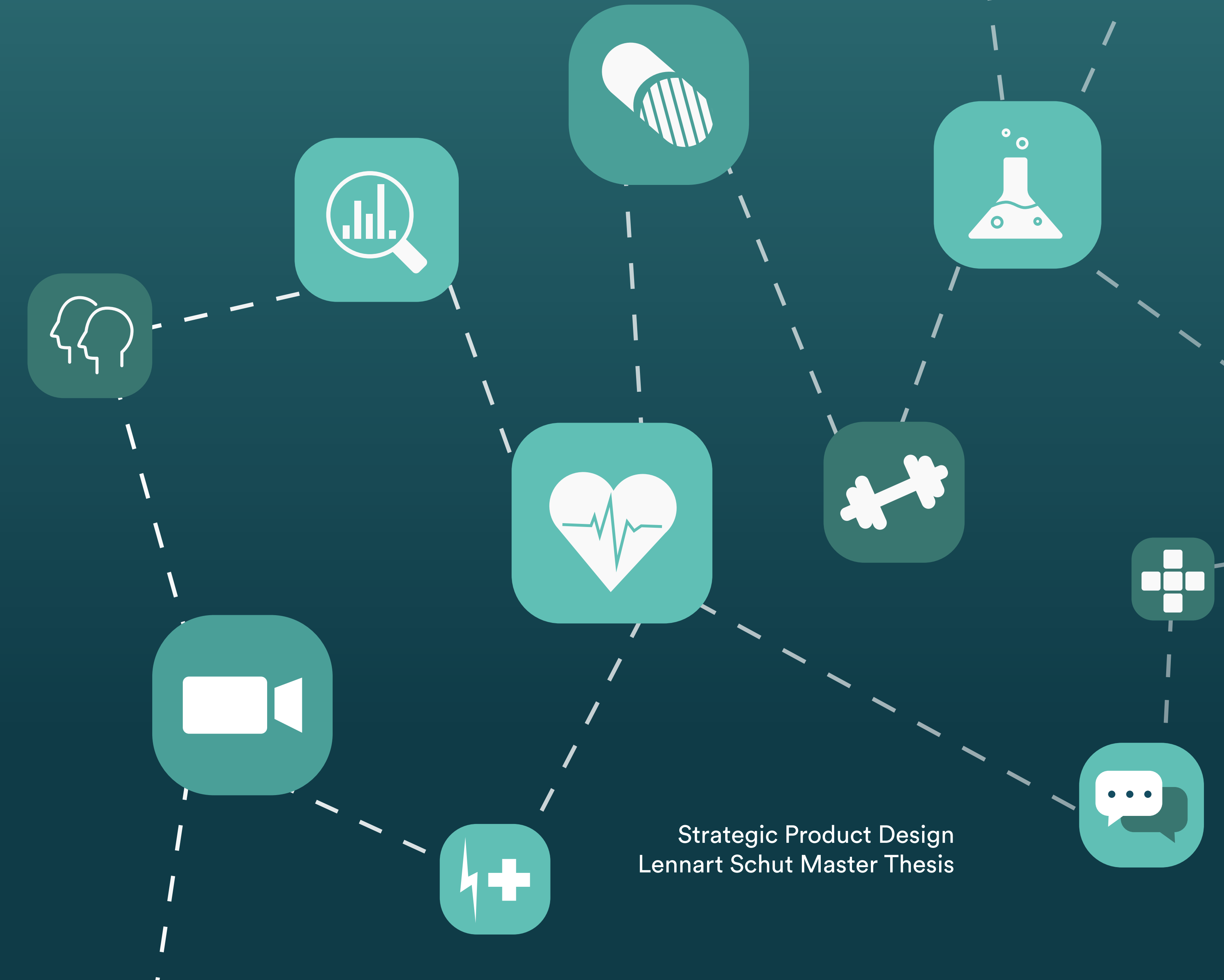
The Digital Entrance for Primary Care

Translating patients' and caregivers' needs into a new way to interact and connect



Strategic Product Design
Lennart Schut Master Thesis

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MASTER THESIS

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EXECUTIVE SUMMARY

The current pandemic has drastically changed the primary care field. Suddenly, GP practices had to implement more digital or ‘care at a distance’ methods to keep interacting with patients. This was reflected by the strong increase in telephone consults and practices that used video calling for the first time. However, the sudden digital experience is not welcomed with open arms by patients and caregivers. 47% of the patient express that they are not positive about ‘care at a distance’ modalities (Meurs, 2020b), and approximately only a quarter of caregivers want to intensify e-consultation methods after the pandemic (Keuper, 2020). It is quite likely that after this pandemic, both groups want to return to the previous status quo, regardless of the benefits that eHealth and e-consultation can provide.

The goal of this graduation project was to increase the adoption of e-consultation in primary care together with IZER. IZER is a supportive organisation for primary care practices in the region of Rotterdam Rijnmond that aims for improving the quality of care. The graduation project followed the roadmapping process, starting with an analysis consisting of a literature study, qualitative interviews, and observations. During the research, caregivers and patients were thoroughly analysed to search for trends and wishes about (digital) primary care. The major discovered trends were the need for higher efficiency in the process due to the high effort of digitalisation, the demanded shift in control to the patient, the need for accessibility for the patient, the wish for digital to support the process, and the need for good communication. Together with a technology scout, an ideation was performed to look for suitable solutions. In the end, a final concept was chosen and developed into a strategy and a new user-journey.

The result is DagKo: the Data-driven complaint support for patients in primary care (Data-gedreven Klacht Ondersteuning). DagKo is a software service that supports patients to do their triage independently and guides them towards the best next step concerning their complaint and medical history. The service uses data from previous patients with similar situations to analyse the most efficient and effective methods in a specific situation. Additionally, new consultation options are added to enhance the right care in the right situation. These additions consist of a data-driven virtual doctor, a monitoring program and a quickly accessible doctor service. To strengthen the implementation of the concept, a strategy was made in the form of two roadmaps. Next to this, the user-journey was improved according to the new service.

The needs and wishes of the patients and caregivers were translated into DagKo. The software provides increased accessibility and control for the patients. It is an service that listens carefully to the user and gives options for the best suitable care. This service is not only beneficial for patients. Because of the smart use of data, caregivers will be supported with suitable advice during their triage. Caregivers just have to confirm the suggested modality by the software. This will result in an increase in efficiency for the caregivers, letting them give more attention to patients that need it by spending less time on simple situations.

During the user-testing, patients experienced the two characteristics of the concept, the option to choose and data-driven advice based on effectiveness and efficiency, as positive. The additional modalities were ranked relatively positively, but due to the futuristic aspects were also harder to grasp. Caregivers also expressed support for the concept of DagKo. The caregiver acknowledged the potential of the gain in efficiency and it was recognized that the service is especially useful for filtering easier complaints. The technical difficulties in the realisation of the concept were mentioned by a data expert and caregivers and recognized during the strategy. In the strategy, it became apparent that the biggest bottleneck of this concept was the centralized data warehouse that needed to be created. Strategic suggestions were made to ease the transition towards the set final concept. One important aspect of this strategy is to validate the concept by the use of a pilot performed at CBS.

PREFACE

Graduation, the end of studying at the Technology University of Delft, offers a lot of opportunities. During this time, I got to choose an assignment and a context that I wanted to design for. With my field of interest, the choice was made to analyse and design for a very basic human need: medical care. With a focus on primary care, also known as the gatekeeper of care.

At the start of my project, three skilled professionals were asked to help me during the process: Lianne Simonse, Ruud van Heur and Kit Kattenberg. Lianne Simonse, chair, continuously helped me to raise the bar of my project with her thorough and sharp feedback, especially in the academic and roadmapping field. Ruud van Heur, the mentor, succeeded in motivating me after each coaching meeting where he guided me through the process with inspiring anecdotes. Last but not least, Kit Kattenberg as the company mentor. During the process, Kit's skilled feedback and collaborative mindset challenged me to bring the concept to a higher level. Thank you all for your support during my graduation, I learned a lot from you.

Furthermore, during this process, I did a lot of actions that required other people to gain information or insights. I want to thank them all, and especially the employees of IZER, for their time, effort and openness to make my project a success.

At last, during the process, I got a lot of support from my family and friends. I especially want to thank my parents, their ability to cheer me up always amazes me, and my roommates. Because this thesis was mostly written at home, it was great to have friends close that went through the same process.

Enjoy reading, and do not hesitate to contact me if you have any questions or comments.

Lennart Schut

March 2021
Rotterdam

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Chapter 1.

Project Introduction

1. Project Introduction

1.1. Primary care

1.1.1. Seeking medical help

Central in this project, is primary care. Primary care is part of the total Healthcare system. The Dutch government describes primary care as follows:

> ***"Primary care is care for which you do not need a referral to make an appointment. This can be a treatment by your general practitioner, dentist, physiotherapist, social worker or local nurse"*** *(Rijksoverheid, 2020a).*

Medical care is needed when a person gets sick or has a medical-related question. This makes primary care usually the first contact point for patients that seek medical help. GPs, with support from other medical professionals and assistants, work in the primary care and handle day-to-day healthcare. Usually, a person calls the GP or goes online to make an appointment. During the consultation, the GP listens to the patient about their request for medical care or advice. The GP asks questions and can perform simple tests (e.g. listening to the function of the heart) to analyse the possible cause. After that, the GP decides what the best way is to help or treat the patient. There are several actions the GP can do, such as providing preventive care, health education, prescription of medicine, redirection to a specialist, etc. This consultation is an important interaction that requires a safe space for the patient to be open about their medical needs and complaints and for the doctor to do the consultation.

If the patient needs to see a specialist because of an action that the primary caretaker can not do, then the patient gets referred to the secondary care line. This is why primary care also functions as a gatekeeper for secondary care. It is important to know that in this dynamic, secondary care is more expensive than primary care. Therefore, it is motivated (by for example the government) that the primary care caregivers help the patients as far as they can (Rijksoverheid, 2020b).

1.1.2. The actors

During the care process, there are usually three main actors: the patient, the GP, and the assistant. Furthermore, some practices hired additional practice supports to work at the practice. The main stakeholders are reflected briefly below based on the orientation.

1. In the primary care process is the **patient** the one that needs professional help to solve their medical question or complaint. It is common that the patient is the one that contacts the practice. However, in some cases such as check-ups, test results, or others, the practice will contact the patient.

2. The **assistant** has two goals: to help the patient and to assist the GP. The assistant helps the patient in multiple ways. Some main examples of these actions include: be available as the first point of contact for patients, perform triages, test and check-ups, give medical advice. In this triage, the assistant determines the priority of the patients' complaint and estimates the chances of likelihood that the complaint will pass with or without treatment. This step prevents that the GP will receive every patient, which is important to do due to his busy schedule. Next to this, the assistant assists the GP in communicating to patients, planning their agendas, keeping the patient dossiers up-to-date and other (administrative) tasks.

3. The **GP** has the main goal to provide care to the patient. The GP is a generalist that can estimate well what kind of care a patient needs. If a GP is uncertain about the right type of care needed, then the GP will give the patient a referral or ask for a "look consult" (in Dutch: Kijkconsult) from a specialist.

4. In the Netherlands, there are two kinds of **practice supports** (POH: praktijkondersteuner huisarts): practice support somatic and practice support mental healthcare (Patiëntenfederatie Nederland, 2020). The POHs are in support of the GP practice with a specialized care field. The practice supports somatic focuses on chronic care; diseases that patients have their whole life. These diseases include diabetes, cardiovascular diseases, asthma/COPD. The care of chronic care patients usually focuses a lot on lifestyle, so a big part of the job is to motivate and educate their patients. The practice support mental healthcare started in 2007 due to the rising need for psychological and psychosocial and the rising mental healthcare costs in the secondary care line (POH-GGZ, 2020). The POH-GGZ employees support the GP with patients that have psychological, psychosocial, and psychosomatic complaints. Noteworthy for both POHs, the GP always keeps the final responsibility of the care of the patient.

Some of the values of the actors are in line with each other. The caregivers want to provide the best care possible and the patient wants to receive the best care. Next to this, caregivers run a "business" so they want to optimize operations to lower the work pressure and their costs. The patient on the other hand also values the speed and ease of their consultation.

1.1.3. The problem

The interaction between caregivers and patients can be done in several communication ways, such as: physically at the practice, physically at the patients home, by phone, chat, video call, and more. There is a division that can be made between traditional methods and digital methods. Digital methods are also called e-consultation and they are a rather underused method by caregivers. This can be seen in the slow adaptation. Between 2011 and 2016, the number of email consults in the Netherlands was raised from approximately 0,2% to 0,7%(Nivel, 2018). Primary care is slow to adopt innovative digitalization, as noted by the client of this assignment IZER.

This has changed due to the recent pandemic of COVID-19. Due to the way that the virus spreads, it made contact between people difficult and (possibly) dangerous. For GPs and their patients, this might be a boost in a more digital and thus safe way of working. That is not the only benefit of e-consultation. The client, IZER, also mentions several efficiency benefits as well for caregivers, and accessibility and care quality benefits for patients.

Still, the adoption of e-consultation and digitalisation is lacking. Recent research asked people the question if the pandemic changed their way of thinking about e-consults: 29% were positive already, 24% are more positive than before, 44% is still not positive and 3% is more negative than before (Meurs, 2020b). On the patient side, the user-friendliness of the e-consult system was lacking most of the time. For the GPs it also offers challenges. One example is that GPs are not able to share the digital information with all local organizations and healthcare professionals. Both the GP and patient also mentioned problems such as technical difficulties and privacy issues.

1.2. Project Brief

1.2.1. The assignment

For my Master Graduation Project, I will dive into the lack of adoption of e-consult at GP practices. The problem will be analysed on the several issues that are currently seen: difficulties and problems from the patient-side, difficulties and problems from the GP-side, problems in the integration from the GP side, political and regional stimulation, and overall communication. One important aspect is user-friendliness, this will be analysed in every communication way. When the problem is thoroughly analysed, a solution will be created. The solution will be a convincing argument on how the transition from physical consults to e-consults can be stimulated. The client for this assignment is IZER (Integrale Zorggroep Eerstelijn Rijnmond) and that is why the target group will be on GP practices and patients in the region Rotterdam-Rijnmond.

In the conversations with the company IZER, they indicated that they want to stimulate the adoption of e-consults at GPs for their region. In this assignment, they stress a couple of important goals:

- First of all, IZER wants to have an operational solution that they can implement in the next few years (2021/2022). This means that the outcome should be practical with a focus on viability and feasibility.
- Next to this, due to my expertise as a designer, IZER wants me to focus on the patient experience during this process. Online consultation is a new environment that should have the same safe and pleasant experience as more traditional consultation methods. This part focuses on desirability.
- Thirdly, the solution needs to be hybrid in terms of digital and physical, meaning that the e-consult should be complimenting physical meetings instead of replacing them.

To achieve these requirements, a convincing story with a short-term solution needs to be provided to IZER.

This solutions space fits well with my Master direction: Strategic Product Design due to the high involvement of strategy. However, this assignment has human-centred design elements as well so it is suitable for a designer. Next to this, e-consultation in primary care is a medical topic and therefore fits the Medisign track.

1.2.2. The scope

For my graduation assignment, it is set that the patient and the GP (in the region of Rotterdam-Rijnmond) are the most important stakeholders. However, due to the lack of regional studies in Rotterdam-Rijnmond, national studies will be extrapolated to a regional level. This means that the initial scope of my assignment is the field of GPs in the Netherlands. In the Netherlands, there are 5020 general practices (NIVEL, 2017) with 12.766 GPs (NIVEL, 2019). These practices usually do around 9000 consultations a year per general practice (NZa, 2018). In the region of Rotterdam-Rijnmond, there are 386 general practices (Independer, 2020). This means that in the region of Rotterdam-Rijnmond, approximately 350.000 consultations are done each year and of which 231.000 were physical meetings (before the pandemic).

1.3. IZER

IZER is a company that started in 2007 with five GPs. The company positions itself as a care group for and by general practitioners in the region Rotterdam-Rijnmond. Their goal is to improve care and treatment and to keep it financially sustainable. Their focus is on chain based care, meaning that they focus on chronic diseases or elderly care where multiple caregivers need to work together. IZER provides support for the following chronic diseases: diabetes, CVRM, asthma/COPD.

One clear strength IZER has is the wide variety of people that they have in their team or work closely with. Currently, they have approximately 80 people working in their company. Their employees vary from medical professionals, such as GPs, GP assistants, different kinds of POHs, and even dieticians, to employees with more organisational strengths; such as managers and strategists. Next to this, IZER has around 225 members.

1.3. Project Approach

This project has the basis of the roadmapping process (Simonse, 2019). However, adjustments were made in that process due to the established result of the project. In agreement with IZER, it was decided that the result will consist of the report, two roadmaps and an improved user journey. Due to the user journey, a third diamond is added which will be done simultaneously with the second diamond. In figure 1, the process is shown in an illustration.

