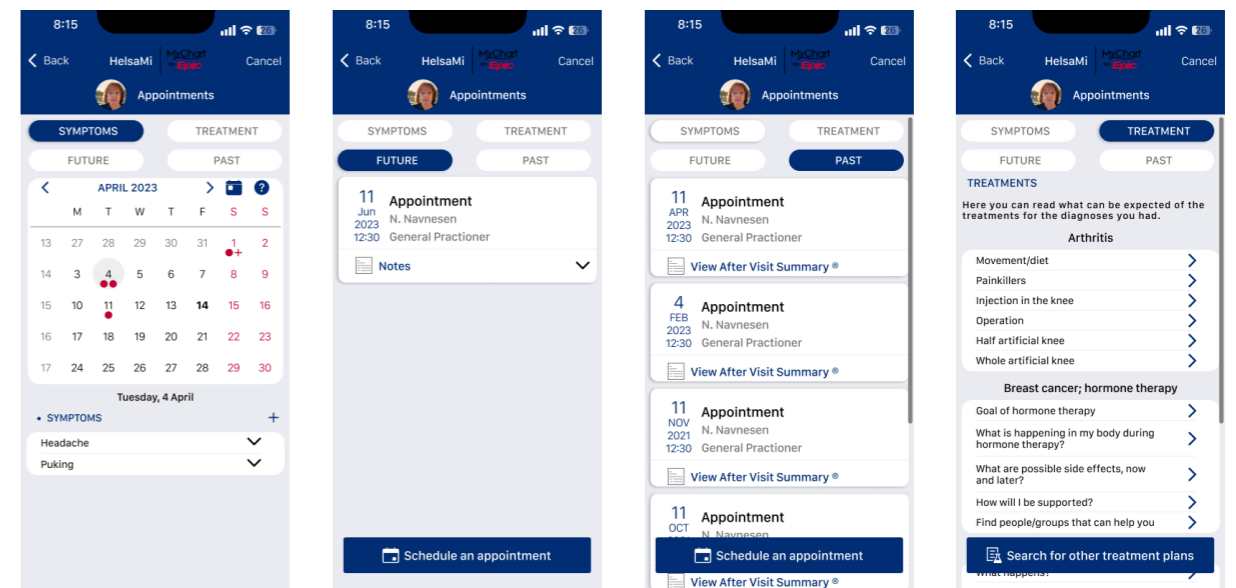


Figure 6.15: Different tabs

### 6.3.2 Feedback from Helseplattformen

This Hi-Fi prototype was also presented to Helseplattformen, and they commented on some of the features. Although they did not have many issues with the first 2 suggested features, they would like to see an option to share a symptom summary with a GP, this was subsequently contested since it would give too much information to doctors. So the GPs get a load of information about patients, something the Helseplattformen was previously viciously against. This is why there is an information message when the user wants to send a message to a health provider, however, more explanation as to why there can only be one message sent.

Helseplattformen did mention that the platform should provide patients with educational resources to help them better understand their symptoms and learn from their symptom recordings. The symptom tracking therefore should also potentially include sleep, diet, exercise, and medication data. With the understanding of their symptoms and possibly what caused them, the platform should help patients make informed decisions about their health based on their symptom recordings. This would actually help with patient empowerment, a point made also in health literacy. For people that have daily symptoms, like migraines, and have to track those it would be good to add a weekly calendar so they can see their symptoms more easily.

It would, however, be nice to see if symptoms that are similar have similar causes, by providing anonymous data, on symptoms and medication, to adjust or take out specific medication.

For the tab "Treatment" it was previously suggested to "Include more information about treatments and likely illnesses based on age and health condition". However, the danger here is that it might be too suggestive for people that self-diagnose.

### 6.3.3 Feedback from Users

In the process to enhance the user experience, participant feedback plays an important role in shaping the design and functionality of digital solutions. By analysing the insights from the two participants, we can identify key areas of improvement and propose actionable solutions. The users that were tested here were one design student under the age of 30, and one district manager (male, 45-50) of the Norwegian Cancer Society.

#### Feature 1: Push notifications and reminders

The participants liked that the reminders to take medication were on the first screen they saw, however, they would like to see more detail about the medicine, such as dosage, name, and description, this could be also done with a picture of the medicine. To make it easy for them to find out what medicine they need to take. One participant thought also it would be nice if feedback, when medication is taken, be sent to their healthcare provider since it would be crucial information for the healthcare provider if the medication is taken or not.

When the user subsequently clicks on add task or task info it also should allow the user to switch calendar days in the calendar to see what is happening on other days, to see the other tasks.

They expressed appreciation for the ability to see the doctor's notes beforehand. They highlighted that if the system could correlate and allow users to actually view the doctor's notes, it would be an excellent feature that would help them prepare for their appointment. This functionality would provide users with valuable insights and enable them to come prepared with relevant questions and concerns, ultimately enhancing their overall healthcare experience, and making the whole doctor appointment more efficient.

Attention should also be given to the placement of elements within the user interface. Ensuring that the emergency number is positioned further away from other interactive elements reduces the risk of accidental activation and improves overall usability.

#### Feature 2: Messaging with the GP

The direct message is by both participants appreciated, however, providing a clear explanation as to why users are limited to sending only one message helps them understand the system's constraints and expectations.

Addressing specific wording suggestions, changing the heading from "Where?" to "Pinpoint on your body" adds clarity and guides users in accurately describing their symptoms. Similarly, renaming the "Cancel" button to "Close" prevents confusion and ensures users understand its intended function. It should also be more clear when something must or does not have to be filled in.

### **Feature 3: Symptom tracking**

To enhance the user experience and provide a comprehensive view of their schedule, the inclusion of a general calendar with an overview would greatly benefit the solution. This addition allows users to have a centralised location to track their appointments and symptoms, eliminating the need for separate future and past tabs. By utilising a calendar time line, users can effortlessly navigate through different dates and access relevant information regarding their symptoms and appointments. This streamlined approach improves usability and provides a clear overview of a patient's health status over a month. By using filters and expandable headings, to show more information, the screen can still be organised and cause no distractions or the sense of being overwhelmed. The filters could be sorted into "Symptoms", "Future Appointments" and "Past Appointments". These modifications provide specificity and assist users in understanding the purpose and organisation of each section within the system. The "Treatment" tab as how it is now presented in this proposal should be under a different heading altogether.

Furthermore, for effective symptom tracking, it is crucial to offer clear instructions and descriptive text that guide users in accurately filling out the information. By providing comprehensive guidance, users can confidently report their symptoms and contribute to the accuracy of the data. Additionally, it is advised by one of the users that instead of immediately being able to edit, the user first needs to click edit so the user knows when they are able to edit or not. This is however a feature where it is advised to do some further user testing with expected users.

Additionally, it is proposed that the system's silhouette should automatically generate the appropriate gender representation. This thoughtful inclusion adds a personalised touch to the user interface, promoting inclusiveness and making patients feel seen and respected.

### **Feature 4: Treatment plan**

The fourth feature of the solution focuses on the treatment plan, which currently provides information about various treatments and allows users to add different diagnoses to their "Treatment" page. To enhance this feature, it would be beneficial to incorporate a time line that offers more specific details about the user's treatment plan. For instance, the time line could indicate upcoming milestones, such as undergoing chemotherapy in three weeks. This additional information helps users understand the progression and timing of their treatment.

In addition to the treatment information, it would be valuable to provide clear and structured resources that users can access. This ensures that users have comprehensive information about available resources related to their treatment. By presenting resources in a clear and structured manner, users can easily navigate and find the information they need to support their treatment journey.

Furthermore, it is important to provide relevant information about treatments and potential illnesses based on the user's age and health condition. However, it is crucial to strike a balance and avoid being overly suggestive, especially for individuals who may engage in self-diagnosis. The aim should be to provide informative and educational content without encouraging unwarranted self-diagnosis or unnecessary concerns. By providing accurate and reliable information, users can gain a better understanding of potential treatments and illnesses while maintaining a responsible approach to their health management.