The Future diamond

The first diamond, the future diamond, forms the basis of this project. Extensive research is done during the diamond to gain knowledge of the situation and to gather insights. This is first done by diverging and then by converging. The divergence is called the trend research and is done by a literature study, qualitative interviews and observations. All of these actions will give a lot of insights that can be used to map the user journey and to establish meaningful trends. Next up, with all the data it is important to dissect the information and to see what is important. This process is called Future Visioning, and at the end of this phase, the current trends are used to create the desired future for primary care. In this process, scoping is done to limit the solution field.

The Roadmap diamond

The second diamond (the one above the other) follows the roadmapping process. A technology scouting is done to review relevant technologies in the primary care field and outside of it. The results of this technology scouting, combined with the future vision gives a basis for the ideation. This means that ideas are generated based on user values combined with upcoming technologies. Then during the time pacing, the concept is chosen and decisions are made about the implementation and strategy of the concept. This will result in a design roadmap.

The User Journey diamond

The new concept is a replacement for the current user journey. This means that patients will go through a different user journey with the new concept. In this diamond, users are put to the test how they would react to the new scenario. The validation user-test review if the new scenario is beneficial and fulfils the established future vision. With the newly gathered data, conceptual iterations are done to improve the concept further.

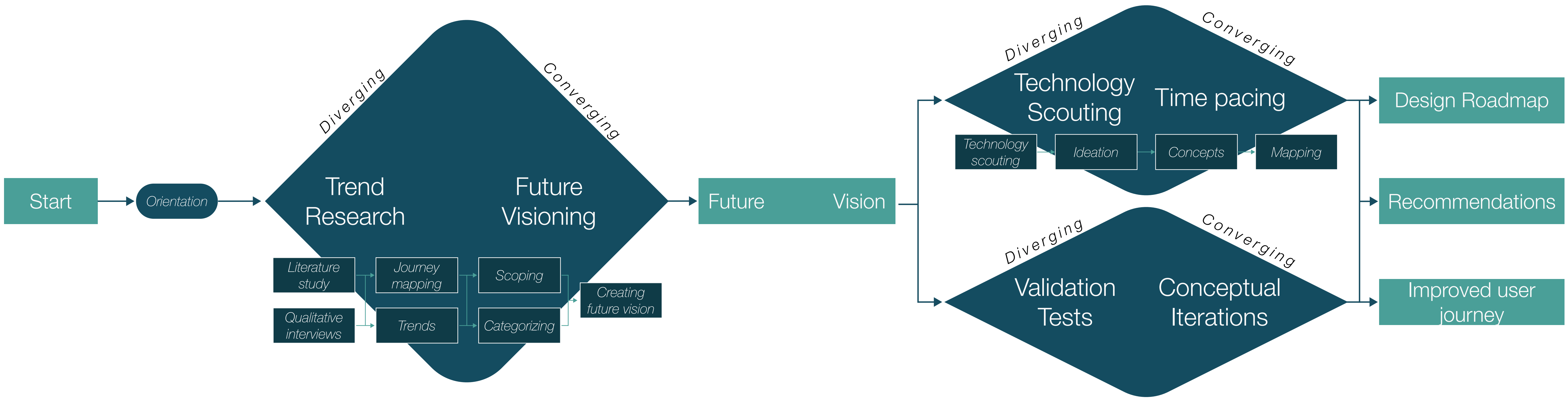


Figure 1, Visualisation of the process

Chapter 2.

Digitalisation in Primary Care

2. Digitalisation in Primary Care

2.1. Research Approach

The assignment made by IZER and myself started for me with one big assumption: e-consultation needs to be promoted because it is (in some or multiple ways) better than the status quo or "normal consultation". To analyse the difference between these forms of consultation, a literature study is done based on international and national papers that focus on two aspects: [1] e-consultations advantages and disadvantages, and [2] e-consultation in the Netherlands.

The aim of this chapter is to answer the following research questions:

- What are e-consults?
- What are the advantages and disadvantages of e-consultation
- What is the status quo of e-consultation in the Netherlands?

In this study, articles that analyse e-consultation qualitatively and quantitatively were analysed. The following terms were used to search for these academic articles 'e-consultation', OR 'digital consultation', OR 'web-based', OR 'consult', AND 'primary care', OR 'primary healthcare', OR 'general practice'.

2.2. Literature Study

2.2.1. Definitions and language

Before diving into paper research, companies, and patient journeys, it is important to define the basic concepts and language that are used for eHealth and e-consultation.

eHealth is a broad concept and a collective name for multiple concepts in care. The Dutch council for public health and society (RVS: Raad voor Volksgezondheid en Samenleving) has defined in 2002 as the following:

> ***'eHealth is the use of new information- and communication technologies, and especially internet technologies, to support health and healthcare.'*** *(Van Rijen, De Lint, & Ottes, 2002)***.**

The definition by the RVS is still valid and used today by healthcare organizations that focus on digitalisation such as Nictiz (Van Lettow, Wouters, & Sinnige 2019).

In 2012 Nictiz made categorization in eHealth, providing clarity and structure in eHealth (Krijgsman & Wolterink, 2012). The different eHealth applications were divided in categories, which could be categorized in three main groups: e-public health, e-care, and e-care support, as seen in figure 2 (ZorgImpuls, 2018). These main groups are dependent on the phase and user of the care process. Furthermore, eHealth applications show three kinds of different interactions: caregiver to the patient, caregiver to other caregivers, and the patient to their own personal care use.
E-consultation or electronic consultation, as seen in figure 2, is part of e-care support. Other terms that are used are digital consultation or remote care. It supports the caregivers during their consults with supportive technology tools. This can be with telephone, video, text messaging, email, or other actions used on web-based portals such as prescription orders, appointment booking, and patient access to online health records (or a combination) (Mold et al., 2019).

2.2.2. The beginning of e-consultation

It is difficult to pinpoint the start of different e-consultation methods due to a lack of research or referencing. Logically, with the arrival of e-mail (or even of the internet), patients could have used mail or the internet to get consults or gain medical knowledge. For the Netherlands, maybe the first to use e-consultation was Robert Mol when he started 'de e-maildokter' in 2001 (Mol, 2010). People could email him with medical questions, and he would call or email them back depending on the situation.

Throughout the years, many countries have adopted different methods of e-consultation. One country that stands out is Denmark, which made consultation through email mandatory in 2009. One year before the country made it mandatory to have this service for general practitioners (GPs), the country had around 1.2 million e-consultations in 2008. In 2013 this number was 4 million, which was 11.2% of all the consults that were done in Denmark (Hansen, 2014). More recent numbers, from 2019 show that 21% of all consultation was an email consultation, with 7,2 email consultations in total (Grønning et al., 2020). Research that analysed the level of emails sent and received in European countries placed

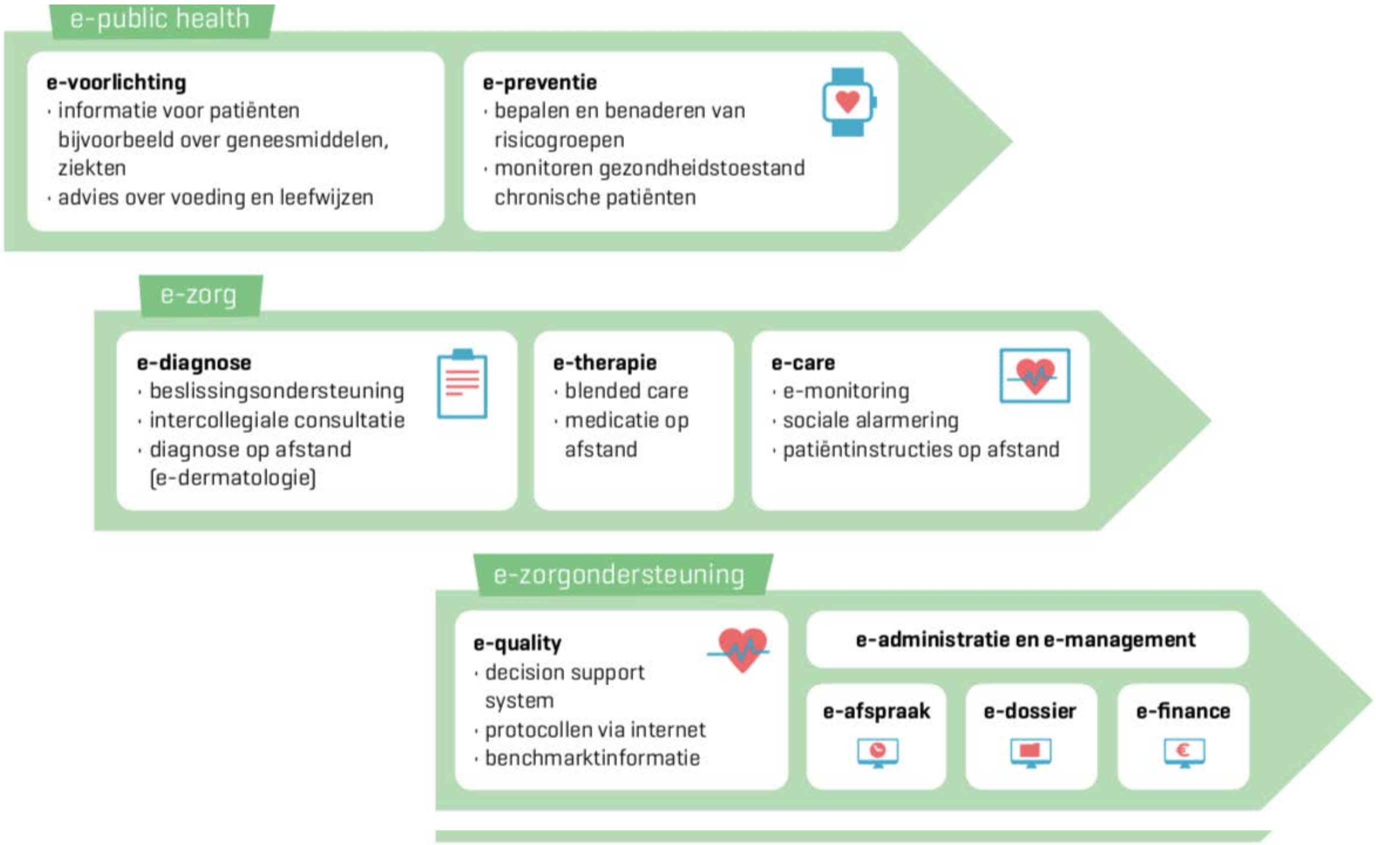


Figure 2, Structure of eHealth visualised by Zorgimpuls (2018)

Denmark at the top (507/1000, 50.70%). One of the countries that scored the lowest was France (187/1000, 18.70%) and the Netherlands had a score of 25,30% (253/1000) (Newhouse et al., 2015). It is difficult to pinpoint what the factors are that determine a good adoption. For example, the UK has invested a lot financially in e-consultation, but the use of e-consultation by caregivers and patients has not significantly increased. In 2016, UK general practitioners mentioned that they are using telephone consultations frequently (66%), however, fewer were implementing email consultations (6%) and most were not planning on doing that (53%) (Brant et al., 2016).

E-consultation in the Netherlands

It is difficult to pinpoint the start of Just like in the UK, e-consultation in the Netherlands had also slow adoption. In the Netherlands in 2016, 66% of all consultations were physical consults at the surgery (Nivel, 2018). The other main communication way was the consultation by phone with 28% of all consultations. Home visits by the doctor take approximately 5% of the share and only a small share of 0,7% were email consults. The growth of the share of e-mail and telephone consults can be seen in figure 3. It is difficult to pinpoint the cause for this slow adoption by users. One reason for this could be that the practices do not offer e-consultation services. Comparing data from 2010 where 32.0% of the Dutch general practices had at least one email consultation and the difference with 2014, where this rose to 52.8%, shows a growth in the use by GPs (Huygens, 2017). Besides email consultation, there is also a rise in other possibilities such as requesting repeat recipes, asking questions and making an appointment. Comparing the numbers from 2013 and 2016, there is a big increase in both the possibility offered by GPs and the use by patients. Still, the online use of services by the patient is still fairly low and a lot of patients do not seem to use it as seen in figure 4 (Nictiz, 2016).

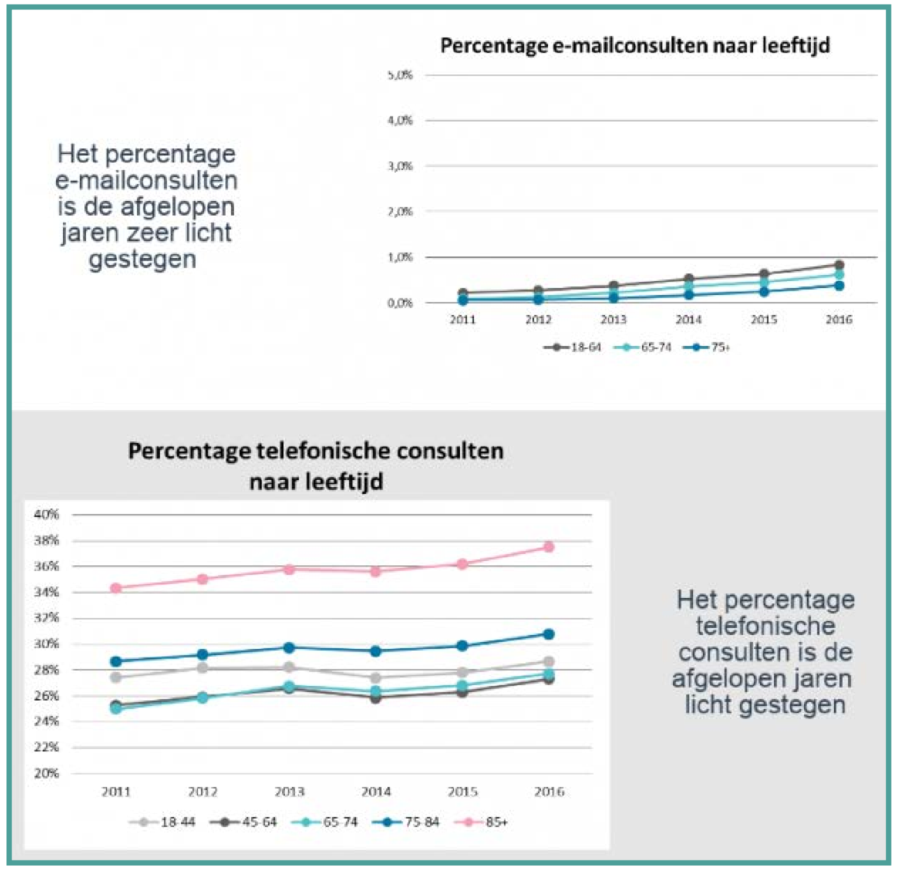


Figure 3. Share of E-mailconsults and telephone consults in the Netherlands from 2001 till 2016 (Nivel, 2018)

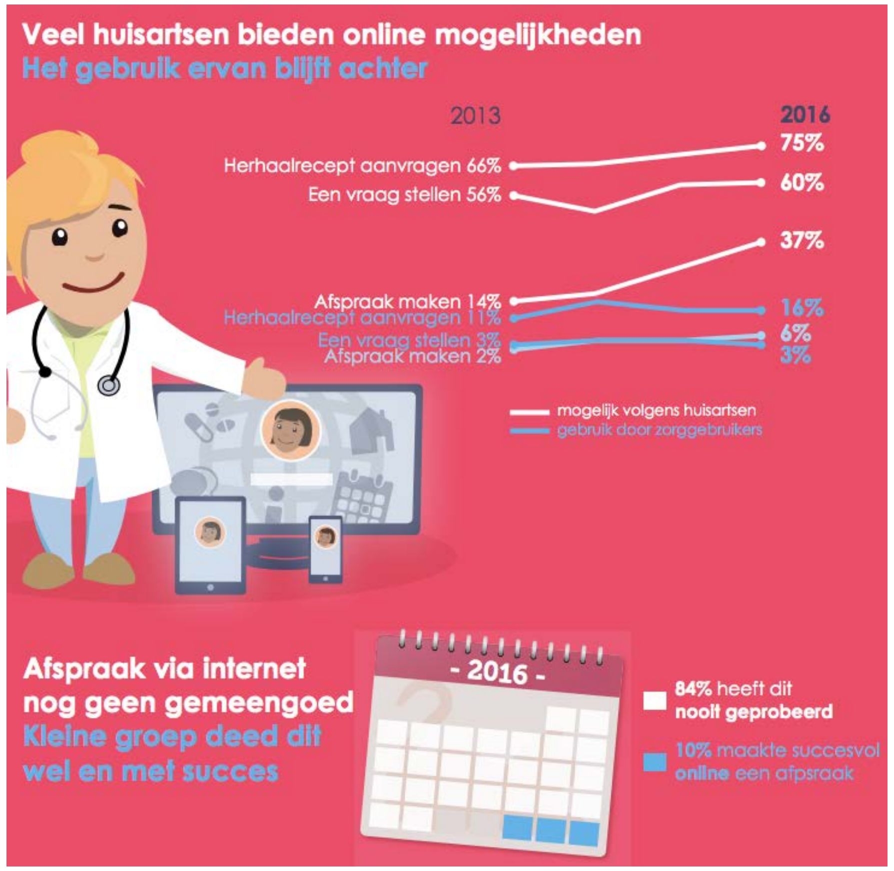


Figure 4, Visualsation of the growth of services provide by caregivers from 2013 to 2016 (Nictiz, 2016)

2.2.3. Benefits of e-consultation

eHealth and e-consultation are slowly increasing and caregivers and patients welcome this development due to several benefits that these supportive technology t ools have.

Increased efficiency

To fully understand the benefits, it is important to understand the effect of an e-consult. E-consultation replaces the normal physical consultation form with a digital one and provides options for patients to manage their care online. The physical form, which was mostly used by caregivers in 2016 in the Netherlands, requires physical contact between patient and caregiver. This can be in two forms: the patient visits the practice or the caregiver visits the patient. A physical consult always requires one stakeholder to visit the other, which is time-consuming. E-consultation has the potential to be an efficient way that saves both patient and caregiver time (Cowie, 2018). Furthermore, the lack of direct contact (asynchronous contact) between caregivers and patients, could save caregivers time (Banks 2018). Efficiency for caregivers can be seen as an umbrella term due to the sum of multiple effects:

- One of these reasons is due to the **decreased time of consults** and the potential for **reducing the amount of physical/telephone consults** (Cowie 2018).
- Another explanation for the increased efficiency could be in the **shift in workload to patients**. Some caregivers mentioned that there was a perceived workload from the caregiver to the patient by having them do some of the (administrative) work online (Carter, 2018).
- There was also an efficiency gain in the physical consults due to e-consultation. Due to the information that was provided beforehand in the text, it **complimented the physical consult** and led to a more focused and quicker consultation (Libby, 2015) (Cowie, 2018) (Banks, 2018).
- This increase in efficiency has **financial benefits** for the caregivers and the whole care system (Libby, 2015).

The efficiency is also clear from the patient's side.

- With physical consults, there is usually **waiting and travelling time** that is **reduced or lacking** in e-consultation (Liddy, 2015).
- Furthermore, the asynchronous communication that some of these methods have resulted in **higher flexibility** for patients. Patients can contact the caregiver at any time they want (Carter, 2018). For example, if a patient does not have time during the day to contact or visit the practice, they could send an email or chat in the evening from their own home. The flexibility of this method and control over the connection method was highly appreciated by patients (Cowie, 2018).

Sensitive topics

Besides efficiency, it also showed another side of digital communication. Due to the lack of communication in person, patients felt that they could ask embarrassing questions more openly (Carter, 2018) (Banks, 2018). This had several outcomes, an increased willingness to discuss sensitive topics (Huxley, 2015), which in some cases showed potential for questions about mental health (Carter, 2018). Furthermore, this also resulted in an increase in questions that were not asked in a physical consult (Banks, 2018).

Helpful with difficult cases

For caregivers, not only the efficiency of the primary care increased. Caregivers reported that e-consultation methods provided reassurance to them with unfamiliar or challenging cases due to the ease of sharing details with specialists about the patient (Liddy, 2015).

Positive experience

At last, the benefits of primary care are also seen in patient satisfaction. Research showed that 95% patients rated their experience on a healthcare webportal as "Excellent" or "good" and even 91% of patients were "extremely satisfied" with consulting online (Liddy 2015). Not only patients, but also caregivers were satisfied with e-consultation. GPs mention that they are very confident using e-consultation with patients and did not feel that the use posed any risk to patients (Cowie 2018).

2.2.4. E-consultation drawbacks

The shortcomings or disadvantages of different eHealth and e-consultation methods also became apparent in the research.

Increased workload

First of all, the contradiction to the increase in efficiency potential mentioned before. Caregivers saw an increase in workload in administrative tasks, due to the effort of contacting patients themselves to make an appointment instead of the patients contacting them (Carter, 2018) (Cowie, 2018) or because of extra stages that were added to the process (Banks, 2018). Furthermore, it was also speculated that the increased accessibility decreased the threshold for patients to request a consultation, leading to more consultations and so an increase in workload (Banks, 2018).

Lack of visual/auditory cues

Another disadvantage of e-consultation is due to the way of communicating. Most of the e-consultation methods are from a distance, some have asynchronous communication (mail and chat). Communicating through the phone lacks the richness of visual cues while communicating through text lacks visual and auditory cues (Huxley, 2015). This can result in a loss of ability to check a patient's understanding of the problem that is often done via non-verbal communication (Atherton, 2016). Not just caregivers have negative benefits of the loss of stimuli, patients as well. Patients mentioned that e-consultation was difficult for mental problems because the visual and auditory stimuli were preferred (Huxley, 2015). This is not contradictory to earlier statements mentioning that e-consultation leads to more sensitive questions being asked. This means that the first contact for sensitive topics might be easier for e-consultation, but that the treatment works better with non-e-consultation methods.

Lack of depth

E-consultation not only lacked visual or auditory cues, but they also seem to lack information at all. Caregivers express their dissatisfaction with the depth of the information that is given by the patient through e-consultation (Liddy, 2015). The key concern or reason for consulting was often a struggle for caregivers through the information given online. Next to this, quickly probing for more information is not possible to do with asynchronous communication which left the caregiver with limited information (Banks, 2018). One reason for this could be that patients also felt that they had a less favourable opportunity to provide all relevant information compared to 'face-to-face consulters' (Carter, 2018).

Inappropriate use

One of the disadvantages caregivers mention is the misuse of e-consultation methods. Caregivers received e-consultation requests for complaints where face-to-face consultation was necessary. It is unclear why patients used the wrong method, however it was a source of frustration for the caregivers (Banks, 2018). This could cause unnecessary delays (Carter, 2018), and more clarity is needed where what kind of e-consultation is appropriate (Cowie, 2018). One explanation for using the wrong method was that the caregivers thought that patients used e-consults to get a normal consult quicker because the responsibility shifted towards the practice to contact (Banks, 2018). Other research showed similar results, however, the cause was different because caregivers expressed that patients used e-consultation to skip the line to get quicker in the appointment system (Cowie 2018).

Less overall experience

Qualitative research comparing e-consultation to face-to-face consultation showed that e-consultation scored less in quite a few aspects in terms of experience for patients. For example with problem resolution, 55% of face-to-face consulters reported that their problem had been 'completely resolved' versus 33% of e-consulters. This was also the case for a good or a very good experience of making an appointment (59% vs 44%), good or very good overall experience (67% vs 77%), and other aspects with less substantial differences. Still, a majority of the patients in the research were satisfied with the e-consultation experience and would use it again, explaining that the benefits are a motivation for them (Carter, 2018).

Technical difficulties

Technical difficulties are a disadvantage for both caregivers and patients. Research showed that some caregivers experienced technical difficulties with e-consultation, for example by uploading photographs or documents (Libby, 2015). Moreover, for video calling, the patient and the caregiver both need to have reliable connections, must be in a private area to communicate, and have a clear and bright view of themselves (Atherton, 2017). If one of the two does not have these requirements, it could influence the quality of the conversation.

Still some uncertainties

At last, it must be mentioned that some practices where these researches were done just had a small volume of e-consultation. The e-consultations systems are still young and have not been fully integrated into the systems. Therefore, in some cases, it could lead to a perception that e-consultation leads to extra work (Cowie, 2018). Furthermore, change or innovation in companies always requires some increased effort before the gain is shown. This means that currently, the field of e-consultation still has uncertainties that further research must show.

Situational use

One aspect that caregivers mention frequently with e-consultation is situational use. Some research pointed out that caregivers felt comfortable handling situations with e-consultation when the required care was "small" or more straightforward, such as clinical questions, changes in medication, test results, etc. The caregivers mentioned that the type of consult is dependent on the complaint (Banks, 2018).

2.2.5. Corona's influence on e-consult use

It can be said that before 2020, the adoption by e-consultation services was not adopted that well by patients and caregivers in the Netherlands. This has changed due to the global pandemic. The Corona virus or COVID-19 has been detected in the Netherlands since February 2020 . This created a different society, starting with the first lockdown in March 2020. In this new society, it is advised not to come in close contact with other people due to the hazard of spreading or receiving the virus. The government mentioned several actions for people to prevent the virus from spreading: wearing a face mask in public, limiting physical contacts throughout the day (for example: by working from home), no shaking hands, and many more.

This "new way of living", also changed how patients and caregivers interacted with care and with each other in primary care. Noteworthy is how the patients used online information and/or apps to help their health during this pandemic. The type of health-related information that people want digitally is very dependent on the complaint or information that they are searching for, an example, getting treatment for addiction or psychological complaints is not preferred through internet methods as shown in figure 5. (Meurs, 2020a)

One of the most noteworthy changes that corona caused was the increase in eHealth and e-consultation methods. The use of eHealth applications and the availability of these services increased. As seen in figure 6, e-consults, requesting repeat recipes online and teleconsultation (consultation with phone) had a big increase in 'we were already using it but we are intensifying their use'. There are also e-consultation methods that were not used before and were used for the first time during the pandemic; 64% of the caregivers video called with patients for the first time and 12% of the caregivers had e-consultations for the first time. Corona, and specifically the obedience of people to limit their physical contacts, made the contact between patient and primary caregiver mostly an 'care at distance'-experience. The availability of e-consultation methods also highly increases compared to 2019 as shown in figure 7 (Tuyl, 2020a). Most noteworthy here is the enormous increase of possibility to do a video call by practices: in 2019 it was not offered at all and in 2020 72% offer these services.

The research by Tuyl asked practices which e-consultation methods they are using or have introduced. A recent study asked practices what eHealth applications they used. The research (Keuper, 2020) is presented in figure 8. Most practices are doing repeat recipes online (87%), e-consultation (84%) and teleconsultation (66%). Telemonitoring is only done by a small portion of practices (12%). Noteworthy is the differences between these results compared to previous data. For example with video calling with patients. Earlier research (Tuyl, 2020a) mentioned in April 2020 that 64% had introduced this service, while 8% was using it more during the pandemic. This means that at least a majority of the practices (72%) used video calling in some way. However, the data from August 2020 shows that video calling is used by 52% of the interviewed practices. This can be due to the differences in respondents, however, the difference is still quite big.

This increase can also be seen in regional numbers from the region Rotterdam-Rijnmond. IZER provided me with the numbers from 140 practice that uses the GP information system Medicom in the region. In the whole year of 2019, a total of 1294 e-consultation were performed by these practices. In 2020, this number increased to a total of 1973 e-consultations. This means that there is a slight increase. However, a practice usually does 9000

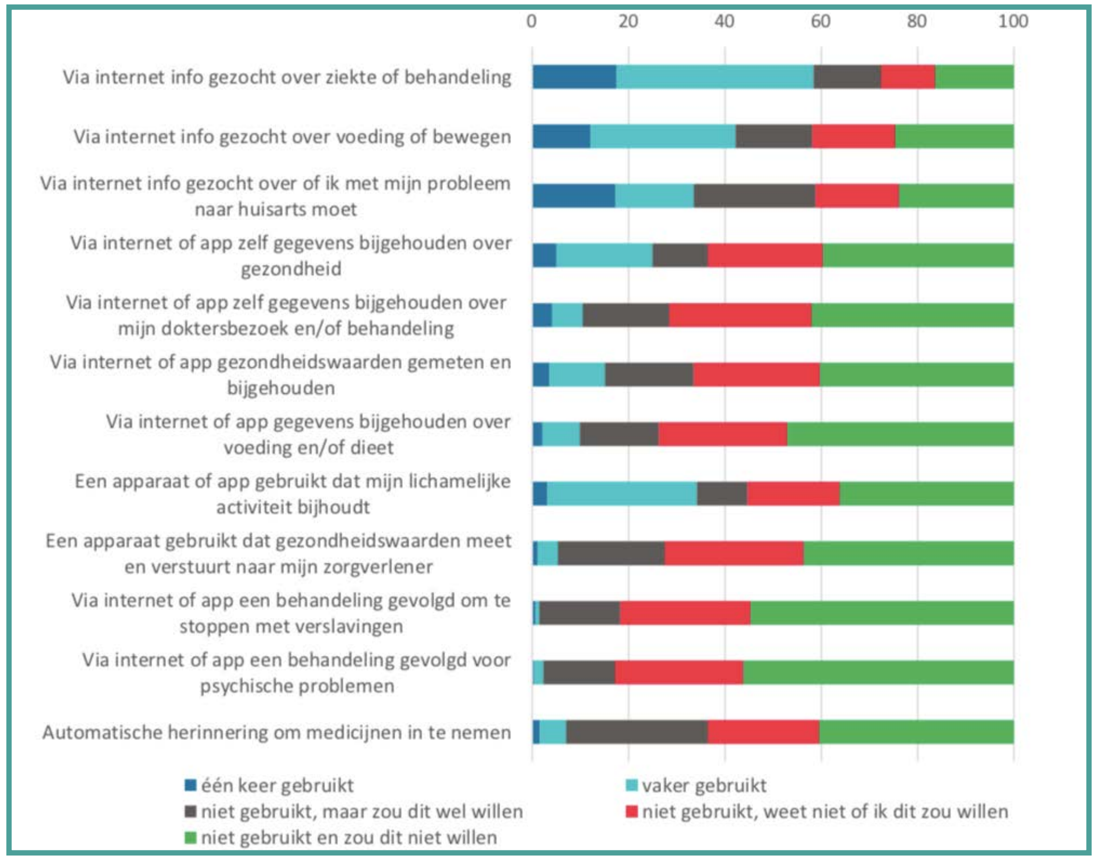


Figure 5. Percentage of people that searched for healthcare information digitally and for what reason (Meurs, 2020a)

consultations a year (NZa, 2018). This means that approximately of the total consultation amount of 1.260.000, only 0,15% of the consultations were e-consultations. Other factors influence the number (e.g. people go less to the GP during the pandemic), but the amount of e-consultation is still extremely low.

These statistics provide mostly what caregivers use and support, but this does not give a clear overview of the actual division of consults. Looking closely at the way that patients used care as seen in figure 9 (Meurs, 2020b), contact by telephone was the most used form of e-consultation by patients. Newer techniques such as sending photos, looking at medical information online, and especially video calling, were not used that frequently at all by patients. Especially video calling and sending pictures was not often done at all.

Sufficient promotion

One reason for the low amount of e-consultation can be due to low promotion. Patients cannot request what they do not know. Research shows that in the Netherlands 67% of all the GP practice homepage websites had information about digital consultation. However, only 8% have information about video calling consults on their websites. This can be interpreted that there is sufficient promotion of e-consultation in general but not specifically on all the available e-consultation options.