In conclusion, by integrating the pain points, requirements, and suggestions provided by the participants, HelsaMi can be enhanced to better cater to patient needs. The incorporation of medication reminders, detailed medicine information, easy access to medication details, and robust task recording and monitoring functionalities address critical pain points highlighted by users. Moreover, implementing a time line feature, expanding the symptom tracker, utilising a calendar for appointment tracking, and automatically generating gender-specific silhouettes significantly enhance the overall user experience.

## 7.1 Features Recommendations

To ensure the development of a successful health app, this thesis recommends incorporating interaction design features that are relevant to users with poor health literacy and align with the requirements expressed by the expected users interviewed during user tests, as well as the recommendations from stakeholders. During the process, four features were prototyped, (1) Push notifications and reminders, (2) Messaging with the GP, (3) Symptom tracking, and (4) Treatment plan.

### Feature 1: Push notifications and reminders

Regarding the first feature (Figure 7.1), it should not be too difficult to implement since it has already been partially integrated into the application, albeit not in this particular manner. The suggested enhancements for the application include a medication reminder feature that is prominently displayed on the home screen, ensuring ease of use. The medication list should be designed to be easily understandable, and the app should provide access to information on test results, medication modifications, and treatment plans in between appointments. Furthermore, the app should empower patients to take proactive measures between appointments by offering reminders for exercises or tests. Additionally, a feedback function could be incorporated to enable patients to provide information to healthcare providers when medication is taken, thereby offering crucial data for assessment purposes.

The function to immediately call the emergency number is greatly appreciated by all, however, the emergency number should be further away from other interactive elements to prevent accidental activation.

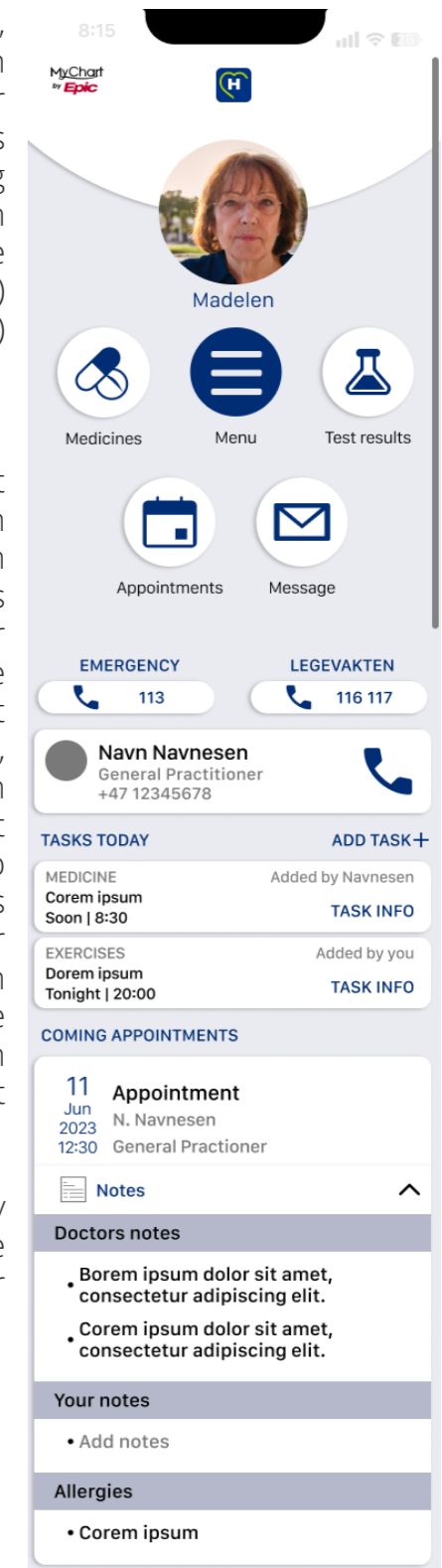


Figure 7.1: Feature 1

## Feature 2: Messaging with the GP

The second feature, which involves establishing two-way communication with healthcare professionals, has received significant demand from all survey and interview participants, making it a highly valued addition for all users. This feature encompasses a messaging platform that enables patients to engage with their doctors outside of scheduled visits. However, it is important to provide a clear explanation regarding the limitation of sending only one message within the messaging feature to manage user expectations effectively. Additionally, improvements in wording clarity are necessary, such as changing the label “Where?” to “Pinpoint on your body” and renaming the “Cancel” button to “Close.” These adjustments will enhance user understanding and streamline the user experience within the messaging feature.



Figure 7.2: Feature 2

## Feature 3: Symptom tracking

Implementing the third feature will be challenging, and user feedback should be carefully considered. This feature will empower patients to take an active role in their healthcare journey by providing knowledge and skills to navigate the healthcare system, especially for those with poor health literacy. To facilitate communication between patients and their healthcare providers, a symptom-tracking function can be developed to help users understand their symptoms and take appropriate action. Which should potentially include sleep, diet, exercise, and medication data. Additionally, the silhouette feature should automatically show the user's correct gender.

Include a time line feature in the symptom tracker where patients can view their symptoms, treatment, past, and future appointments. Also, add an expanded menu where patients can add notes and specify the time of day when they experienced their symptoms. Allow patients to add their own symptoms to the list.

It could be intertwined with a time line of appointments, providing a clear overview of all the data from the patient in a month. The feature could also potentially send (anonymous) data to healthcare providers to see if any medication causes any (dangerous) repeated symptoms.

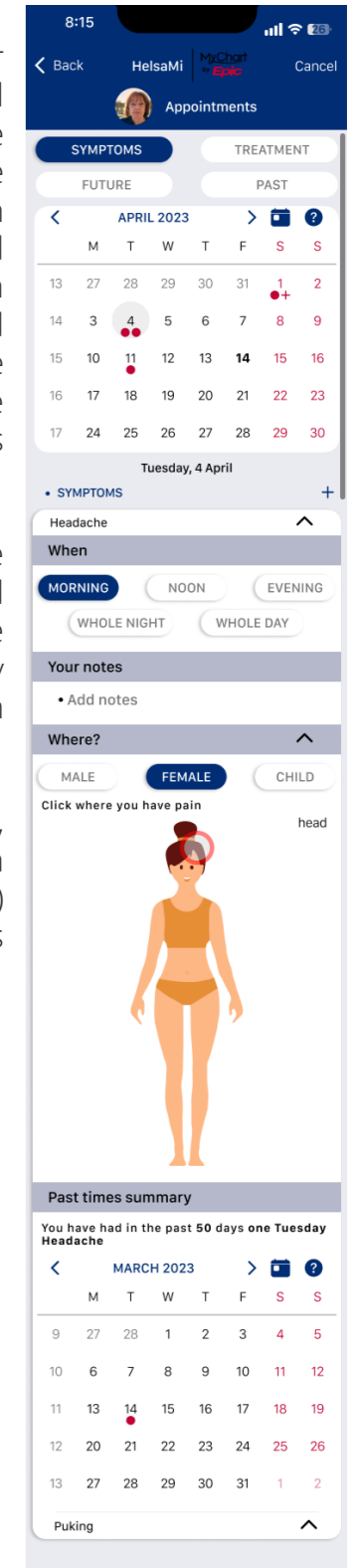


Figure 7.3: Feature 3

## 7.2 Overall Recommendations

The interface should be user-friendly, intuitive, and accessible even for patients who may not be familiar with technology or have limited functional ability. The interface should be designed with simplicity and clarity in mind. A clean and organised layout with clear navigation paths can significantly enhance usability. Consider using familiar round-shaped touch buttons, as they are easy to understand and operate, promoting a seamless user experience. By prioritising essential features and presenting information in a logical and hierarchical manner, users can navigate the application effortlessly and focus on their desired tasks. Consider also aesthetics and fun in the design for enjoyment, use familiar round-shaped touch buttons for ease of use, and design for top-down interaction to reduce distraction and potential information overload. Employing visually appealing design elements, such as pleasant colour schemes and visually stimulating graphics, can create a positive emotional response in users. However, it is essential to strike a balance between aesthetics and usability to avoid overwhelming or distracting users.

Consistency in the use of icons is crucial for enhancing user understanding and reducing cognitive load. In the current application, the use of different icons without a consistent style or purpose can lead to confusion. To address this limitation, it is recommended to establish a clear and standardised set of icons that align with industry standards and user expectations. Icons should be intuitive, representing their intended functions accurately. By maintaining consistency in icon design and meaning, users can easily recognise and associate icons with specific actions or features, improving overall usability and user confidence.

During three user tests, the issue of menu disorganization and unclear headings was frequently discussed, causing a high cognitive load for users who need to remember the location of desired options among around 35 headings (six of which are actual settings). It is recommended that a workshop is held where actual users do a card-sorting exercise with all the menu items. These menu items can either be differently sorted or maybe items can be under one heading, to distract the user less from the purpose. If deemed necessary by the users, consider incorporating a dedicated “Settings” section within the application where users can customise and modify various aspects of their app experience. This section should encompass all the relevant settings options, allowing users to personalise their application according to their preferences.

The current features are implemented in the mobile application, however, to cater to the varying needs and preferences of users, it is crucial to ensure that the application is available also on desktops, as is also said in the “musts”. This multi-device availability allows users to access the application conveniently, regardless of their preferred device or location. By embracing a responsive design approach, the application can provide a consistent and optimised experience across various devices, enhancing user satisfaction and engagement.

### Feature 4: Treatment plan

The fourth feature (Figure 7.4) is the treatment plan, at this moment it offers mostly just information about different treatments and users can add different diagnoses to their “Treatment” page. Where they can also find clear and structured information about available resources can also be provided. It is advised that this is on a separate page and not in appointments, or calendar. There still should be a feature added to a potential time line where more specifics are added about their treatment for example in 3 weeks they need to undergo chemo. Include more information about treatments and likely illnesses based on age and health condition, but avoid being too suggestive for people that self-diagnose.

By implementing these features, patients should experience improved empowerment and health literacy, resulting in an overall better patient experience. During testing, a user suggested changes to the “Appointment” section, such as removing future and past selections and using a calendar time line for both symptoms and appointments in one place. This change can provide patients with a clear overview of their symptoms in a month. The section name “Calendar” could replace “Appointments”. Additionally, the information about treatment should be in a separate section since it’s more about treatment information rather than a treatment time line. However, features like a time line for potential treatment still fit in the calendar.

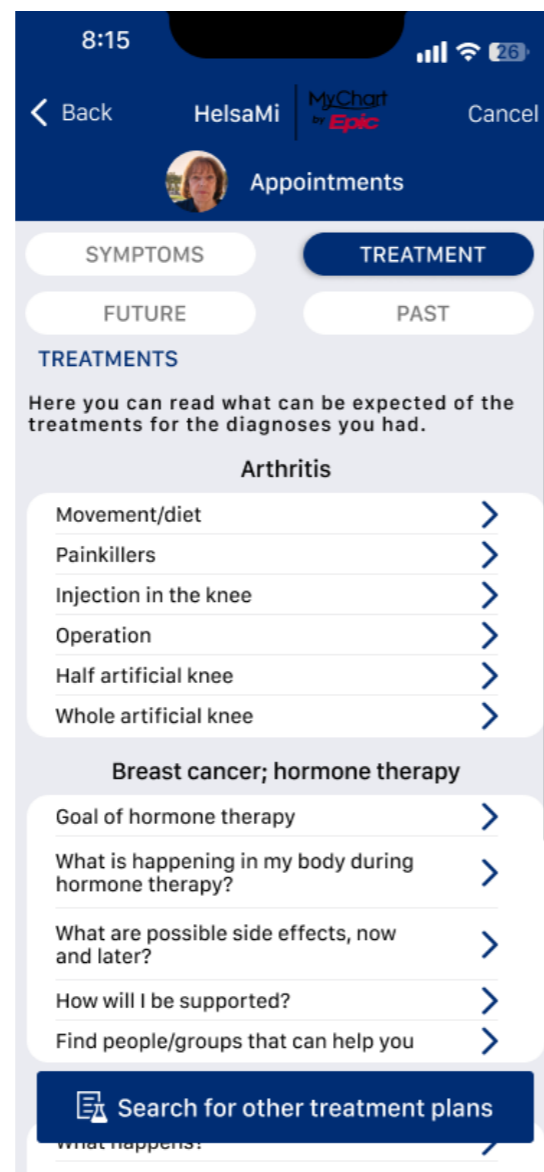


Figure 7.4: Feature 4

# Chapter 8

## Discussion

## 8.1 Discussion

The research question for this thesis was:

**“How can the HelsaMi app, currently used in the Health Region Central Norway, be enhanced to prioritise the patient’s role as an active participant in their clinical journey, resulting in advantages for both the patient and GPs?”**

### 8.1.2 Universal design

A big part of the research question was to get patients to be active participants in their clinical journey. To improve health literacy, it is important to develop cognitive and social skills that enable individuals to access, understand, and use health-related information effectively. Improving health literacy implies addressing specific challenges faced by individuals with varying levels of health literacy (Norgaard et al., 2015). This includes providing clear and understandable health information, ensuring user-friendly and intuitive interfaces in the eHealth solution, and considering users’ varying degrees of digital literacy. It also means to involve relevant interest organisations, target users, and healthcare professionals in the development process to ensure that eHealth solutions align with user needs (Chan, 2011; Gilstad, 2014).

During interviews, it became clear that users want more control over their patient journey, and be able to directly message the GP if they have health problems. Users were appreciative of the four new features, they were found helpful. The feedback emphasised the need for health resources within the platform to help users better understand their symptoms and make informed decisions about their health. By adding the **“Push notifications and reminders”** feature users will be provided with tailored information and clear displays regarding their medication and tasks. By providing comprehensive guidance and descriptive text, HelsaMi aims to empower users to accurately report their symptoms and contribute to the accuracy of their health data. Better guidance can be created to add additional details such as dosage, name, and description, accompanied by visual references like pictures. This would help the patients and their care givers more control over their tasks. This personalised approach helps users understand what they need to do and when, ensuring they stay on top of their healthcare routines. Additionally, the feature supports users between visits by providing necessary information and support, ultimately enhancing their overall health literacy.

The **“Messaging with the GP”** feature also contributes to improved health literacy by facilitating easier communication between users and their healthcare providers. While the limitation of one message per healthcare provider prevents message overload, it still allows users to contact their GPs and seek clarification when needed. This direct line of communication empowers users to better understand their health conditions and treatments, fostering a more informed and engaged patient population. At the same time, it is important to recognise the potential risks associated

with the “Messaging with the GP” feature. While the limitation of one message per user helps prevent message overload for healthcare providers, it still may result in an information overload for GPs. Since it is an extra function that was not available before. GPs already face significant demands on their time and resources, and an increased volume of patient messages can put additional strain on their ability to provide timely and comprehensive care.

With the feature “**Tracking symptoms**”, users can gain a better understanding of the potential causes and triggers of their symptoms, enabling them to make more informed decisions about their health. The feature plays thus a significant role in empowering users to take control of their own health. By allowing users to input their health conditions and track their symptoms, the platform enables users to identify patterns and potential triggers. Armed with this knowledge, users can make informed decisions about their health, such as adjusting their lifestyle or seeking medical advice. The visual nature of the feature enhances comprehension and reduces reliance on extensive text, further promoting health literacy. It could, however, also include additional data points such as sleep, diet, exercise, and medication in the symptom tracking feature, to get an even more informed decision about their health. However, it is important to acknowledge the potential risk of health-related pre-occupancy or “obsessing to much over their own health” as is also mentioned by participants of survey 1. Constantly tracking symptoms may cause individuals to become overly concerned about minor fluctuations or common symptoms, leading to unnecessary anxiety.

Furthermore, the suggestion to provide patients with access to their doctor’s notes and incorporating a time line in the “**Treatment plan**” feature supports health literacy. This feature provides users with a clear understanding of their treatment journey. By incorporating a time line and specific details about upcoming milestones, users can also better prepare for and manage their treatments. By offering users access to their medical records and treatment information, HelsaMi promotes transparency and enables individuals to actively participate in their healthcare decisions. This access to information enhances patients’ ability to understand their condition, ask relevant questions, and engage in meaningful discussions with their healthcare providers. Which fosters a sense of control for some of the users. However, they do require a certain level of comfort and proficiency with digital technologies. Not all users may be familiar with how to effectively communicate their health concerns or interpret medical advice received through an application. Similarly, healthcare providers need to be proficient in using the messaging system and ensure clear language and no medical terminology.