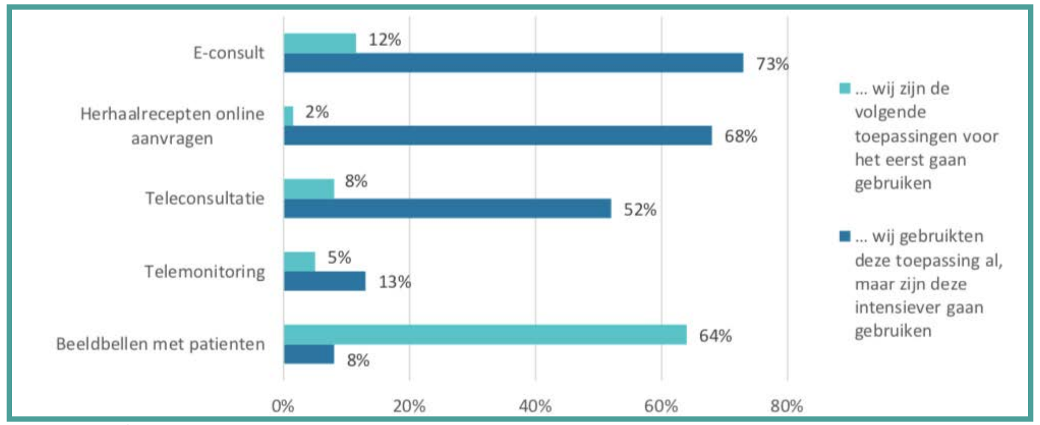


Figure 6. Caregivers answers to the question: Did u implement new eHealth-methods or intesify existing methods because of the pandemic? (Tuyl, 2020a)

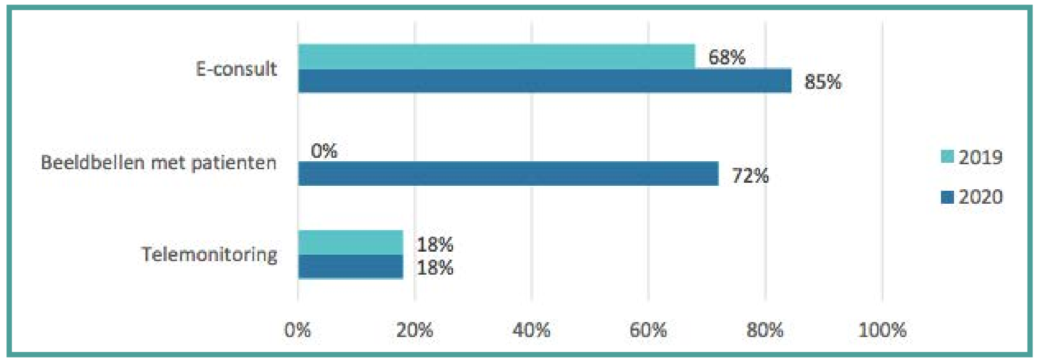


Figure 7. E-health methods in GP practices in 2019 and in 2020 (Tuyl, 2020a)

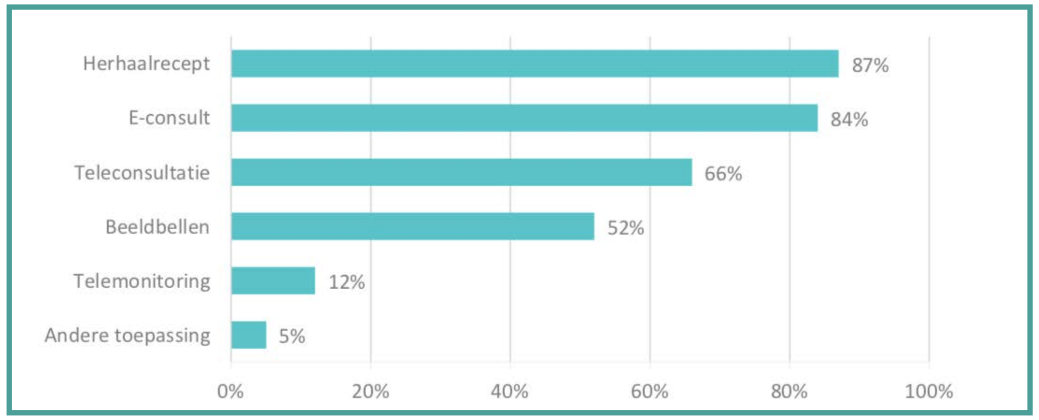


Figure 8. Percentage of practices that admitted to use e-health methods (multiple answers possible) (Keuper, 2020)

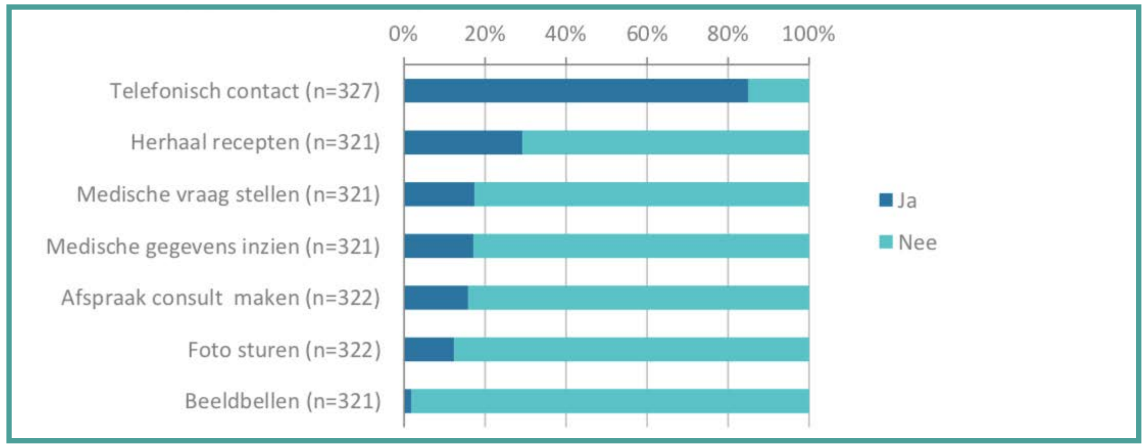


Figure 9. Ways in which patients had contact at a distance with GP practices during the corona pandemic (multiple answers are possible) (Meurs, 2020b)

2.2.6. Opinion of e-consultation

During the pandemic, a lot of caregivers and patients had an in some way an introduction to eHealth and e-consultation. Analysing the data of these experiences is important to see how it develops. Nivel, the Dutch institute for Research of healthcare researched the opinion of e-consultation before 2020 and during the pandemic.

Divided opinion

The overall opinion of digital applications in healthcare did not change significantly. As seen in figure 10 (Meurs, 2020a), most people (+/- 40%) are still enthusiastic and want to try digital applications or are not sure (+/- 40%). The other two options are equal as well: have to (+/- 10%) or don't want to (+/- 10%). There is a slight decrease in enthusiasm (and in people that do not want to) and quite a raise in people that are unsure about the digital applications.

The opinion of care at a distance did change quite a lot. As seen in figure 11 (Meurs, 2020b), 29% is positive and 24% is more positive than before the pandemic. However, 44% is still negative and 3% is more negative than before the pandemic. It is unclear why there is such an increase in positivity compared to before the pandemic or what kind of experiences that group had. Interesting is that quite a lot (47%) is not positive about the care at a distance method.

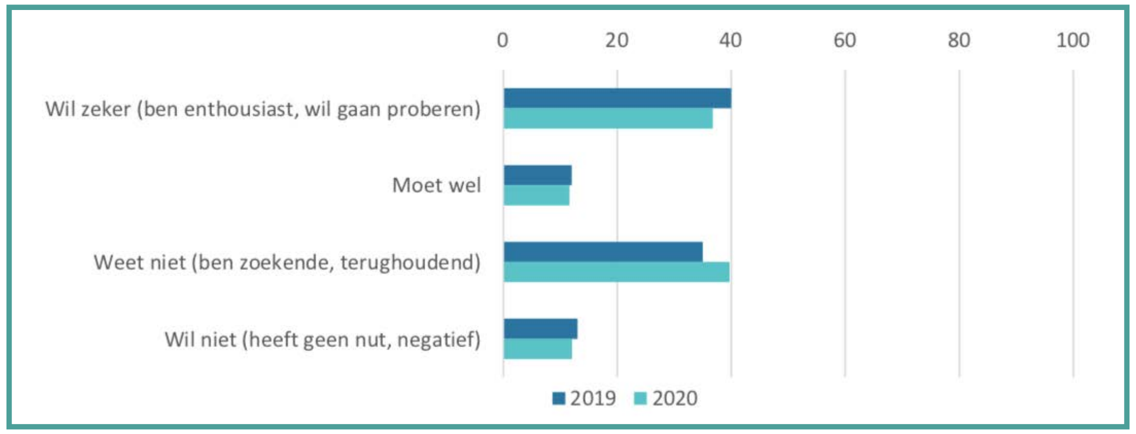


Figure 10. People answering the question "What is your general opinion about digital methods in healthcare?" (Meurs, 2020a)

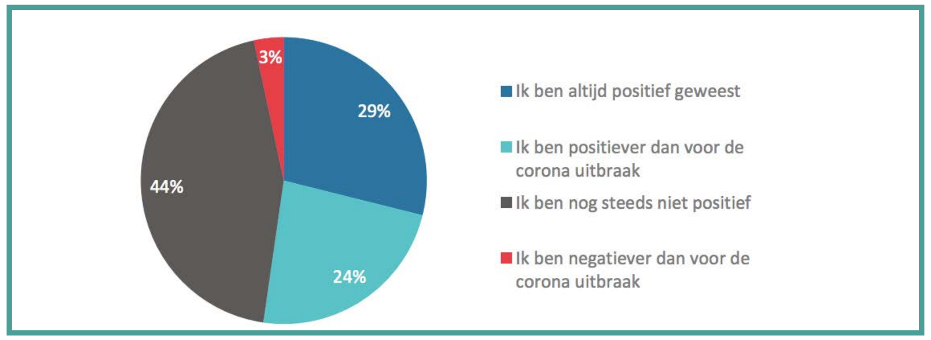


Figure 11. Patient answer the question if their opinion changed about 'care at a distance' with caregivers because of the corona pandemic (Meurs, 2020b)

A positive experience for the patient

The opinion of patients can be defined as neutral, balanced and/or unchanged. This is remarkable compared to the overall positive experience they had, as seen in figure 12 and 13 (Meurs, 2020b). Figure 12 shows that the majority of the patients had a positive experience with e-consultation and want to continue this in the future. Especially, repeat recipes and viewing medical data online had high scores (+/- 90% wanted to do this in future the same). Figure 13, asks if the care question they had was sufficiently answered during the pandemic. Around 75% of the respondents mentioned that the practice had answered their care complaint sufficiently. Both these findings could indicate that care at a distance is a sufficient and well-liked method for patients that have used it during the pandemic.

Increase in negativity

The previous research points out that patients would use e-consultation methods again and are helped. Still, there seems to be a negative or sceptic opinion towards e-consultation that increased in negativity. In figure 14 (Meurs, 2020a), patients were asked what digital applications could mean to healthcare. Comparing 2019 with 2020, almost all of the five tested aspects have an increase in 'agree/disagree', 'disagree', and 'completely disagree'. Only the aspect 'does care brings lower costs to healthcare' was rated more positive in 2020 than in 2019. It is unclear why there is such a decrease in the perception of benefits, especially compared to the data that patients had a positive experience and want to use e-consultation in the future as well (Meurs, 2020b).

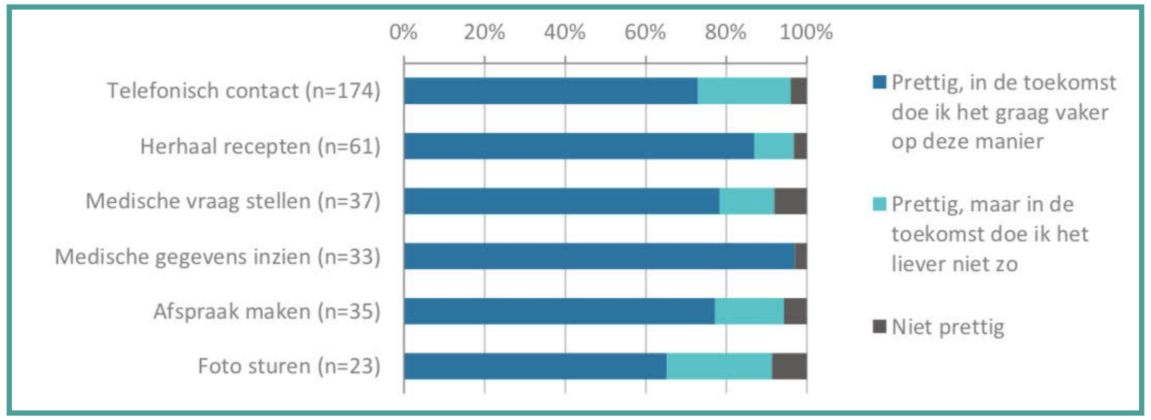


Figure 12. Appreciation and intention to increase this type of contact in the future as well (Meurs, 2020b)

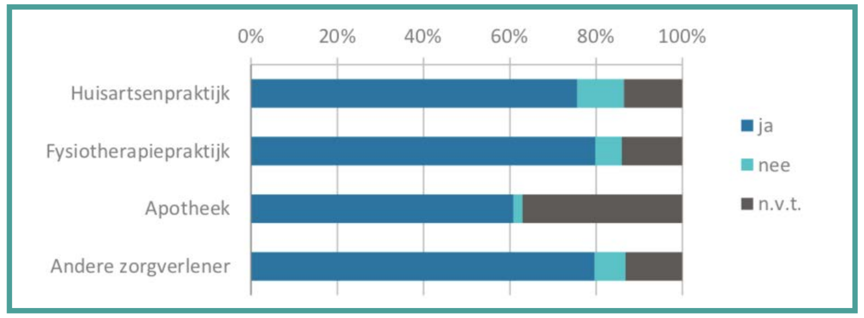


Figure 13. Patients answer the question: "Is your care complaint sufficiently answered by the caregiver?" (Meurs, 2020b)

For finding an answer to this decrease in the perception of the value of digital applications, one of the researchers of Nivel; Lilian van Tuyl, was contacted (Appendix 2). Van Tuyl mentioned that they do not have supportive data on why there is such a decrease in appreciation of the values. She suggests that there is a possibility that people had bad experiences with technology at a distance in their personal or work life, and translating those experiences to 'care at a distance'.

Next to this, compared to earlier given positive research by patients, Van Tuyl mentioned that there is a difference between people that have used digital consultation and people that have not. People that have used digital consultation are overall more positive about digital consultation than people that have not used it. Van Tuyl explains that probably people have to gain some experience with different digital methods before a good analysis can be done.

In another way, caregivers also have a negative perception of the value of eHealth application. In both the research of April and July (Keuper, 2020), it is shown that the majority of caregivers do not want to intensify e-health in the future as seen in figure 15. The research points out that this is mostly due to the 'high-speed acceleration' in which e-health applications were implemented and that a lot changed too fast.

One reason for the increased negative opinion towards e-consultation is the increase in administrative burdens. Due to changes in working methods, triage and practice changes, caregivers experienced an increase in administrative burdens. The reduction of administrative burdens due to e-consultation was mentioned only slightly (Tuyl, 2020b). The research mentions that it is unclear if these are "start-up problems" or real bottlenecks. However, it explains the lack of enthusiasm to continue or intensify e-consultation applications.

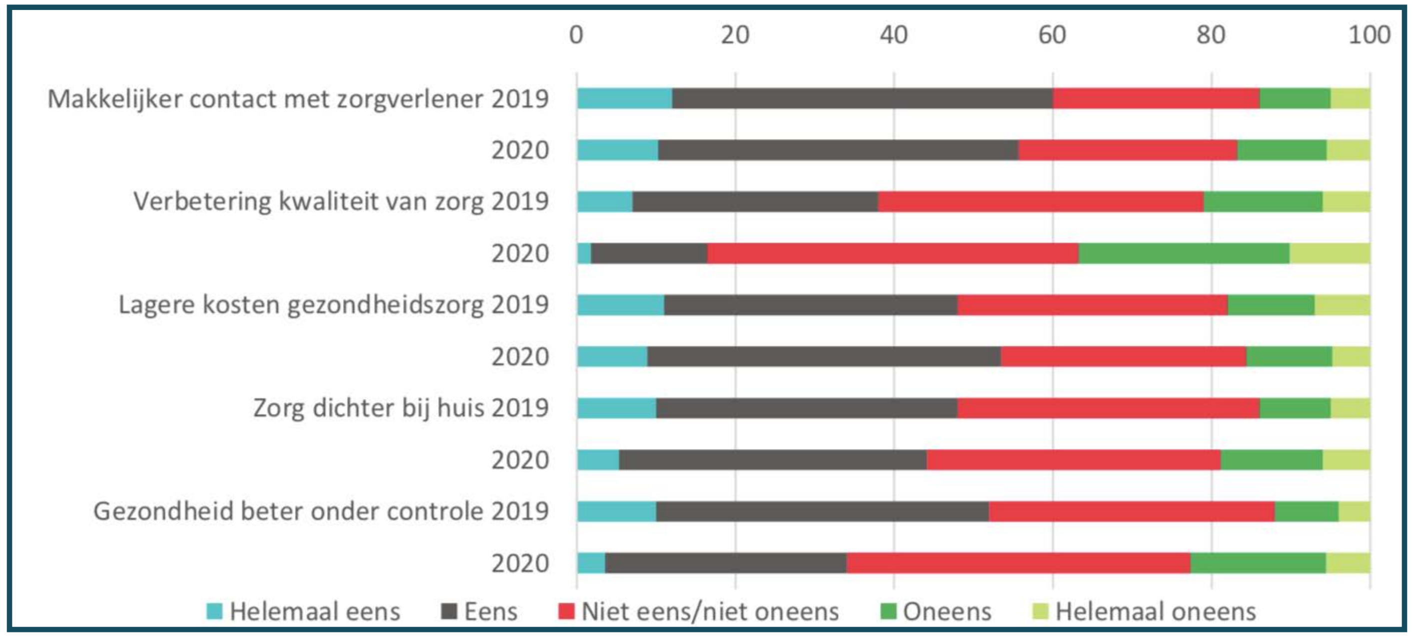


Figure 14. Percentage of patients that answer the following question about the contribution of digital methods: "digital methods can contribute in healthcare to ..." (Meurs, 2020b)

Urge to resist change

A possible explanation for the lack of enthusiasm can be due to a resistance to change or innovation. Resisting innovation is a very regular response that customers (in this case the patients and caregivers) have (Talke, 2013). This is also the case for e-consultation, caregivers also felt an urge to resist new consultation methods despite the advantages presented to them (Brant, 2016). Interestingly, the research by Brant shows the lack to try. Brant: "None (of the participants) were currently using internet video, and 86% (n = 273/318) had no plans to introduce internet video consultations.".