## 8.1.2 Universal design

Incorporating the points of universal design into the mobile health application brings about several improvements. By considering the principles of universal design, the application becomes more accessible and usable for a wider range of users. Additionally, user testing involving both users and stakeholders ensures that the design aligns with their specific needs and preferences. This iterative process of gathering feedback and incorporating it into the design helps create a more inclusive and user-friendly application. However, it is important to acknowledge that during this process, there may have been a lack of diversity in the user pool, which could lead to certain user perspectives being underrepresented. Additionally, the availability of user testers might have been limited, potentially affecting the comprehensiveness of the feedback gathered.

The feature “**Push notifications and reminders**” provides users with personalised functions, offering appropriate information displays and drill-down details for managing tasks, medication, and reminders. This feature not only helps users stay organised but also provides necessary information and support between visits. Additionally, users can see their upcoming appointments on the home screen and add purpose-related information, giving them more control over their next visit and enabling them to review notes the doctor wants to discuss.

The “**Messaging with the GP**” feature enhances user freedom by making it easier to contact healthcare providers. While users can only send one message per healthcare provider to avoid overwhelming the GPs, this feature ensures accessibility and direct communication channels.

The visual nature of the “**Symptom tracker**” and “**Treatment plan**” features reduces reliance on textual information and minimises the attention required from users, making it easier to interpret and monitor symptoms. This can cause that they can identify patterns more easily and take appropriate action.



## 8.2 Future Work

### 8.1.3 Conclusion of the Discussion

This thesis aimed to effectively improve the communication between the GP and patients, by also improving the health literacy of the patients and the design of HelsaMi. This includes prioritising the patient's role as an active participant in their clinical journey. Additionally using design methods to improve both the design and health literacy in the application.

The design of the four new features in HelsaMi prioritises user needs, intuitive interfaces, and consistency throughout the platform. By conducting user testing and involving stakeholders, the platform ensures that the design meets user expectations and promotes active engagement in healthcare decisions. With familiar design elements, user-friendliness, and a focus on empowering patients, HelsaMi aims to enhance health literacy and enable users to navigate the healthcare system with confidence and understanding.

To create a successful health app, it is recommended to incorporate features that align with interaction design principles, cater to individuals with low health literacy, and meet the needs of the target users. Crucial to this is the implementation of the designed features to empower the users, improve health literacy, and enhance the overall patient experience. It is also important to follow the recommended features. Those features might need some more user testing and further improvement before being implemented in the application. Since the focus of this report was on the mobile application, the features for the website still need to be designed.

In terms of the app's interface and design, it should be user-friendly, intuitive, and accessible to all users, including those with limited technological familiarity or functional abilities. Employing a clean and organised layout, clear navigation paths, and round-shaped touch buttons can enhance usability and ease of interaction. Striking a balance between aesthetics and usability is crucial, employing visually appealing elements while avoiding overwhelming or distracting users. Consistency in icon design should be maintained to enhance user understanding, and a responsive design approach should be adopted to ensure the app works seamlessly across different devices.

Additionally, addressing the disorganisation of the menu is crucial. Conducting a card-sorting exercise with actual users can help streamline menu items, reduce cognitive load, and improve user experience. A clear and standardised set of icons aligned with industry standards and user expectations should be implemented for improved navigation and ease of use.

Overall, by addressing the recommendations and the new features, the health app can provide an enhanced user experience, promote health literacy, and effectively serve its intended purpose.

## 8.3 Reflection

During the course of my master's thesis, I encountered various challenges and setbacks in working with Helseplattformen, health personnel and users within the healthcare sector. Initially, the intention was to gather insights from both health workers and people who had utilised their services. However, it became evident that health personnel, especially GPs, were difficult to reach, making it challenging to obtain their perspectives and experiences. As a result, the focus of my research shifted primarily towards patients, potential users, representatives of patients and caregivers.

Despite the change in focus, contacting and engaging with user committees, and other expected users proved to be a hard task. Although numerous invitations for interviews and surveys were sent out, the response rate was disappointingly low. Nevertheless, those who did respond provided valuable information and insights, as noted in Section 4.5 and other parts of this thesis.

This experience taught me several important lessons on how to work with users in the health and design process. Firstly, it highlighted the need for proactive and persistent communication when reaching out to health personnel and user committees. Recognising that they are often occupied with demanding workloads and limited availability, I could be more persistent in getting them to answer.

The negative perception surrounding Helseplattformen and HelsaMi made it so that I was very hesitant to reveal that I was working with Helseplattformen in the emails, surveys and interviews. Because of the negative perception surrounding Helseplattformen and HelsaMi getting access to the applications was hard and highlighted the need for adaptability and problem-solving skills. As a researcher, it was essential to remain flexible and explore alternative methods to gather meaningful data. This included seeking alternative sources of information like using the Dutch application, and screenshots from people that did use the HelsaMi application.

Considering all these, frustrations and changes in the project, I learned a great lesson in project management. By anticipating potential risks, like not being able to contact GPs or getting the necessary information from Helseplattformen. Having alternative plans was essential, for example I needed to use alternative resources, adjust the time line, and have modified the project scope to adapt to changing circumstances. Because of these circumstances I can better navigate unexpected challenges and keep projects on track. Effective communication and collaboration are also essential in this process.

I believe this project can show other designers the frustrations and limitations of working with health providers, and working in the health world. Therefore, designers can gain valuable insights and understanding from this project, which can shed light on the frustrations and limitations that come with designing for health providers and

working in the healthcare industry. By examining the challenges and complexities faced during the project, designers can develop a deeper appreciation for the unique requirements and constraints involved in healthcare design. This knowledge can inform future design processes and lead to the creation of more effective and user-centred solutions in the healthcare domain. Additionally, sharing the experiences and lessons learned from this project can contribute to the broader conversation on improving the collaboration between designers and health providers, fostering better design practices and outcomes in the healthcare field.

In conclusion, the experience of working with health personnel, user committees, and patients throughout my master's thesis provided valuable lessons on engagement, communication, and adaptability. While the challenges encountered were significant, they emphasised the importance of persistence, and proactive problem-solving in order to effectively collaborate with stakeholders in the healthcare sector. These lessons will undoubtedly influence my future endeavours in user-centred design and research within the health domain.

# Chapter 9

## Conclusion

Most of the Norwegian population, they are accustomed to using digital tools to find the information they require and to communicate with both public and private parties. In the health and care sectors, Norway has also started to participate in the delivery of digital citizen services. The growing population experiences functional limitations, perceived lack of user skills, limited access to technology, lack of interest, and overall usability issues with these digital services. These services should support the elderly as well as the younger population. Patients with low health literacy require tailored information that is specific to their health conditions and situations, and eHealth solutions should be designed in a user-friendly manner. Therefore, there was a need for a product that helps these patients with better communication with their GP. Previous studies have shown that patients benefit from eHealth services and express a desire for better and more user-friendly apps, including features like messaging platforms, appointment scheduling, and symptom tracking. Helseplattformen has worked on such an application, called HelsaMi. Currently, HelsaMi lacks functions and is not as user-friendly as it should be.

This thesis aimed to improve HelsaMi, the existing app in Health Region Central Norway, with a focus on communication between GPs and their patients through user interface design. The research involves various methods to gather insights from stakeholders, and the findings will be used to design specific parts of the app for Central Norway. The thesis also emphasises the importance of establishing standards for accessibility and accuracy in mobile health app development. The main goal of the HelsaMi application is to improve the health literacy of patients, by giving them more control over their own health. Key features recommended for the redesigned app include symptom tracking, appointment and medication reminders, treatment plans and two-way communication with doctors. By listening to the expected users and stakeholders four features were designed to answer their needs.

### **Feature 1: Push notifications and reminders**

### **Feature 2: Messaging with the GP**

### **Feature 3: Symptom tracking**

### **Feature 4: Treatment plan**

This thesis is a proposal to improve the communication between GPs and their patients, with the help of interaction design and should improve the empowerment and health literacy of the users of HelsaMi, resulting in an overall better patient experience. Further research and design should be concentrated on the best possible structure information to avoid information overload for elderly individuals, especially in the menu. Addressing menu disorganisation through, for example, card-sorting exercises and implementing a standardised set of icons will improve navigation and user experience. Further user testing and improvement may be required before implementing these features. Consistency in icon design and a responsive design approach is key. By following these recommendations and incorporating the new

features, the health app can provide an enhanced user experience and effectively serve its purpose.

This thesis not only provides valuable insights and recommendations for improving the HelsaMi app but also delves into broader recommendations that can be applied to other health applications. Designers working on health apps can learn from the requirements and findings presented in this thesis to enhance their own designs.

By studying health literacy and universal design in health, designers can gain valuable knowledge on how to create user-friendly features that cater to diverse user needs. The thesis highlights the importance of empowering users, improving health literacy, and enhancing the overall patient experience through thoughtful design choices. Catering to the users' needs is also done by conducting user tests, which in this thesis is emphasised for its importance. By examining the feedback and requirements outlined in this thesis, designers can gain valuable guidance for developing health applications that prioritise user needs, enhance health literacy, and effectively serve their intended purpose. Applying these learnings to other health app projects can lead to improved user experiences and better outcomes for users in the healthcare domain.



# References

Agile Business (2014). "Chapter 10: MoSCoW Prioritisation." from <https://www.agilebusiness.org/dsdm-project-framework/moscow-prioritisation.html>.

Becker, S., et al. (2014). "mHealth 2.0: experiences, possibilities, and perspectives." JMIR mHealth and uHealth 2(2): e3328.

Bergland, C. (2017). "One Citizen – One Health Record." Norwegian Directorate of eHealth.

Bravo, J., et al. (2018). "M-health: lessons learned by m-experiences." Sensors 18(5): 1569.

Bukman (2018). "Het complete epd-overzicht: welk ziekenhuis heeft welke leverancier?". from <https://www.zorgvisie.nl/epd-overzicht/>.

Byambasuren, O., et al. (2019). "Current knowledge and adoption of mobile health apps among Australian general practitioners: survey study." JMIR mHealth and uHealth 7(6): e13199.

Carroll, J. M. (2003). Making use: scenario-based design of human-computer interactions, MIT press.

Centers for Disease Control and Prevention (2023). "What Is Health Literacy?". from <https://www.cdc.gov/healthliteracy/learn/index.html>.

Chan, C. V. and D. R. Kaufman (2011). "A framework for characterizing eHealth literacy demands and barriers." Journal of medical Internet research 13(4): e1750.

Design Kit (n.d.). "How Might We." from <https://www.designkit.org/methods/how-might-we.html>.

Design., T. C. f. U. (1997). "The Principles of Universal Design." 2.0. from <https://design.ncsu.edu/research/center-for-universal-design/>.

Dignio (2022). "MyDignio - Pasientappen." from <https://dignio.com/no/mydignio/>.

Dignio (2023). "MyDignio." 3.14.2. from <https://apps.apple.com/nl/app/mydignio/id1166598602?l=en>.

Direktoratet for e-helse (2022). "E-helsetrender: Utviklingstrekk 2022." IE-1098.

Dorresteyn, V. (2014). "Radboudumc worstelt met Epic." from <https://www.zorgvisie.nl/radboudumc-worstelt-met-epic-1516293w/>.

Elmansy, R. (2021). "The Double Diamond Design Thinking Process and How to Use it." Designorate <https://www.designorate.com/the-double-diamonddesign-thinking-process-and-how-to-use-it/> Accessed February 2023.

Getzoff, M. (2022). "Most Technologically Advanced Countries In The World 2022" Designorate <https://www.gfmag.com/global-data/non-economic-data/best-tech-countries>

Gaglio, B., et al. (2012). "Do patient preferences for health information vary by health literacy or numeracy? A qualitative assessment." *Journal of health communication* 17(sup3): 109-121.

Gibbons, S. (2018). "Journey Mapping 101." from <https://www.nngroup.com/articles/journey-mapping-101/>.

Gilbert, S., et al. (2020). "How accurate are digital symptom assessment apps for suggesting conditions and urgency advice? A clinical vignettes comparison to GPs." *BMJ open* 10(12): e040269.

Gilstad, H. (2014). "Toward a Comprehensive Model of eHealth Literacy." *PAHI* 63: 72.

Greenberg, A. J., et al. (2017). "Access to Electronic Personal Health Records Among Patients With Multiple Chronic Conditions: A Secondary Data Analysis." *Journal of medical Internet research* 19(6): e188.

Guo, J. and B. Li (2018). "The application of medical artificial intelligence technology in rural areas of developing countries." *Health equity* 2(1): 174-181.

Helse- og omsorgsdepartementet (2019). "Nasjonal helse- og sykehusplan 2020 – 2023." Meld. St. 7.

Helsedirektorat (2022). "Gå10." 2.3.1. from <https://apps.apple.com/nl/app/g%C3%A5-10/id1447263129?l=en>.

Helsedirektorat (2022). "Heia meg." 2.8.1. from <https://apps.apple.com/nl/app/hea-meg/id1446753385?l=en>.

Helsedirektorat (2023). "Slutta." 3.0.0. from <https://apps.apple.com/nl/app/slutta/id1514235393?l=en>.

Helseplattformen (2022). "Endringer som kommer med Helseplattformen." from <https://helseplattformen.no/endringer-som-kommer-med-helseplattformen#kodeverk-og-terminologi>.

Helseplattformen (2022). "helsami-og-helsenorge." from <https://helseplattformen.no/helsami/helsami-og-helsenorge>.

Helseplattformen (2022). "Hva er HelsaMi." from <https://helseplattformen.no/helsami/hva-er-helsami>.

Hertzum, M. and G. Ellingsen (2019). "The implementation of an electronic health record: Comparing preparations for Epic in Norway with experiences from the UK and Denmark." *International journal of medical informatics* 129: 312-317.

Hofer, F. and D. Haluza (2019). "Are Austrian practitioners ready to use medical apps? Results of a validation study." *BMC medical informatics and decision making* 19(1): 1-9.

Hollington, J. (2023). "What is NFC? How it works and what you can do with it" from <https://www.digitaltrends.com/mobile/what-is-nfc/>

Huvila, I., et al. (2016). "Taking health information behaviour into account in the design of eHealth services." *Finnish Journal of eHealth and eWelfare* 8(4): 153-163.

Jordan, J. E., et al. (2010). "Conceptualising health literacy from the patient perspective." *Patient education and counseling* 79(1): 36-42.

Kascak, L. R., et al. (2014). Integrating Universal Design (UD) principles and mobile design guidelines to improve design of mobile health applications for older adults. 2014 IEEE international conference on healthcare informatics, IEEE.

Kim, E.-H., et al. (2009). "Challenges to Using an Electronic Personal Health Record by a Low-Income Elderly Population." *Journal of medical Internet research* 11(4): e44.

Kivekäs, E., et al. (2016). "General practitioners' attitudes towards electronic prescribing and the use of the national prescription centre." *Journal of evaluation in clinical practice* 22(5): 816-825.

Ku, B. and E. Lupton (2022). *Health design thinking: creating products and services for better health*, MIT Press.

Majumder, S. and M. J. Deen (2019). "Smartphone Sensors for Health Monitoring and Diagnosis." *Sensors (Basel)* 19(9).

Meskó, B., et al. (2017). "Digital health is a cultural transformation of traditional healthcare." *Mhealth* 3.

Mold, F., et al. (2015). "Patients' online access to their electronic health records and linked online services: a systematic review in primary care." *British Journal of General Practice* 65(632): e141-e151.

Moll, J., et al. (2018). "Patients' Experiences of Accessing Their Electronic Health Records: National Patient Survey in Sweden." *Journal of medical Internet research* 20(11): e278.

Nguyen, A. D., et al. (2019). "Patients' use of mobile health applications: what general practitioners think." *Family practice* 36(2): 214-218.