2.2.7. Increased pressure on primary care

One of the major reasons for practices to start with eHealth of e-consultation is due to the pressure that is increasing on primary care every year. There are several reasons why the pressure on primary care is increasing. The biggest reasons are the ageing population, and the increase of consults each year.

Ageing population

According to CBS, around 20% of the Dutch population was 65+ at the end of 2020. In 2040, this number will be around 25% (CBS, 2020). Next to the normal ageing population (in Dutch: vergrijzing), there is also double "vergrijzing". This means that inside the group of 65+, the group of 80+ is increasing. Older patients have more consults, which is logical due to a decline in their health. In table 1 this can be seen in the division of the patient population and if they had one or more times contact with the GP practice from 2014 till 2018. Furthermore, the research pointed out that in

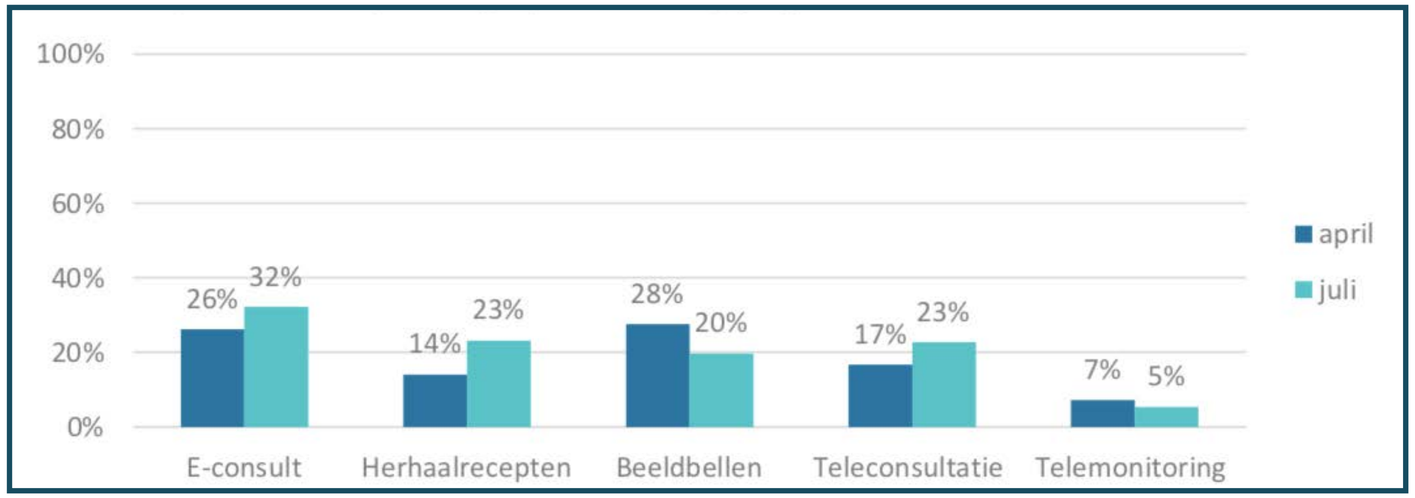
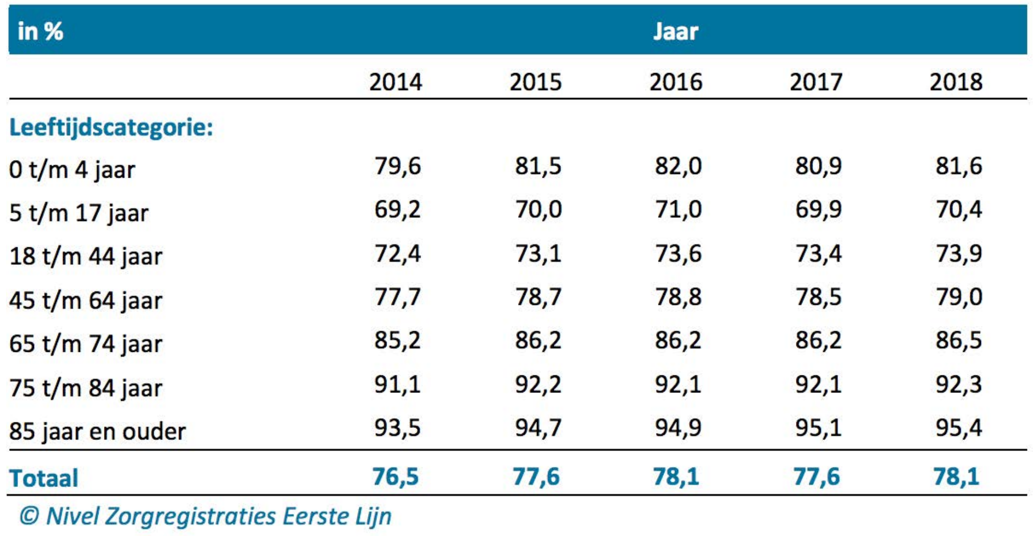


Figure 15. Percentage of practices that plan to intensify different eHealth methods (Keuper, 2020)

2018 patients averagely had 4,5 times contact with their GP practice. The category 5 till 17 years had the least amount of contacts with 2,3 a year and 85+ had the highest with an average of 13,3 meetings a year (Meijer, 2019). In conclusion, an increase in the population age increases the number of consults.

Increase in pressure

Besides the ageing population, there is also a change happening in human behaviour. In the Netherlands, comparing 2018 to 2001, there is an increase of 10% in contact with the GP. This was mostly seen in contact by telephone and in contact with the POH (Flinterman, 2018). There was not a big increase in the total number of consultations, however, the number of long consultations and the amount of contact that the HAP (GP emergency post) has increased. The report of Nivel concludes that “Because of organisational changes in primary care, the increased demand for care has been dealt with. The question is if this will work in the future as well” (Flinterman, 2018).



in %	Jaar				
	2014	2015	2016	2017	2018
Leeftijdscategorie:					
0 t/m 4 jaar	79,6	81,5	82,0	80,9	81,6
5 t/m 17 jaar	69,2	70,0	71,0	69,9	70,4
18 t/m 44 jaar	72,4	73,1	73,6	73,4	73,9
45 t/m 64 jaar	77,7	78,7	78,8	78,5	79,0
65 t/m 74 jaar	85,2	86,2	86,2	86,2	86,5
75 t/m 84 jaar	91,1	92,2	92,1	92,1	92,3
85 jaar en ouder	93,5	94,7	94,9	95,1	95,4
Totaal	**76,5**	**77,6**	**78,1**	**77,6**	**78,1**

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Table 1, Percentage of registered patients with one or more contacts with the practice per year by age group, 2014-2018 (Meijer, 2019)

CONCLUSIONS

To answer the research questions at the beginning of this chapter, e-consultation is part of eHealth to provide digital or remote consultation. The many advantages, disadvantages are summarized in table 2. Noteworthy in the advantages and disadvantages are:

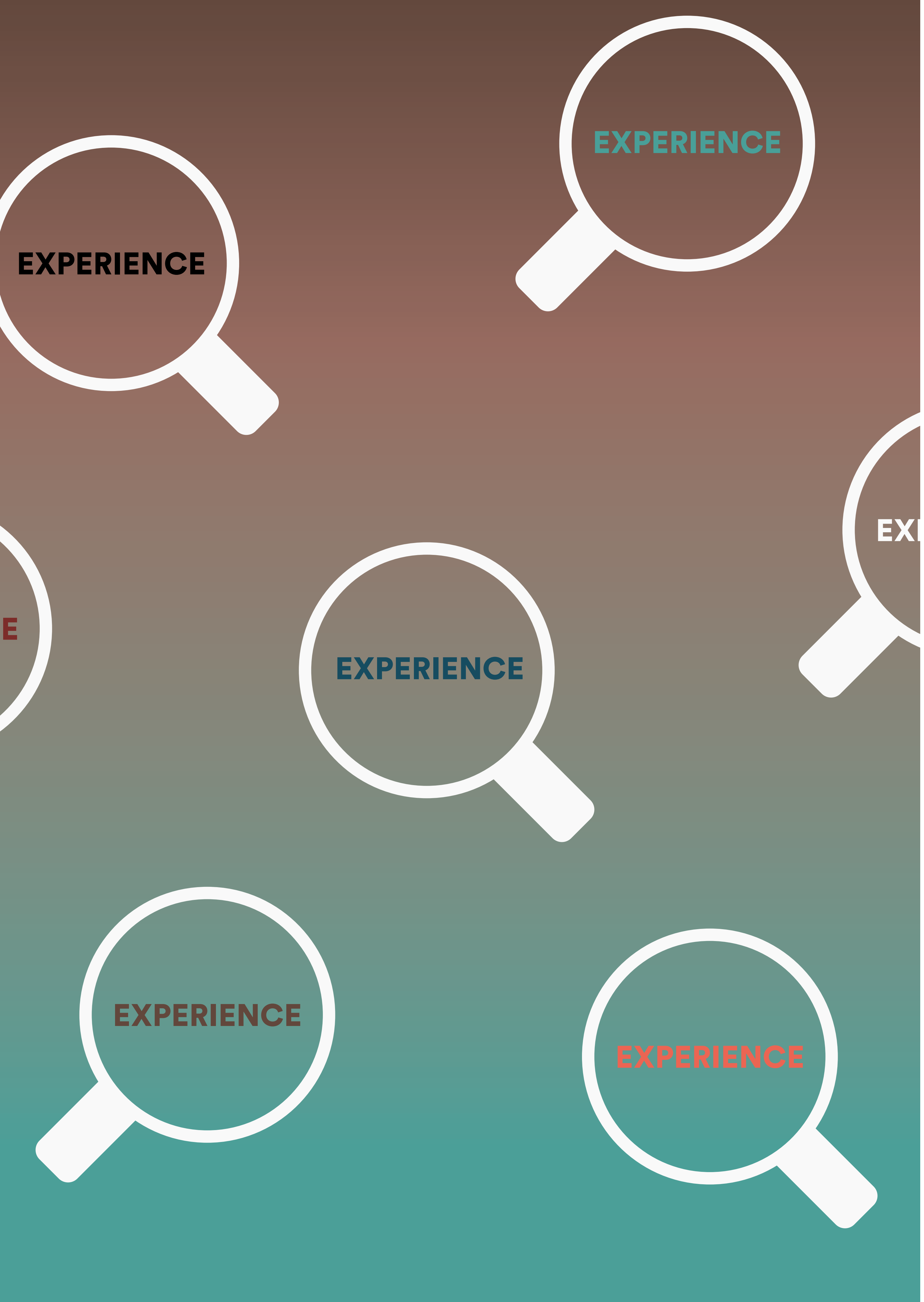
- The advantages of e-consultation point towards a positive experience for patients, and an efficient process for caregivers.
- Many disadvantages find their origin in technical difficulties or problems that occur while the software is still in the early stages.
- It can be concluded that e-consultation has a lot of potential, however this potential is currently not reached at all.

The following conclusions can be taken about recent Dutch e-consultation research:

- The corona pandemic made caregivers try a lot of e-consultation methods, however, it mainly resulted in a big increase in telephone consults.
- A fair share of caregivers and patients did not experience e-consultation methods positively during the pandemic. Next to this, the patients that did not experience e-consultation are negative about it. Both trends can relate to an urge to resist change and the feeling of having the “second best” method.
- Change is needed to counter the increasing pressure on the Dutch primary care system.

EXPERIENCE DIGITAL POSITIVE	Efficient for caregiver
	Efficient time-saver
	Pleasant for patient
	Positive opinion about it
	Provides flexibility for patient
	Image/video can be useful
	Sensitive communication way
	Quick response time
	Raises unsurfaced problems
	E-consults enhances face-to-face meetings
	Helps in difficult cases
	Saves the specialist money
EXPERIENCE DIGITAL NEGATIVE	Can be frustrating
	Has technical difficulties
	More effort
	Unclear and confusing
	Less personal; less suited for GGZ
	Language barriers are more prominent
	Less overall experience
	Inappropriate problems for e-consults
	Lacking information given by patient
	Misuse e-consult, get consult faster
EXPERIENCE DIGITAL NEUTRAL	Digital/distance for small or checks
	E-consults shift workload from CG to patient
REASONS NOT TO DIGITALISE	Scepticism
	Corona forced e-consultations; "second best" feeling
	Need to resist e-approaches
PROCESS COMMUNI-CATION	Most practises have e-consult information online
	No or bad promotion of digital
	Low promotion of video calling (NL)
TRENDS	Back to pre corona
	A lot of physical or by telephone
	Corona promotes care at a distance
	Patients low e-consultation rate
	Increase e-consults methods for caregivers
	Big increase in video calling at caregivers
	Which info users searched online depends on question
	Healthcare costs are increasing
	People go less to GP in pandemic

Table 2. The results from the literature studies categorized



Chapter 3.

Analysing the Experiences

3. Analysing the experiences

3.1. Research approach

3.1.1. Observational approach

In chapter 2, most data that was analysed was data from researches. Still, it is important to gather insights from different kinds of sources. One way of gathering insights is through observations. The overarching goal of the observations would be to analyse if the insights provided earlier are strengthened or countered by real-life situations and to look for new observations that could be important. Three observations were done in different situations with different goals. They were done in the following order.

1. At the GP emergency post with chat system

During interviews with caregivers, the concept of the GP emergency post was explained. In short: every practice is "covered" by the emergency post during the evenings, nights and weekends, in the exchange that a GP monthly does a couple of emergency post shifts. The emergency practice is a bit out of the scope, however, the interviewee explained that they worked with an advanced digital system that lets caregivers easily make chats, calls and video calls with patients. Therefore it was valuable to observe the workings of that system. The research questions were:

- How is the digital interaction between patient and caregiver at the emergency post?
- What is the experience (pros and cons) of this digital interaction for both patient and caregiver?

This research is done by observing a caregiver during her shift at the emergency post. In the observation, the interaction and conversation are noted down and obscurities are asked. It was not allowed to take photos of anything patient-related.

2. At the GP practice with multiple ways of communicating

Observation two focused on increasing my knowledge from the caregiver's perspective. This was done by attending the GPs workday and observe how the GP interacts with patients. Furthermore, it was also possible to "eavesdrop" on the telephone calls that the assistant does with the patients that call her. The research questions were:

- What are the differences between consultation methods?
- How is the first contact between assistant and patient (duration, attitude, types of questions)

It was not allowed to take photos of anything patient-related.

3. At home as a patient using e-consultation methods.

There are multiple steps necessary for creating a good patient journey. One of these steps is experiencing the process yourself (Simonse, 2019). Therefore I started the e-consultation process for myself with a real medical complaint. I especially chose an e-consultation to observe how that process currently works. The goals were as follows:

- How do I experience an e-consult?
- What is different from an e-consult and previous physical consults I had?

Screenshots of the process were taken throughout the process.

3.1.2. Qualitative approach

The literature study and the observations provided an overview of the situation of e-consultation. However, the insights from the literature study were mainly on a general or systemic level and did not provide insights into the experience that caregivers or patients had with digital consultations. Qualitative research was done to analyse their experience and to gain deeper insights.
One aspect that was apparent by analysing previous researcher's work is that they mostly focused on either the GP or the patient, and most of the time the focus was on the caregivers. The qualitative research will have a broad approach, focusing on all stakeholders and consultation methods, to provide a more complete analysis. This means that "traditional" consultation will also be thoroughly examined.

Research question caregivers

In chapter 2 it became clear that caregivers are likely to go back to traditional consultation methods (physical and telephone) after the pandemic. The research does not provide in-depth insights into the experiences of caregivers with e-consultation. Therefore, it is important to delve deeper into the motives of caregivers to understand their situation better. For my qualitative analysis, caregivers will be interviewed about their experiences with different forms of consultation, implementation of e-consultation and digitization in general. The main research question is as follows:

- How do caregivers experience the different consultation methods and the implementation of digital consultation methods?

Research question patients

As mentioned earlier, the patient side of the story is not reviewed a lot in studies or reviewed by caregivers. Most of the qualitative research in the current field in e-consultation only interviews caregivers. Therefore it is important to interview patients as well. Next to this, research pointed out that patients had quite a positive experience with digital consultation methods but still not a lot of patients use it. It is interesting to learn how patients think about e-consultation and why they use or do not use it. The research questions for this part are as follows:

- How did patients experience their recent (e-) consultation process?
- What is important for a good consult?

The audio of the interviews was recorded and eventually transcribed. The transcripts were anonymized, and no photo or video material was gathered during the interviews. Video calling was chosen over normal calling to pick up any visual cues.

3.2. Observational study

The detailed reports of the observations can be found in appendix 3. In the parts below, a summary of the observations and the main conclusions will be presented.

3.2.1. GP emergency post observations

The observation was done at the GP emergency post on a Sunday. A GP invited me to observe due to the new way of working the emergency post has started to work with since March. During corona, the emergency post started using Spreekuur.nl, a chat system for patients and GPs.