Norgaard, O., et al. (2015). "The eHealth literacy framework: a conceptual framework for characterizing eHealth users and their interaction with eHealth systems." *Knowledge Management & E-Learning* 7(4): 522.

Norsk Helsenett (2022). "Brukerveileder for Helsenorge."

Norsk Helsenett (2023). "Helsenorge." 2.4.69. from <https://apps.apple.com/nl/app/helsenorge/id1108860468>.

Nutbeam, D. (2000). "Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century." *Health promotion international* 15(3): 259-267.

Oedekoven, M., et al. (2019). "Patients' health literacy in relation to the preference for a general practitioner as the source of health information." *BMC Family Practice* 20: 1-10.

Ørnhaug, G. T. E. R. (2023). "Direktør for Helseplattformen skylder på brukerne for at 16.000 brev ikke kom dit de skulle." from <https://www.nrk.no/trondelag/direktor-for-helseplattformen-skylder-pa-brukerne-for-at-16.000-brev-ikke-kom-dit-de-skulle-1.16327273>.

Pagliari, C., et al. (2005). "What is eHealth (4): a scoping exercise to map the field." *Journal of medical Internet research* 7(1): e391.

Patient Sky AS (2022). "PatientSky." 7.2.1. from <https://apps.apple.com/nl/app/patientsky/id1031577563>.

pch. cector (2020). Free Vector. Freepik. <https://www.freepik.com/author/pch-vector>

Powell, R. E., et al. (2017). "Patient Perceptions of Telehealth Primary Care Video Visits. ." *Annals of family medicine* 15: 225-229.

Prevention, C. f. D. C. a. (2023). "What Is Health Literacy?". from <https://www.cdc.gov/healthliteracy/learn/index.html>.

Roess, A. (2017). "The Promise, Growth, and Reality of Mobile Health — Another Data-free Zone." *New England Journal of Medicine* 377(21): 2010-2011.

Ruland, C. M., et al. (2008). "Developing a shared electronic health record for patients and clinicians."

Segui, F. L., et al. (2018). "The prescription of mobile apps by primary care teams: a pilot project in Catalonia." *JMIR mHealth and uHealth* 6(6): e10701.

Sekaran, U. and R. Bougie (2016). *Research methods for business: A skill building approach*, John Wiley & Sons.

Stickdorn, M., et al. (2018). *This is service design doing: applying service design thinking in the real world*, " O'Reilly Media, Inc."

Sun, X., et al. (2022). "Wearable Near-Field Communication Sensors for Healthcare: Materials, Fabrication and Application." *Micromachines* 13(5): 784.

Sutcliffe, A., et al. (2010). "User engagement by user-centred design in eHealth." *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 368(1926): 4209-4224.

Thobroe, S. (2023). "Pasient ved St. Olavs hospital døde av slag: Fylkeslege kobler dødsfallet til Helseplattformen." from [https://www.nrk.no/trondelag/pasient-ved-st.-olavs-hospital-dode-av-slag\\_-fylkeslege-kobler-dods-fallet-til-helseplattformen-1.16256179](https://www.nrk.no/trondelag/pasient-ved-st.-olavs-hospital-dode-av-slag_-fylkeslege-kobler-dods-fallet-til-helseplattformen-1.16256179).

Tjerbo, T. and L. Kjekshus (2005). "Coordinating health care: lessons from Norway." *International journal of integrated care* 5(28).

Wahl, B., et al. (2018). "Artificial intelligence (AI) and global health: how can AI contribute to health in resource-poor settings?" *BMJ global health* 3(4): e000798.

Walker, J., et al. (2019). "OpenNotes After 7 Years: Patient Experiences With Ongoing Access to Their Clinicians' Outpatient Visit Notes." *Journal of medical Internet research* 21(5): e13876.

Wang, Y., et al. (2013). "Do men consult less than women? An analysis of routinely collected UK general practice data." *BMJ open* 3(8): e003320.

Wattanapisit, A., et al. (2020). "Can mobile health apps replace GPs? A scoping review of comparisons between mobile apps and GP tasks." *BMC medical informatics and decision making* 20(1): 1-11.

WHO (2011). "mHealth: new horizons for health through mobile technologies." World Health Organization.

WTW AS (2019). "HelseRespons." 1.2.6. from <https://apps.apple.com/nl/app/helserespons/id889988148?l=en>.

Wynn, R., et al. (2020). "Special issue on eHealth services." 17(8): 2885.

Youwell (2022). "Mariners Medico Guide." 1.1. from <https://apps.apple.com/nl/app/mariners-medico-guide/id1642481858?l=en>.

Zanaboni, P. and A. J. Fagerlund (2020). "Patients' use and experiences with e-consultation and other digital health services with their general practitioner in Norway: Results from an online survey." *BMJ open* 10(6): e034773.

Zanaboni, P., et al. (2020). "Patient use and experience with online access to electronic health records in Norway: results from an online survey." *Journal of medical Internet research* 22(2): e16144.

# Appendix



# Appendix A: Consent form

## Consent form for survey 1 & interviews

### Design project on an application for General Practitioners

This is an inquiry about participation in a research project where the main purpose is to

understand how communication between General Practitioners and their patients now goes and how it can improve. In this letter, I will give you information about the purpose of the project and what your participation will involve.

### Purpose of the project

My main goal is to make an application to help improve communication between General Practitioners and their patients. This study focuses on how General Practitioners communicate with their patients and how an app can make this communication more efficient. Therefore, also (perspective) patients' perceptions will be investigated to understand how to provide an optimal user experience for them. This survey is part of the master's thesis at NTNU for Interaction Design.

### Who is responsible for the research project?

NTNU is the institution responsible for the project. The researcher is Lilian van den Bos, a 2nd-year master's student at the Faculty of Design. The study's supervisor is Mari Bjerck (mari.bjerck@ntnu.no), an assistant professor at the Faculty of Design.

### Why are you being asked to participate?

You have been selected because you are a person that might go to a GP one in a while that is willing to help me in making an application to improve the communication between General Practitioners and their patients.

### What does participation involve for you?

If you choose to take part in this study, it will involve answering this survey, and at the end, you can put your email if you want to participate in further work, such as testing the application.

### Participation is voluntary

Participation in the project is voluntary. If you choose not to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you choose not to participate or later decide to withdraw.

### Your personal privacy – how we will store and use your personal data

No personal data will be used in the final report, only when handling it during the data processing phase. The personal data will be processed confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act). Any names or contact details will be removed as they are not relevant to the study. As well as myself, the study's supervisor will have access to the data collected.

### What will happen to your personal data at the end of the research project?

The study is scheduled to end on June 30th 2023. The data collected will be destroyed and deleted at the end of the study.

### Your rights

So long as you can be identified in the collected data, you have the right to:

- Access the personal data that is being processed about you
- Request that your personal data be deleted
- Request that incorrect personal data about you be corrected/rectified
- Receive a copy of your personal data (data portability), and
- Send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

### What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement with NTNU, NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is by data protection legislation.

### Where can I find out more?

If you have questions about the project or want to exercise your rights, contact:

- NTNU via myself, Lilian van den Bos (lfvanden@stud.ntnu.no) or the study supervisor Mari Bjerck (mari.bjerck@ntnu.no).

Yours sincerely,

Mari Bjerck  
Project Leader  
(Supervisor)

Lilian van den Bos  
Student

-----  
Consent form

I have received and understood information about the project "implementing welfare technology in health care services through service design from the perspective of a designer." and have been allowed to ask questions. I give consent:

- to participate in an interview

I give oral consent for my personal data to be processed until the project's end date, approx. June 30th 2023

(Signed by participant, date)

(Consent form based on the consent form in: "Improving the user's experience post-acquisition" from Grubb 2021)

# Appendix B: Surveys and Interviews

## Questions for Survey 1

### Introduction:

My goal with this survey is to find out how communication now goes between GPs and their patients. And what GPs need from their patients in order to have a successful understanding of their patients' symptoms. My main goal is to make an application to help improve communication between General Practitioners and their patients.

This survey first has a couple of questions about your background and will then proceed with more focused questions. If you prefer to answer in Norwegian, you are able to do so.

You never have to fill out what you had or what symptoms you had or any other personal data.

### Screening and demographics questions

1. What is your age group? (Less than 35 years, 35-44 years, 45-54 years, 55-64 years, over 65 years)
2. What is your gender? (Male, Female, rather not say)
3. I have gone to the general practitioner in... (less than half a year ago, half a year- a year ago, a year-2 years ago, 2-4 years ago, 5 years or more ago)

### Mobile health section

1. How do you communicate with your general practitioner?
2. Specifically, what you use (messenger, helseNorge, phone calls)
3. Do you use applications to convey your health (eg. Google Fit, Apple Health, etc.) when you are at the general practitioner's? (Yes/No)
4. (You selected No) Why don't you use applications when you are at the general practitioner fill out why. (Eg. I am not confident in how to safely use mobile technology, I don't see how it can convey what I have, etc.)
5. What kind of health applications do you use?
6. Did your general practitioner recommend an application to you?
7. Please rate the following barriers to health app integration, for why you would not install an app (where 1 is the most important barrier and 5 is the least important):
  - lack of knowledge of effective apps
  - lack of a trustworthy source to access effective apps
  - lack of access to mobile devices
  - lack of interest
  - lack of understanding of benefits
  - others (please specify)
8. What would help you to use health apps more often?
9. How would you like to receive training on the use of effective health apps, including app evaluation? (eg, webinars, animations, podcasts)

10. What would you like from an application to help you communicate with your general practitioner? (eg, diary for patients, forms to determine what kind of illness the patients have, a silhouette of a body to determine where your pain is, a place to embed an image)

11. Is there anything you would like that would make communication a lot smoother and easier between the general practitioner and you?

### Closing:

12. Is there anything else you would like to add that you feel has not been answered?

13. Do you want to participate in a workshop? If yes, fill in your email.

Thank you – those are all the questions I have for you.

If anything else occurs to you after I leave, please don't hesitate to let me know by email.

I may be in touch with you again to ask a few follow-up questions if that is ok?

Thanks again!

## Questions for Interviews

### Introduction:

Thank you for your interest in participating in this study. Your feedback is crucial to the success of my master's thesis project in Interaction Design. My goal with this interview is to help me understand your needs and expectations for an application that can improve communication between patients, doctors, and their general practitioners (GPs).

This survey first has a couple of questions about your background and will then proceed with more focused questions. If you prefer to answer in Norwegian, you are able to do so.

You never have to fill out what you had or what symptoms you had or any other personal data.

### Screening and demographics questions

1. What is your age group? (Less than 35 years, 35-44 years, 45-54 years, 55-64 years, over 65 years)
2. What is your gender? (Male, Female, rather not say)
3. What is your role in the user committee? And what does the user committee do?
4. How did you get involved?

### Personal mobile health section

1. Have you ever used any digital tools or applications to monitor your health progress or communicate with your doctor/GP? If yes, which ones, and what did you like or dislike about them? Specifically, what you use (messenger, helseNorge, phone calls)
2. Why don't you use applications when you are at the general practitioner fill out why. (Eg. I am not confident in how to safely use mobile technology, I don't see how it can convey what I have, etc.)
  - lack of knowledge of effective apps
  - lack of a trustworthy source to access effective apps
  - lack of access to mobile devices
  - lack of interest
  - lack of understanding of benefits
  - others (please specify)
3. Would you or the group you are representing be willing to use an application that could help you communicate with your doctor/GP and monitor your health progress?
4. How often does the person you are representing visit their doctor/GP, and what are the most common reasons for their visits?
5. How comfortable are you and the group you are representing with sharing their health information (e.g., symptoms, medical history, test results) with your doctor/GP?

6. Has the person you are representing or you yourself ever experienced any difficulties or barriers in communicating with their doctor/GP? If yes, what were they, and how did they affect their health management?
7. How do you or the group you are representing normally get information in between doctor's visits, and what kind of information do they usually get?
8. Have you ever heard about any difficulties or barriers in communicating with doctor/GP Or did you yourself have any difficulties? If yes, what were they, and how did they affect health management?
9. Did you or the group you are representing ever felt that they weren't prepared for a doctor's visit, or for in-between visits? Like they lacked information.
10. What information would you or the group you are representing like to receive from their doctor/GP between visits (e.g., test results, medication changes, treatment plans)?
11. What features or functions would you or the group you are representing like to see in an application that could help them communicate with your doctor/GP and monitor your health progress (e.g., appointment scheduling, medication reminders, symptom tracking)?
12. What are your or the group you are representing concerns or reservations about using a health monitoring application?

### Anything Extra

13. Is there anything else you would like to share that could help us design a better application for patients like you?
14. What would you like from an application to help you communicate with your general practitioner? (eg, diary for patients, forms to determine what kind of illness the patients have, a silhouette of a body to determine where your pain is, a place to embed an image)
15. Is there anything you would like that would make communication a lot smoother and easier between the general practitioner, doctor and you?

### HelsaMi

16. Have you ever used the HelsaMi app? If yes, what were your experiences with the app?
17. Do you have any other suggestions or feedback on how the HelsaMi app can be enhanced to prioritise the patient's role as an active participant in their clinical journey?
18. What are some of the features you would like to see in the HelsaMi app that is not currently available?
19. How do you feel about being an active participant in your clinical journey? Do you think this should be prioritised in the HelsaMi app?

**Closing:**

20. Is there anything else you would like to add that you feel has not been answered?

21. Do you want to participate in a workshop? If yes, fill in your email.

Thank you – those are all the questions I have for you.

If anything else occurs to you after I leave, please don't hesitate to let me know by email.

I may be in touch with you again to ask a few follow-up questions if that is ok?

Thanks again!

## Questions for Survey 2

**Communication between your doctor and you**

The inquiry is about a research project aimed at improving communication between General Practitioners and their patients through the development of an application. The study will investigate the communication process between General Practitioners and patients and gather feedback from patients to provide an optimal user experience. The project is being conducted by Lilian van den Bos, a master's student at NTNU, under the supervision of Mari Bjerck.

Participation in the project is voluntary, and personal data will be processed confidentially and in accordance with data protection legislation. Participants have the right to access, delete, and correct their personal data and may file a complaint if necessary. Personal data will be destroyed and deleted at the end of the study.

*The Norwegian version is available, however, it may contain errors.*

**Introduction:**

Thank you for your interest in participating in this study. Your feedback is crucial to the success of my master's thesis project in Interaction Design. My goal with this interview is to help me understand your needs and expectations for an application that can improve communication between patients, doctors, and their general practitioners (GPs). This survey first has a couple of questions about your background and will then proceed with more focused questions. If you prefer to answer in Norwegian, you are able to do so. You never have to say what you had or what symptoms you had or any other personal data.

I understood the information about the project "How can the HelsaMi app, currently used in the Health Region Central Norway, be enhanced to prioritise the patient's role as an active participant in their clinical journey, resulting in advantages for both the patient and general practitioner?" and have been allowed to withdraw at any time. I give consent:

Yes/No

**Screening and Demographic Questions**

1. To which Health region in Norway do you belong to
  - Helse Midt-Norge/Helse Nord/Helse Vest/Helse Sør-Øst
2. What is your age group?
  - 18-24 25-34 35-44 45-54 55-64 over 65
3. What is your gender?
  - Woman/Man/Non-binary/Prefer not to say
4. Are you taking care of a person who needs medical help?
  - Yes/No

### Personal Mobile Health section

All in all, how dissatisfied or satisfied are you with the health services when it comes to:

5. Possibility of digital access to health information? (e.g. responses to examinations and tests, medications, visit summaries)
  - Very dissatisfied Somewhat satisfied Neither satisfied nor dissatisfied Somewhat dissatisfied Very satisfied Do not know
6. Possibility of digital contact with your GP or doctor? (e.g. get information, send message, order/change appointments, renew prescription)
  - Very dissatisfied Somewhat dissatisfied Neither satisfied nor dissatisfied Somewhat satisfied Very satisfied Do not know