One main aspect that was noted was the difference between the emergency post and a normal GP practice. The personnel work with a different motto. At a normal practice, the patient will be helped and care is provided. At the emergency post, the first step is to evaluate the urgency of the complaint and then evaluate the next actions. This realisation was good to have and will later be elaborated in the scope.

During the observations, the benefits and drawbacks of the system surfaced:

- Chatting with patients seemed to be an efficient way of communicating with the GP. One of the main benefits is that the GP can have multiple chats open at the same time. While one conversation is answered, and the GP has to wait for a response, another conversation can be opened.
- Furthermore, chatting seemed to be effective for smaller and not urgent questions. While it was the emergency post, people that connected still came with small and simple questions. The GP replied with a quick response, usually with the help of templates, and most patients were helped.
- One drawback of the system were some technical problems that the program still had. These bugs caused delay and frustration for the GP.
- Next to this, the two programs that were used were not integrated. This resulted in the GP copying information from one to the other, which was time-consuming.
- A lot of people that contact Digi HAP did not have urgent complaints. Some people over-dramatize their complaint to get help quick or just cannot estimate the urgency of their complaint well.

3.2.2. At the GP practice with multiple ways of communicating

The second observation was done at a GP practice. In total, four different kinds of contact with patients were observed: telephone contact between patient and assistant (10 calls), a home visit by GP (1 consult), physical visit at the practice by GP (1 consult) and telephone consults by GP (7 consults).

The main noteworthy observations were as followed:

- During the calls with the assistant, it was noted that many people call with small medical-related questions. A lot of the times these questions were small, asking about test results or repeat recipes. The assistant mentioned that this occurs often.
- The telephone consultations showed to be an efficient way of working for the GP due to the speed and ability to multitask (chatting and typing information on the computer). The speed was shown due to the quick connection between patients and caregivers and in the length of the consultations (between 5 and 10 minutes each).
- Physical and home visits turned out to be the most time consuming, however, they both provide additional benefits. A physical examination can be done, there is way more conversation between caregiver and patient, and it provides non-verbal communication cues. A patient can be comforted by placing a hand on someone's shoulder.
- Both the GP and assistant are very busy and multitask during their work due to the high amount of administrative work. This administrative work mainly consisted of updating patients online dossiers.

3.2.3. At home as a patient using e-consultation methods.

The third observation was done mostly at home. An e-consultation was experienced as a patient myself with a real complaint. This process can be divided into four parts: registration at Rotterdam practice, first contact with a new practice, secured mailing, and 'Uw Zorg Online'. This experience took several weeks and the treatment is still ongoing.

The main noteworthy observations were as follows:

- For this observation, an e-consult was analysed. To get an e-consult it was needed to register to a practice that offered this service. A lot of practices do not promote or explain these services well. Furthermore, the method to get in contact that is shown the most is the telephone number.
- During the e-consultation process, some parts were not clearly explained. This caused frustration for me. Luckily, the assistant helped quickly and effectively.
- The secured e-mail/chat service that the system uses is very secure. It will send an extra email with a code that needs to be filled in each time you log in. This did not feel like a hassle and felt secured and valid.
- The e-mail/chat service worked very fast and effectively. There was no "real" waiting time and the GP would reply in a couple of days (minimum of 1 day, maximum of 5). I experienced it as very pleasant and would continue to use it for non-urgent questions.

		OBSERVATIONS		
		Digi HAP	Prac-tice	Pat. Me
POSITIVE	Digital/distance for small or checks	🟥		
	Digital (chat) is efficient for CG	🟥	🟥	
	Digital (chat) is easy			🟥
	Digital is secure			🟥
NEGATIVE	Digital can be frustrating			🟥
	Digital is unclear and confusing			🟥
	System had technical difficulties	🟥		🟥
	Bad integration caused more effort	🟥		
STATUS QUO	Telephone efficient due to speed and ability to multitask		🟥	
	Physical gives more information		🟥	
	Physical costs more time		🟥	
OTHER	First contact usually by phone		🟥	🟥
	No or bad promotion of digital			🟥
	Assistant answers many small questions		🟥	
	Contact urgent Digi HAP without real urgency	🟥		
	Pressure is high and increases	🟥	🟥	

Table 3. The results from the observations categorized

CONCLUSIONS OBSERVATIONS

The conclusions of the observations are placed in table 3.

- Quick digital interaction between caregiver and patient at the Digi HAP is a very efficient and effective way to handle small questions. The main disadvantage was the bad integration, resulting in more effort for the caregiver.
- At the GP practice, the differences between consultation methods became apparent. Physical consultation is lengthy but qualitative strong, while telephone consults are efficient and quick. The assistant has an important role in answering many smaller medical-related questions.
- My e-consultation experience showed that e-consultation can be frustrating and confusing, but was overall experienced positive due to the ease and speed.

The observations strengthen the fact that negative experiences are likely caused by malfunctioning software. Still, the primary caregivers require more efficiency to keep pace with the high pressure.

3.3. Qualitative Study

3.3.1. Methodology (both)

Data collection

In this project, there are quite some different stakeholders: general practitioners, assistants, practice assistant GP (POH), but also patients. Next to this, most patients experience a different care pathway due to their different complaints and needs. Therefore the method that is used to gather data from all of these stakeholders in the context must be flexible. Semi-structured interviews were held using different interview guides for different main categories of stakeholders (Patton, 1990).
From the caregivers, a thorough approach is taken to reflect on all of their experiences with different sources of e-consultation and implementation. For the patients, this was not the same. While contacting patients, it was noted that most patients only had a bit or no experience with e-consultation. Therefore, the decision was made to focus the patient interviews on their experience of their most recent (e-)consult (or multiple if it was till recently), and to reflect on their wishes and needs in primary care. This difference can be seen in table 6, which shows the frameworks for both interview guides.

Sampling

Two sampling strategies were used: criterion sampling and snowball sampling. Criterion sampling was needed for both groups because diversity in the groups was needed to get a complete picture. For caregivers, it was important to have different kinds of caregivers. It was chosen to have at least one of the following roles: general practitioners, assistants, practice assistant GP. For the patients, it was needed to have patients with experiences with different kinds of consultation methods (or with experience with multiple). It was chosen to have at least participants with the following methods: video calling, emailing or chatting, a telephone consult, physical consult. Next to criterion sampling was opportunistic sampling used to find participants. This sampling strategy is good for making on-the-spot decisions and opportunities during actual data collection (Patton, 2002). This was done because the pandemic made it harder to find participants due to mostly relying on online social media accounts (Facebook, LinkedIn, and Whatsapp) to find participants. For the caregivers, a total of eight interviews were held, and for the patients, a total of ten interviews were held. The caregiver participant overview can be seen in table 1 and the patient participant overview can be seen in table 2.

Name code	Occupation	Age	Time duration interview	#Codes per interviewee
HA1	General practitioner	32	1h 15 min.	196
HA2	General practitioner	34	45 min.	89
HA3	General practitioner	40	1h 15 min.	165
HA4	General practitioner	65	1h	101
HA5	General practitioner	56	55 min.	100
POH1	Practice assistant GP	53	15 min.	37
POH2	Practice assistant GP	66	35 min.	49
APO1	Assistant and practice assistant GP	54	1h 5 min.	145

Table 4. Information about the caregiver interviewees

Name code	Age	Time duration interview	#Codes per interviewee
P1	25	25 min.	62
P2	25	14 min.	33
P3	26	18 min.	28
P4	25	19 min.	33
P5	55	20 min.	23
P6	32	26 min.	58
P7	40	17 min.	43
P8	25	17 min.	32
P9	66	21 min.	41
P10	28	16 min.	49

Table 5. Information about the patients interviewees

Data analysis

The interviews were transcribed and coded using the program Atlas.TI. Due to the wide variety in length and topics between the patient and caregivers, it was decided not to group their transcripts during the coding. The codes were analysed and grouped, and this resulted in a Grounded Theory Method (GTM). The results of the GTM have resulted in a code tree and a codebook. The codebooks for both the caregiver and the patients can be found in appendix 7.

Increasing validity

While doing qualitative research, the rigour and the quality of the research depends on the validity. One main method has been used to improve the neutrality of the research, namely using a reflective diary. During the process, the reflective diary was used to reflect on my own biases during the coding process. As I am a designer, I have to be aware of my behaviour to find problems and try to solve them. However, any insights or problem must appear through the proper use of the method and not by force.

Data synthesis

The data from the GTM can be compared with the data from the observations and from papers. Furthermore, a patient journey was made with the information gathered in the interviews.

Framework of caregiver interview guide	Framework of patient interview guide
0. Introduction and interview explanation	0. Introduction and interview explanation
1. Information about your work procedure	1. Basic information about recent consult
2. Methods of consulting	2. Expectations of consult
3. Experiences with different consultation methods	3. Experience of consult
4. Implementation of consult-methods	4. Patient needs and wishes in primary care
5. The future of the GP and the GP practice	5. General final questions
6. General final questions	

Table 6. General framework of the interviews

3.3.2. Data analysis caregivers

Figure 16 shows the extensive codetree from the caregivers. The main themes that emerged are consult, caregiver information, digital innovation, trends, future, and dealing with... . The main theme ‘consult’ is very large compared to the others. Therefore, families of that theme such as ’experience digital positive’ and ‘experience digital negative’ are bigger in quotes than the main theme ‘future’. In the following part, the main themes are briefly explained and elaborated on how the theme contributes to my research. Next to this, important families and subgroups will be elaborated if there is a high contribution to the research.

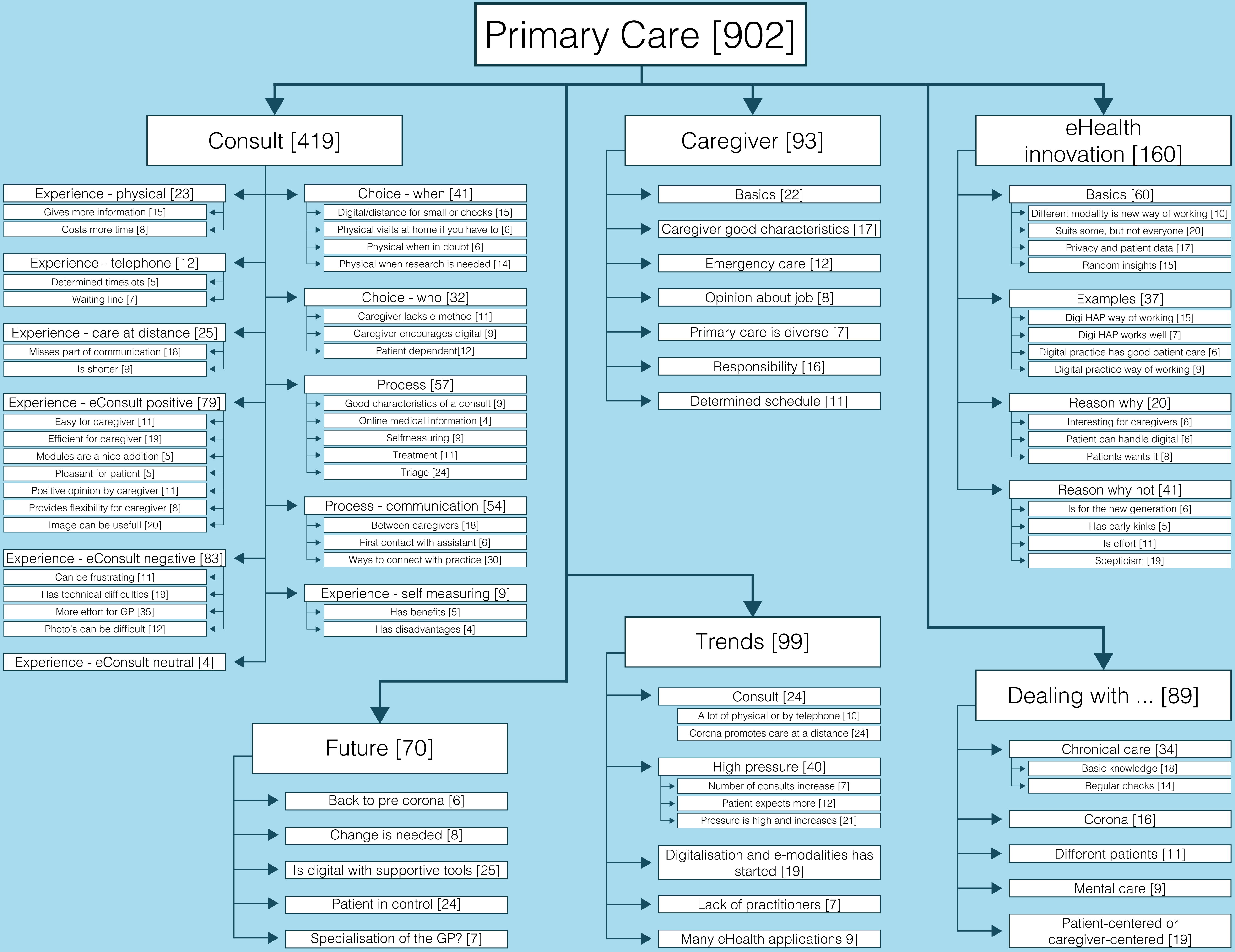
Consult

The consult theme can be divided into three parts: the caregiver experience of different consult methods, the influences that determine the choice of the consult, and the process of a consult. The caregiver experience with different consults methods showed the advantages and the disadvantages of ‘care at a distance’ methods compared to physical consultation. Caregivers mention quite a lot of positive aspects of e-consultation methods [#79] such as efficiency [#19], easiness [#11], the usefulness of images [#20], and more.

(About chatting with other caregivers) “Very useful. Yeah, also because it is a safe method that saves phone calls. You can do it when there is a moment that you do not have something to do because otherwise you will get interrupted the whole time during your work. - Assistant POH 1

“You can see skin colour well, you can see the skin image well, dots spots, etc. I can always spot the chickenpox.” - GP3

The caregivers mentioned negative experiences with e-consultations methods [#83] as well. The biggest



- Primary Care [902]
  - Consult [419]
    - Experience - physical [23]
      - Gives more information [15]
      - Costs more time [8]
    - Experience - telephone [12]
      - Determined timeslots [5]
      - Waiting line [7]
    - Experience - care at distance [25]
      - Misses part of communication [16]
      - Is shorter [9]
    - Experience - eConsult positive [79]
      - Easy for caregiver [11]
      - Efficient for caregiver [19]
      - Modules are a nice addition [5]
      - Pleasant for patient [5]
      - Positive opinion by caregiver [11]
      - Provides flexibility for caregiver [8]
      - Image can be usefull [20]
    - Experience - eConsult negative [83]
      - Can be frustrating [11]
      - Has technical difficulties [19]
      - More effort for GP [35]
      - Photo's can be difficult [12]
    - Experience - eConsult neutral [4]
    - Choice - when [41]
      - Digital/distance for small or checks [15]
      - Physical visits at home if you have to [6]
      - Physical when in doubt [6]
      - Physical when research is needed [14]
    - Choice - who [32]
      - Caregiver lacks e-method [11]
      - Caregiver encourages digital [9]
      - Patient dependent[12]
    - Process [57]
      - Good characteristics of a consult [9]
      - Online medical information [4]
      - Selfmeasuring [9]
      - Treatment [11]
      - Triage [24]
    - Process - communication [54]
      - Between caregivers [18]
      - First contact with assistant [6]
      - Ways to connect with practice [30]
    - Experience - self measuring [9]
      - Has benefits [5]
      - Has disadvantages [4]
  - Caregiver [93]
    - Basics [22]
    - Caregiver good characteristics [17]
    - Emergency care [12]
    - Opinion about job [8]
    - Primary care is diverse [7]
    - Responsibility [16]
    - Determined schedule [11]
  - eHealth innovation [160]
    - Basics [60]
      - Different modality is new way of working [10]
      - Suits some, but not everyone [20]
      - Privacy and patient data [17]
      - Random insights [15]
    - Examples [37]
      - Digi HAP way of working [15]
      - Digi HAP works well [7]
      - Digital practice has good patient care [6]
      - Digital practice way of working [9]
    - Reason why [20]
      - Interesting for caregivers [6]
      - Patient can handle digital [6]
      - Patients wants it [8]
    - Reason why not [41]
      - Is for the new generation [6]
      - Has early kinks [5]
      - Is effort [11]
      - Scepticism [19]
  - Future [70]
    - Back to pre corona [6]
    - Change is needed [8]
    - Is digital with supportive tools [25]
    - Patient in control [24]
    - Specialisation of the GP? [7]
  - Trends [99]
    - Consult [24]
      - A lot of physical or by telephone [10]
      - Corona promotes care at a distance [24]
    - High pressure [40]
      - Number of consults increase [7]
      - Patient expects more [12]
      - Pressure is high and increases [21]
    - Digitalisation and e-modalities has started [19]
    - Lack of practitioners [7]
    - Many eHealth applications 9]
  - Dealing with ... [89]
    - Chronical care [34]
      - Basic knowledge [18]
      - Regular checks [14]
    - Corona [16]
    - Different patients [11]
    - Mental care [9]
    - Patient-centered or caregiver-centered [19]

Figure 16, Caregiver codetree

issue was the increase of effort [#35], followed by technical difficulties [#19].