### Contact with GP

7. When did you have contact with a general doctor last? By contact I mean, for example, personal attendance, telephone or consultation via video or internet-based solution
  - In the past 12 months/More than a year ago/Do not know
8. How did you have contact with your doctor/GP?
  - Phone/Email/Personal attendance/Video consultation/HelseNorge/PatientPortal at the GP/Paper letter/Other

### For you and the person you care for

You can fill this in general for you and the person you care for

9. To what extent have the information and communication enabled you to participate actively in treatment/follow-up for yourself or for the person you take care of? (such as participating in decision-making processes, recording needs, and performing a task)
  - Not at all/To a small degree/To some degree/Largely/To a very large extent / Don't know/not applicable
10. What would you like to have in an application to take a more active role in your care or the care of the person you are caring for?
11. To what extent has the information and communication enabled you to take care of your own health/the health of the person you care for?
  - Not at all/To a small degree/To some degree/Largely/To a very large extent / Don't know/not applicable
12. What kind of information would you like to have to better take care of your own health or the health of the person you care for?
13. How difficult or easy is it to get in contact with your GP?
  - Extremely difficult/Somewhat difficult/Neutral/Somewhat not difficult/Extremely not difficult/Don't know-not applicable

14. How difficult or easy is it to get answers to medical questions? (which does not require an immediate response)
  - Extremely difficult/Somewhat difficult/Neutral/Somewhat not difficult/Extremely not difficult/Don't know-not applicable
15. How difficult or easy is it to get answers to administrative questions? (such as questions about the place of attendance, preparations, appointment booking, and deductible)
  - Extremely difficult/Somewhat difficult/Neutral/Somewhat not difficult/Extremely not difficult/Don't know-not applicable

### Access to health information

16. How good or bad is your GP at giving you information in advance of treatment/follow-up for yourself?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
17. How good or bad is your GP at giving you information in advance of treatment/follow-up for the person you care for?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
18. What kind of information do you need to better prepare for your visit or you visit together with the person you care for?
19. How good or bad is your GP at giving you answers to surveys and tests for yourself?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
20. How good or bad is your GP at giving you answers to surveys and tests for the person you care for?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
21. How good or bad is your GP at giving you written summaries after treatment and examinations for yourself or for the person you care for?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
22. How good or bad is your GP at giving you written information about health, illness and treatment options for yourself or for the person you care for?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
23. How good or bad is your GP at giving you the opportunity to check health information in the patient record for yourself?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable

24. How good or bad is your GP at giving you the opportunity to check health information in the patient record for the person you care for ?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
25. How good or bad is your GP at giving you the opportunity to add information to the patient record (such as allergies and medications) for yourself?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
26. How good or bad is your GP at giving you the opportunity to add information to the patient record (such as allergies and medications) for the person you care for?
  - Very bad/Pretty bad/Neither bad or good/Pretty good/Very good/Don't know-not applicable
27. To what extent do you feel that the health services (with which you have had contact) inform each other about examinations, treatment and follow-up for yourself?
  - Not at all/To a small degree/To some degree/Largely/To a very large extent/Don't know-not applicable
28. To what extent do you feel that the health services (with which you have had contact) inform each other about examinations, treatment and follow-up for the person you care for?
  - Not at all/To a small degree/To some degree/Largely/To a very large extent/Don't know-not applicable
29. What would you like to see on an application that helps you better communicate with your GP?
  - Time line of the condition/Chatbox (eg. Direct line with your GP)/Picture of a silhouette to say where your symptoms lie/Pictures of a silhouette to learn more about body parts and learn about health-related stuff covering that part/ Waiting time at the doctor's office More information and easier access about diseases-illnesses so you don't have to always go to the doctor/ Other
30. Which of the options do you think is most important

### Open Questions

31. What information would you or the group you are representing like to receive from their doctor/GP between visits (e.g., test results, medication changes, treatment plans)?
32. What features or functions would you or the group you are representing like to see in an application that could help them communicate with your doctor/GP and monitor your health progress (e.g., appointment scheduling, medication reminders, symptom tracking, a diary for patients, forms to determine what kind of illness the patients have, a silhouette of a body to determine where your pain is, a place to embed an image)?
33. Is there anything else you would like to share that could help us design a better application for patients like you?

### HelsaMi

34. Have you ever used the HelsaMi app?
  - Yes/No
35. How do you like the HelsaMi app?
36. How do you feel about being an active participant in your clinical journey? Do you think this should be prioritised in the HelsaMi app?
37. Do you have any other suggestions or feedback on how the HelsaMi app can be enhanced to prioritise the patient's role as an active participant in their clinical journey?

### Closing

38. Is there anything else you would like to add that you feel has not been answered?
39. Do you want to participate in...
  - A workshop (for possibly testing a prototype)/ Answering further questions/ No I'm not available

Thank you for filling this form out. I would greatly appreciate it if you could distribute it to family and friends.

# Appendix C: User Test

Thank you for your interest in participating in this study. Your feedback is crucial to the success of my master's thesis project in Interaction Design. My goal with this interview is to help me understand your needs and expectations for an application that can improve communication between patients, doctors, and their general practitioners (GPs).

This User Test has first has a couple of questions about your background and will then proceed with more focused questions. I would appreciate it if I can record this session, this is pure for myself and nobody will ever heard it, but me.

## What do I want to know:

- If anything is not to satisfaction of the user
- Is everything is understood
- If it's better than it was before
- If the symptom tracker is something the users want
- What do they expect from a symptom tracker
- Does it need to be more visual
- Do they want a full diary for symptom tracking?
- What do they want from a treatment plan on the app?
- Who do you think should add these treatments?
- Where do you think they come from?
- What kind of information do you want to have here?

## Background

1. What is your age group? (Less than 35 years, 35-44 years, 45-54 years, 55-64 years, over 65 years)
2. What is your gender? (Male, Female, rather not say)
3. Have you ever used HelsaMi?
  - Confusing to book appointment
  - How often do you use it?
    - Every day
    - Once a week
    - Once a month
    - Twice a month
    - Quarterly
    - Once a year
    - Less than once a year
4. What are the main functions you miss in HelsaMi?

## 1st FLOW: Feature: Push notifications and reminders

5. Check your notifications on the app (this time you can click).
6. What do you think of the layout?
7. What do you think every thing is/ what do you think every button does or shows?
8. What is different with the app how it is now?
9. Do you like the differences?
10. What do you miss here?

## 2nd FLOW: Feature: Messaging with the GP

11. You want to send a message to your GP where do you click on
12. How is this different than it was before?
13. Describe on every page what you think the buttons are for/ Click also on "messages"
14. What do you think every thing is/ what do you think every button does or shows?
15. What is different with the app how it is now?
16. Do you like the differences?
17. What do you miss here?

## 3rd FLOW: Symptom tracking AND Treatment plan 1

18. You want to add a headache that you have had on Tuesday 4th of April
19. What do you think of the layout?
20. What do you think every thing is/ what do you think every button does or shows?
21. What is different with the app how it is now?
22. Do you like the differences?
23. What do you miss here?
24. Now you also want to check (future) treatments where do you think that is
25. Do you think this should be here?
26. Who do you think should add these treatments?
27. Where do you think they come from?
28. What kind of information do you want to have here?
29. What do you think every thing is/ what do you think every button does or shows?
30. What is different with the app how it is now?
31. Do you like the differences?
32. What do you miss here?

## 4th FLOW: Symptom tracking AND Treatment plan 2

33. You want to add a headache that you have had on Tuesday 4th of April
34. What do you think of the layout?
35. What do you think every thing is/ what do you think every button does or shows?
36. What is different with the app how it is now?
37. Do you like the differences?
38. What do you miss here?
39. Now you also want to check (future) treatments where do you think that is

40. Do you think this should be here?
41. Who do you think should add these treatments?
42. Where do you think they come from?
43. What kind of information do you want to have here?
44. What do you think every thing is/ what do you think every button does or shows?
45. What is different with the app how it is now?
46. Do you like the differences?
47. What do you miss here?

Thank you – those are all the questions I have for you.

If anything else occurs to you after I leave, please don't hesitate to let me know by email.

I may be in touch with you again to ask a few follow-up questions if that is ok?

Thanks again!





 **NTNU**

Norwegian University of  
Science and Technology