“What I also think is difficult is that you have to enter information twice. So eh, you have the screen of Spreekuur.nl in front of me at the digi HAP where I see and am busy with the chat and the photos of the patient. But after I am done then I finish it in that and I have to open Topicus and put everything in there as well.” - GP4

“Well for example the video calling on my phone. Well it is, I do not prefer that my phone is known to patients, that is an issue. Because before I know I get extra calls and even in my free time and the evenings.” - POH2

The differences in visual and auditory methods were also made clear. Caregivers mentioned that ‘care at a distance’ misses some parts of the communication [#16].

“I do not think telephone consults are easy, physical is the easiest, to be honest. I think those are the easiest. You just miss parts of the communication through the telephone.” - GP1

In the other family ‘choice’, the differences between physical and digital meetings became clear due to the need for physical examination [#14] and that ‘care at a distance’ is suitable for smaller consults and checks [#15].

“The people that you do not often see, usually have something very small. It is fairly possible to do that by phone or mail.” - GP3

Furthermore, it was mentioned that the choice of the consult is usually dependent on the patient [#12], and that the caregiver encourages e-consultation [#9] but lack certain e-consultation methods [#11].

“So my day looks different now, I am calling and video calling way more. I promote that very much. Just like you, I prefer seeing someone than by telephone. Telephone, it is just very difficult because you cannot form an image with it. So we promote that very much.” - GP 5

Caregiver information

The families and codes in this theme were good to enhance my knowledge of this topic as a designer but did not contribute directly to the goal of this research part.

eHealth innovation

This theme contributes to the implementation of bottlenecks and motivators of digital consultation and innovation in primary care. At first, it provides the basic information that e-consultation methods suit some well and others not [#20], and that it requires another mindset of working [#10].

“When you start a fully digital practice, yeah then you can select patients that can do that. That is going to change the care because patients that cannot do that, will not sign up for that.” - GP 1

Furthermore, the family explains the motivation to do that digital innovation: is needed because patients want it [#8] or that it is interesting for caregivers [#6].

“There are these students, that are still signed in at their parents and nowadays study in Amsterdam. They ask “can I not quickly send a picture?”.” - GP 3

Logically, it also shines a light on the bottlenecks of implementation. Aspects that hinder the implementation are scepticism about the results [#19], the required effort to change [#11] and that innovations are for the new generation [#6].

“Well in the beginning it costs time, and your day is already full, and that piles up as well. You always think in the beginning that it will cost more time than it will bring in.” - GP 5

“Currently I have that (e-consultation) not well integrated because I will retire soon so I think: “my predecessor has to do that”. So I try to motivate her that she will do that because I think it is a good progression in care.” - POH 2

Trends

The main insights at the theme trends can be divided into parts: the high pressure on primary care and the change in the consultation method. Caregivers mention the high and increasing pressure [#21] and that can be seen in an increase of consults [#7]. One reason may be due to patients expecting more [#12] of caregivers.

“Furthermore, patients generally ask more questions. So with more, and more accessible contact with all sorts of questions.” - GP 5

The change in the consultation method is quite a contradiction that was seen earlier as well. On the one hand, is corona promoting ‘care at a distance’ [#24], but on the other hand, a lot of consults are still done physically or by phone [#10].

“Now you see in corona times that the regular care diminished a bit and GPs try to do everything by phone” - GP 4

“At this moment we do a lot by phone but if it is possible then physical because that has my preference.” - POH2

Future

In this theme, caregivers express their expectations and wishes for the future of primary care. The future is digital with supportive tools [25] and the patient is in control [24] were the biggest groups inside of this theme.

“What is something you look forward to in the future?” - LS. “That it becomes way more integrated, the digital part. That is also very easily possible.” - GP 2

“On the other side I think that is where we need to go; the patient has a question and that you patient-centred and patient-controlled healthcare have to do. And not doctor-centred. The question must come from the patient.” - GP 3

Dealing with...

Lastly, in the ‘Dealing with...’ theme caregivers mention how to deal with certain kinds of patients; chronic care, mental care, or different patients, or different situations; corona, patient-centred or caregiver-centred. Except for a mutual confirmation that patient-centred triggers intrinsic motivation and therefore works better than caregiver-centred care [#19], there were no significant grounded findings.

“So people are often busy these days by informing themselves about anything. So you have to make them part of the decision-making process like what do you want?” - GP 4

CONCLUSIONS CAREGIVERS INTERVIEWS

The data shows that caregivers use different consultation methods very situational. Physical meetings are used for physical examinations and when more communication is needed, while e-consultation is great for simple care and short contact. Many e-consultation benefits mentioned in the literature study are recognized and/or experienced. Interestingly, new negative experiences and opinions about e-consultation are seen in the data as well. Caregivers experience e-consultation as an increase of effort, technical difficulties, are sceptic about the result and see it as something for the new generation.

When analysing the caregivers’ opinion about the future, a very digitally supported e-consultation view is sketched. This is potentially due to the increase in pressure trends on primary care and the recognized efficiency of e-consultation for caregivers. It seems that there is a group of caregivers that want to adopt e-consultation, however, the currently malfunctioning software is limiting them to properly use it. A different group does not see the benefits of e-consultation and is likely to return to the more traditional consultation methods after the pandemic.

3.3.2. Data analysis patients

Figure 17 shows the codetree from the patients. The main themes that emerged are consult type, experience, patient, and process. Compared to the data analysis of the caregivers, there are fewer codes. This is logical due to the relatively short experiences most patients had with primary care, which resulted in shorter interviews. In the following part, the main themes are briefly explained and elaborated on how the theme contributes to my research. Next to this, important families and subgroups will be elaborated if there is a high contribution to the research.

Consult type

The consult type theme describes how the choice of the consult is made and in which circumstances what kind of consult is preferred. The choice of the consult is mostly determined by the complaint [#14], but can also be determined by the caregiver [#9] or influenced by corona [#9].

“Well, first I got in contact with the assistant about my complaints. Then she said “well you should visit the practice”, so I did that.” - P8

“I live in Rotterdam and my GP is in Delft. Due to the corona measures, they said: only travel when necessary. And I thought as well, yeah the question that I have, I do not have to physically present for that.” - P1

Physical consults are preferred because they are easier to discuss or talk [#12], or at the first consult [#4]. E-consults are for non-urgent and small aspects [#13], especially telephone is for short contact [#13]. E-consults are also preferred by many patients [#10], for some because they do not want to travel [#6].

“My preference is physical consultation because it is easier to talk to each other than through the phone and you can explain yourself more clearly and the GP can measure things if there are physical complaints or something like that. So I prefer a physical consultation.” - P3

“But definitely if something is not urgent, I would not call anymore. I will use that system again.” - P7

*“What type of consult would you want in the future, regardless of the complaint. And why?” - LS
I would prefer to have a video call all the time. Or prefer normal calling but I am fine with video calling if that is more suited.” - P10*

Experience

The experience theme categorizes the experiences of patients with different types of consults. For this research, the families: digital positive experiences and digital negative experiences families were the most interesting. Efficiency or time-saving [#18], easiness [#7], or just a positive experience overall [#11] were mentioned by patients as the most positive aspects of digital consultation.

“Eh, yeah what I really like about the e-consult and, therefore not like at a normal consult, is that it is a billion times faster. If you go to the whole misery of creating a user account and looking that stuff up.” - P1

“The video consult, yeah I can’t remember how the program is called but it is very pleasant. So you have some kind of waiting room where you are in and then she will get you out of there. And that just works really well and is easy in use.” - P8

The main negative experiences of a digital consult were technical difficulties [#10], not user-friendly [#7], unclear and confusing [#8], and an increase in the effort [#9].

“In the beginning, you told me that you used a portal?” - LS. “Yeah, that one is horrible. Yeah in the portal you cannot log in properly. So every time there are problems. And the portal always has maintenance.” - P10

“But it was not so clear as it could have been I think that the important aspects could be designed easier. And also with more visual cue’s so like if you want this then click here with an obvious button.” - P2

Next to this, the overall experience of the whole consult process was evaluated. Noteworthy are the negative aspects that are divided into a busy GP or slow process [#17], a negative assistant experience [#10], inconvenience [6], and unclear communication [#4].

“But, what I also notice at other GPs is that these huge waiting lists are created again. I think it is strange that I have to wait for a week.” - P9

“Such an assistant, I do not know if you got in contact with a GP assistant, but if you try to get past her you barely succeed. No, it is horrible” - P7

Patient

The patient theme is simply divided into what the patient wants and what the patient has. Accessible care [#13], options and discussion [#10], quick care [#11], and a GP that listens and understands [#16] are the most mentioned aspects that they desire from primary care consultation and caregivers.

“Yeah I, I would make it easier to make an appointment and also to make a quick appointment.” - P2

“Yeah that you can, in a way spar with each other with ‘what do you want?’. There is not advice enforced but discussed like “gee, there are the possibilities”. I always think that there are multiple ways to Rome so I prefer having a say and someone that listens.” - P7

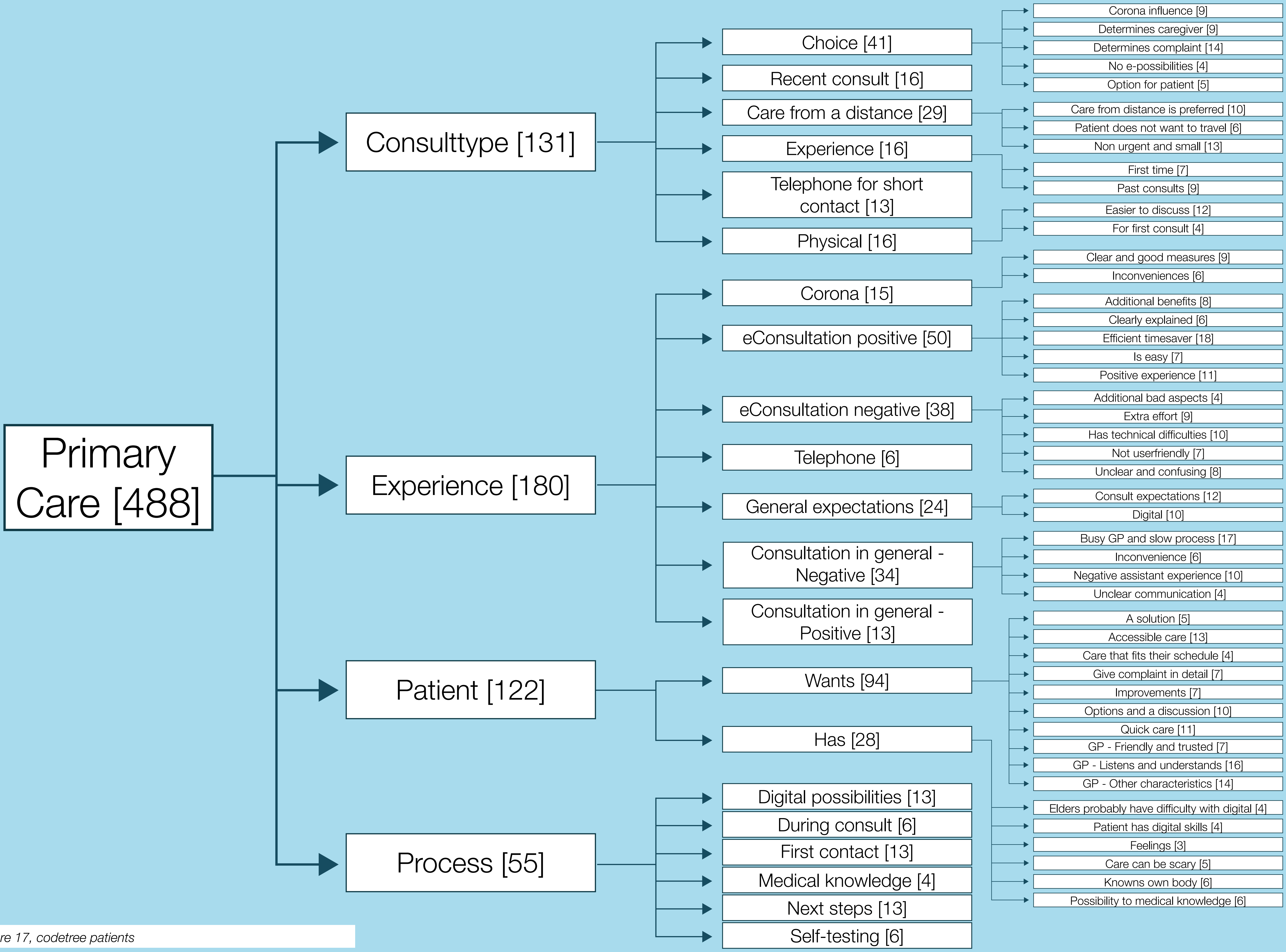
“What do you find important aspects of a consult?” - LS. “That a GP looks at me and that really understands you. That he really listens to your problem and proceeds on that.” - P3

Process

The families and codes in this theme were good to enhance my knowledge of this topic as a designer but did not contribute directly to the goal of this research part.

CONCLUSIONS PATIENT INTERVIEWS

The coding for the patients showed more results that were not seen in literature study before. This is because the current studies mostly focus on caregivers or only patients satisfaction.
It seems that patients think quite functionally in terms of consultation method. The consultation is mostly determined by the complaint, or decided by the caregiver. Next to this, if the complaint can be done with an efficient ‘care from a distance’ method, then that is preferred due to the decrease of (waiting or travel) time, and speed of consultation.
In terms of negative experiences, patients are quite similar to caregivers. The increase in effort, the technical difficulties are recognized as well0, and additionally also the lack of clarity and confusing of e-consultation are seen in the results.
Noteworthy, is the results about the patients’ desires from primary care. There is a clear need for accessible care (that is quick), a GP that listens and understands, and the need for options or discussions with the GP. The latter one is in line with the caregivers analysis, that care should be more patient-centred.



- Primary Care [488]
  - Consulttype [131]
    - Choice [41]
      - Corona influence [9]
      - Determines caregiver [9]
      - Determines complaint [14]
      - No e-possibilities [4]
      - Option for patient [5]
    - Recent consult [16]
    - Care from a distance [29]
      - Care from distance is preferred [10]
      - Patient does not want to travel [6]
      - Non urgent and small [13]
    - Experience [16]
      - First time [7]
      - Past consults [9]
    - Telephone for short contact [13]
    - Physical [16]
      - Easier to discuss [12]
      - For first consult [4]
  - Experience [180]
    - Corona [15]
      - Clear and good measures [9]
      - Inconveniences [6]
    - eConsultation positive [50]
      - Additional benefits [8]
      - Clearly explained [6]
      - Efficient timesaver [18]
      - Is easy [7]
      - Positive experience [11]
    - eConsultation negative [38]
      - Additional bad aspects [4]
      - Extra effort [9]
      - Has technical difficulties [10]
      - Not userfriendly [7]
      - Unclear and confusing [8]
    - Telephone [6]
    - General expectations [24]
      - Consult expectations [12]
      - Digital [10]
    - Consultation in general - Negative [34]
      - Busy GP and slow process [17]
      - Inconvenience [6]
      - Negative assistant experience [10]
      - Unclear communication [4]
    - Consultation in general - Positive [13]
  - Patient [122]
    - Wants [94]
      - A solution [5]
      - Accessible care [13]
      - Care that fits their schedule [4]
      - Give complaint in detail [7]
      - Improvements [7]
      - Options and a discussion [10]
      - Quick care [11]
      - GP - Friendly and trusted [7]
      - GP - Listens and understands [16]
      - GP - Other characteristics [14]
    - Has [28]
      - Elders probably have difficulty with digital [4]
      - Patient has digital skills [4]
      - Feelings [3]
      - Care can be scary [5]
      - Knowns own body [6]
      - Possibility to medical knowledge [6]
  - Process [55]
    - Digital possibilities [13]
    - During consult [6]
    - First contact [13]
    - Medical knowledge [4]
    - Next steps [13]
    - Self-testing [6]

Figure 17, codetree patients

3.4. Patient Care Journey

3.4.1. Explanation

With the gathered research from the caregiver's interviews, patients interviews, and observations, the patient care journey can be sketched. This process took several iterations to come to a final care journey. The process was done during the coding of the interviews, and especially by reviewing the patients' interviews afterwards again. The care journey can be seen in figure 18. One important side note is that this a general primary care journey and certainly not a comprehensive one. It must be stressed that in primary care there is a huge diversity in complaints, patients, and situations. A good example of this is chronic care. Those patients have regular check-ups quarterly, biyearly, or yearly where usually a POH or the GP initiates the contact. This makes them have a different care journey. Due to the lack of chronic care patients in my patients' interview group, I did not include that part in the patient care journey. Next to this, there is also a difference between patients that are in the middle or at the end of a care journey and those that are at the beginning. This is due to the differentiation in treatments, for example, there is a big difference between the care journey of a patient that gets prescribed medicine for four months compared to a patient that gets good medical advice. Therefore, the care journey illustrated shows a situation from non-chronic care patients that initiate the first contact with a complaint.

The phases

The twelve phases are seen at the top of the figure. However, this does not mean that the process always takes twelve steps because it is also possible to go back. A good example is the step 'feedback on the care journey', which can result in the patient going back in the process one step if the patient disagrees with the proposed care journey.

Shift in action

In the illustration, there are dark blue rectangles and bright blue (or IZER blue coloured) rectangles. These dark blue columns rectangles indicate that the caregiver is the one that has a leading role in the action or decision-making. The bright blue indicates that both share a role in the next steps. Especially 'who does triage' and 'care journey outcome' are caregiver led phases. 'Scheduling' and 'next steps' are seen more than the caregiver and the patient both have a big part in this role. 'Consult content' has both colours, because interviews showed that it is quite a complaint and caregiver dependent on how much influence the patient has in these parts. These blocks provide clarity to the care journey and can steer the conversation further.

Most common path

The different options between phases are visualized with white blocks with arrows between them. These arrows show the different options the patient or caregiver has. Some white blocks have thicker edges than the other blocks. It means that those blocks are the most common care journey method. While creating this I realized that there is a big researcher/designer bias by myself because only a few of these most common paths can be backed up (e.g. telephone is the most used consult type, see chapter X). However, this is illustrated to get the conversation going.

The patient's opinion line

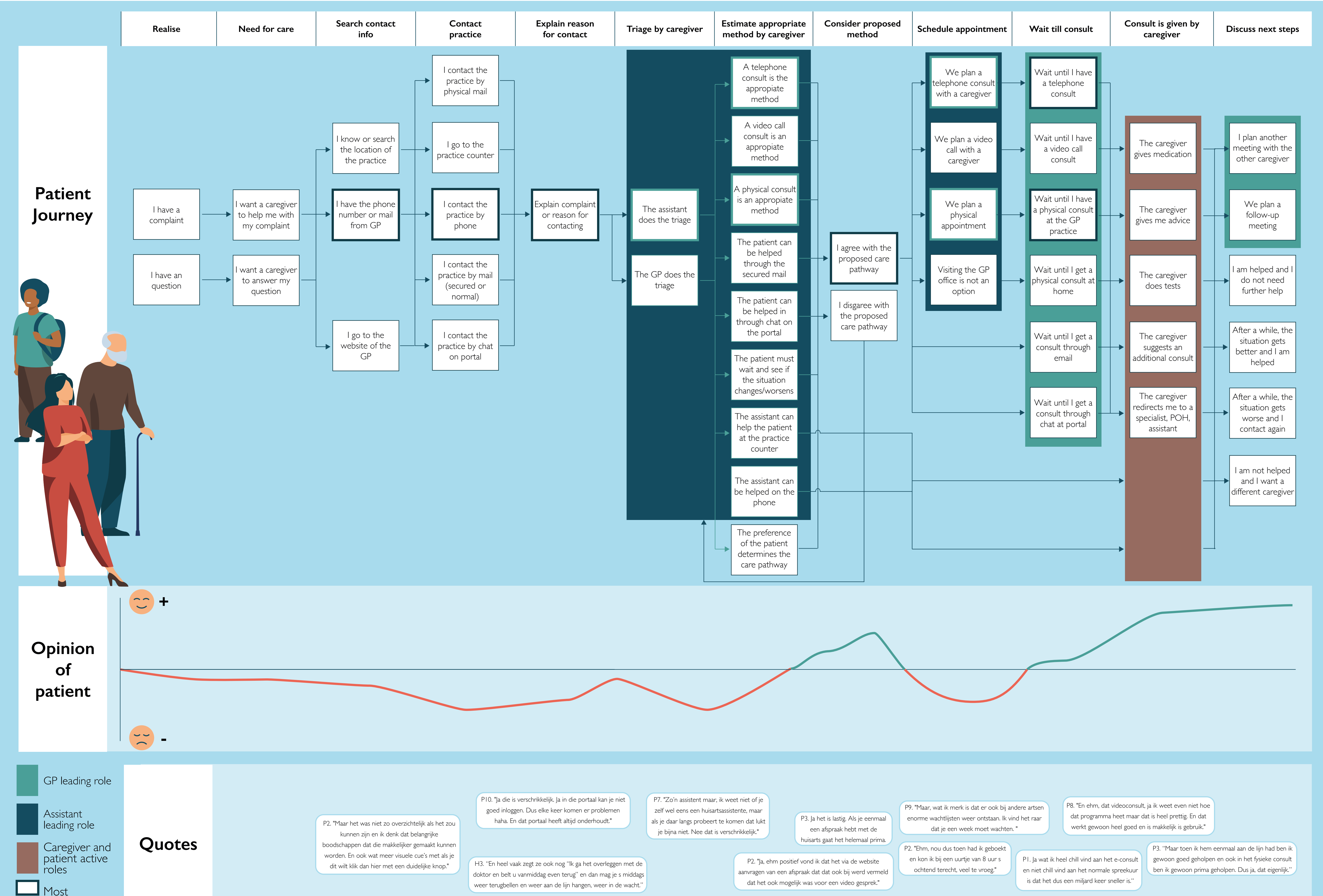
Furthermore, an opinion line was added to the care journey with additional quotes. An opinion or experience line is sometimes added to user journeys to emphasize the opinion of the user during the different stages. An opinion line however is not back-up scientifically at all and is completely biased by my perception after the interviews and observations.

The line is first going down, this is mostly due to the telephone contact hours and waiting line. Next to this, there is another dip, resulting from the negative assistant experience. In phase 'feedback on the care journey', the opinion goes positive because the patient's feelings are relieved because the patient is ensured that help will be given. Furthermore, the scheduling goes negative again due to the lack of options and the inconvenience of consults. When the patient gets a consult, the opinion goes positive again because they usually get helped in a professional and good way.

CONCLUSIONS PATIENT PATHWAY

During the developing of the patient care pathway, two aspects became clear:

- In the beginning the patients has control, this changes around the steps of the triage where the assistant takes control. In the end during the consultation, the GP or a shared control between GP and caregiver is in place.
- The experience of the patient differs in opinion during the stages. It is the lowest during the contacting of the practice, the triage and the waiting time.



Realise | **Need for care** | **Search contact info** | **Contact practice** | **Explain reason for contact** | **Triage by caregiver** | **Estimate appropriate method by caregiver** | **Consider proposed method** | **Schedule appointment** | **Wait till consult** | **Consult is given by caregiver** | **Discuss next steps**

Patient Journey

Realise
- I have a complaint
- I have an question

Need for care
- I want a caregiver to help me with my complaint
- I want a caregiver to answer my question

Search contact info
- I know or search the location of the practice
- I have the phone number or mail from GP
- I go to the website of the GP

Contact practice
- I contact the practice by physical mail
- I go to the practice counter
- I contact the practice by phone
- I contact the practice by mail (secured or normal)
- I contact the practice by chat on portal

Explain reason for contact
- Explain complaint or reason for contacting

Triage by caregiver
- The assistant does the triage
- The GP does the triage

Estimate appropriate method by caregiver
- A telephone consult is the appropriate method
- A video call consult is an appropriate method
- A physical consult is an appropriate method
- The patient can be helped through the secured mail
- The patient can be helped in through chat on the portal
- The patient must wait and see if the situation changes/worsens
- The assistant can help the patient at the practice counter
- The assistant can be helped on the phone
- The preference of the patient determines the care pathway

Consider proposed method
- I agree with the proposed care pathway
- I disgaree with the proposed care pathway

Schedule appointment
- We plan a telephone consult with a caregiver
- We plan a video call with a caregiver
- We plan a physical appointment
- Visiting the GP office is not an option

Wait till consult
- Wait until I have a telephone consult
- Wait until I have a video call consult
- Wait until I have a physical consult at the GP practice
- Wait until I get a physical consult at home
- Wait until I get a consult through email
- Wait until I get a consult through chat at portal

Consult is given by caregiver
- The caregiver gives medication
- The caregiver gives me advice
- The caregiver does tests
- The caregiver suggests an additional consult
- The caregiver redirects me to a specialist, POH, assistant

Discuss next steps
- I plan another meeting with the other caregiver
- We plan a follow-up meeting
- I am helped and I do not need further help
- After a while, the situation gets better and I am helped
- After a while, the situation gets worse and I contact again
- I am not helped and I want a different caregiver

Opinion of patient

🟩 GP leading role

🟦 Assistant leading role

🟫 Caregiver and patient active roles

☐ Most common path

Quotes

P2. "Maar het was niet zo overzichtelijk als het zou kunnen zijn en ik denk dat belangrijke boodschappen dat die makkelijker gemaakt kunnen worden. En ook wat meer visuele cue's met als je dit wilt klik dan hier met een duidelijke knop."

P10. "Ja die is verschrikkelijk. Ja in die portaal kan je niet goed inloggen. Dus elke keer komen er problemen haha. En dat portaal heeft altijd onderhoudt."

H3. "En heel vaak zegt ze ook nog "Ik ga het overleggen met de doktor en belt u vanmiddag even terug" en dan mag je s middags weer terugbellen en weer aan de lijn hangen, weer in de wacht."

P7. "Zo'n assistent maar, ik weet niet of je zelf wel eens een huisartsassistente, maar als je daar langs probeert te komen dat lukt je bijna niet. Nee dat is verschrikkelijk."

P3. Ja het is lastig. Als je eenmaal een afspraak hebt met de huisarts gaat het helemaal prima.

P2. "Ja, ehm positief vond ik dat het via de website aanvragen van een afspraak dat dat ook bij werd vermeld dat het ook mogelijk was voor een video gesprek."

P9. "Maar, wat ik merk is dat er ook bij andere artsen enorme wachtlijsten weer ontstaan. Ik vind het raar dat je een week moet wachten. "

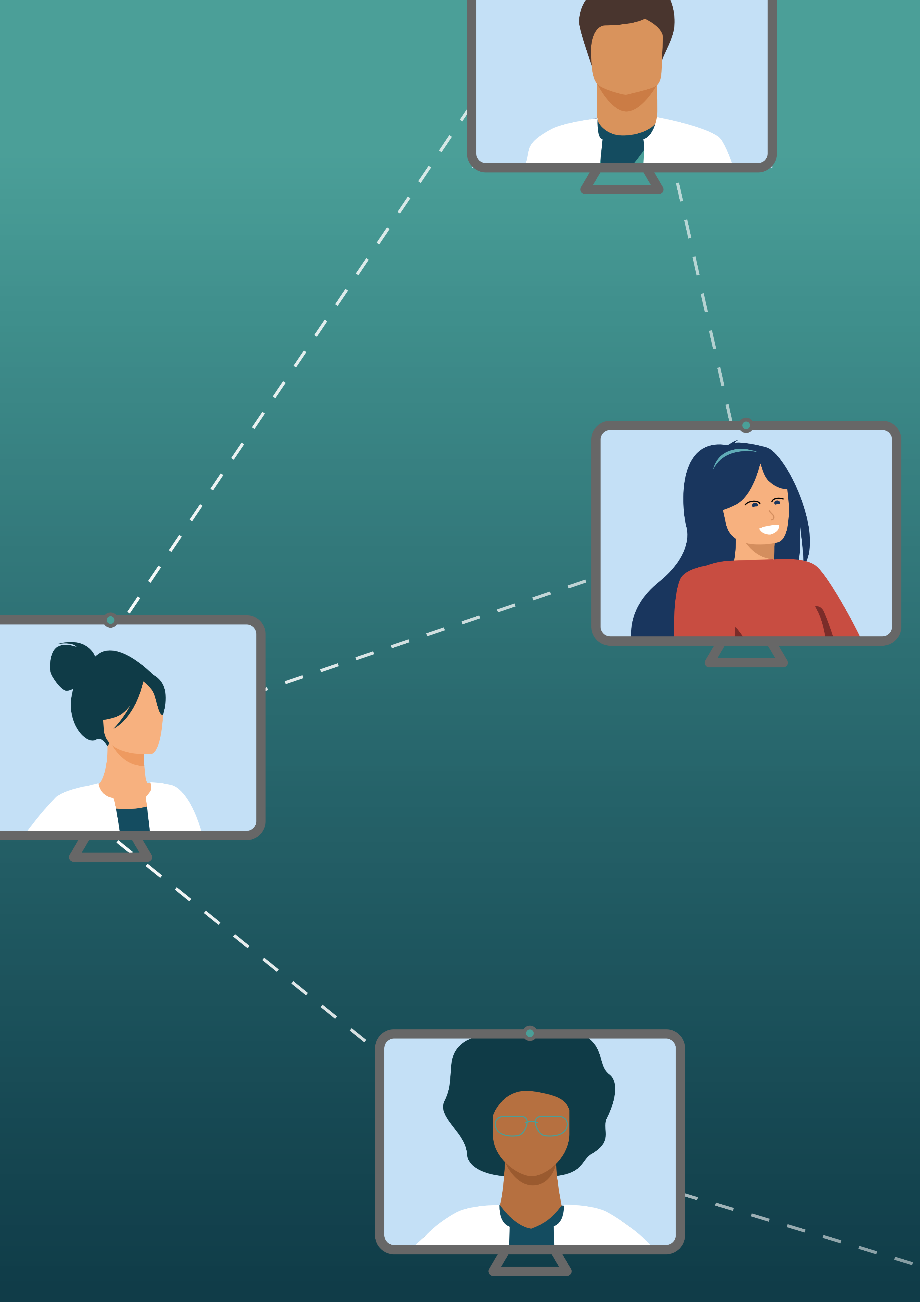
P2. "Ehm, nou dus toen had ik geboekt en kon ik bij een uurtje van 8 uur s ochtend terecht, veel te vroeg."

P8. "En ehm, dat videoconsult, ja ik weet even niet hoe dat programma heet maar dat is heel prettig. En dat werkt gewoon heel goed en is makkelijk is gebruik."

P1. Ja wat ik heel chill vind aan het e-consult en niet chill vind aan het normale spreekuur is dat het dus een miljard keer sneller is."

P3. "Maar toen ik hem eenmaal aan de lijn had ben ik gewoon goed geholpen en ook in het fysieke consult ben ik gewoon prima geholpen. Dus ja, dat eigenlijk."

Figure 18, Patient journey with an estimated opinion line and added quotations from the patient interviews



Chapter 4.

Scoping to a future

4. Scoping to a future

4.1. Design approach

The project mainly diverged at this point, focusing on gathering insights. This chapter will focus on converging. This is first done by combining all of the data of previous methods (interview, observations and literature study) and to categorize them together. The process of grouping data reveals underlying and relevant trends. This is done in three steps: [1] placing the data on a Miro board, [2] categorizing the data in relevant clusters and [3] showing the overlap in trends by placing the data in tables.

These trends will show us current bottlenecks, wishes and needs from patients and caregivers. These insights will let us make future statements: statements how the desired future of primary care should look like.

Before the future vision is completed, some more scoping will be done by critically examining the research and user journey that has been made so far. The solution space is very broad and scoping will help the ideation. The scoping will be done by examining trends in the combined data, and by reviewing the user data. At last, the future vision will be made with the scope and main trends.

4.2. Combining research

Combining research will be done to see patterns in the data. For example the observation at the emergency post, the observation of myself as a patient, patient and caregiver interviews, and the literature study all three points to technical difficulties with digital consultation methods. This strengthens this finding. All research has been combined in one big virtual space. The program Miro is used, and figure 19 indicates how the categorization at first looked. A structured categorization can be seen in table 7.

The table must be read in the following way: if the research or observation showed that result, then the block where the finding was found will be coloured. The table shows two interesting insight categories: [1] new research supports each other and [2] new research provides different insights. Another possible category ‘new research that contradicts earlier research’ was not proved in the data.

1. That new research supports each other can be seen with statements that have multiple coloured blocks behind them. For example, the first block that states that ‘Digital/distance is for small or checks’ is supported by international literature studies, the qualitative caregiver study, the qualitative patient study, and the Digi HAP observation.

2. The second insight category ‘new research provides different insights’ is only analysed during the qualitative study and is not supported by a literature study insight. A good example of this is the insight of the qualitative caregiver analysis that e-consultation provides flexibility for the caregivers. This was not recognized earlier and can be categorized as a new insight. Still, not all newly presented insights can be considered as additions to the current literature. This is due to the contradiction between the wideness of the qualitative studies and the specificity of the literature study. An example of this is the wide variety of the requirements and wishes that the patient expressed about their “ideal care”. In the literature study, these aspects were not researched at all so it is unclear if these theories are new, contradictory or complementary. Furthermore, the observation insights should be excluded from this process because the observations are not be academically grounded. Only the new theories specifically about e-consultation can be considered as additions to the literature that are obtained in the qualitative studies.

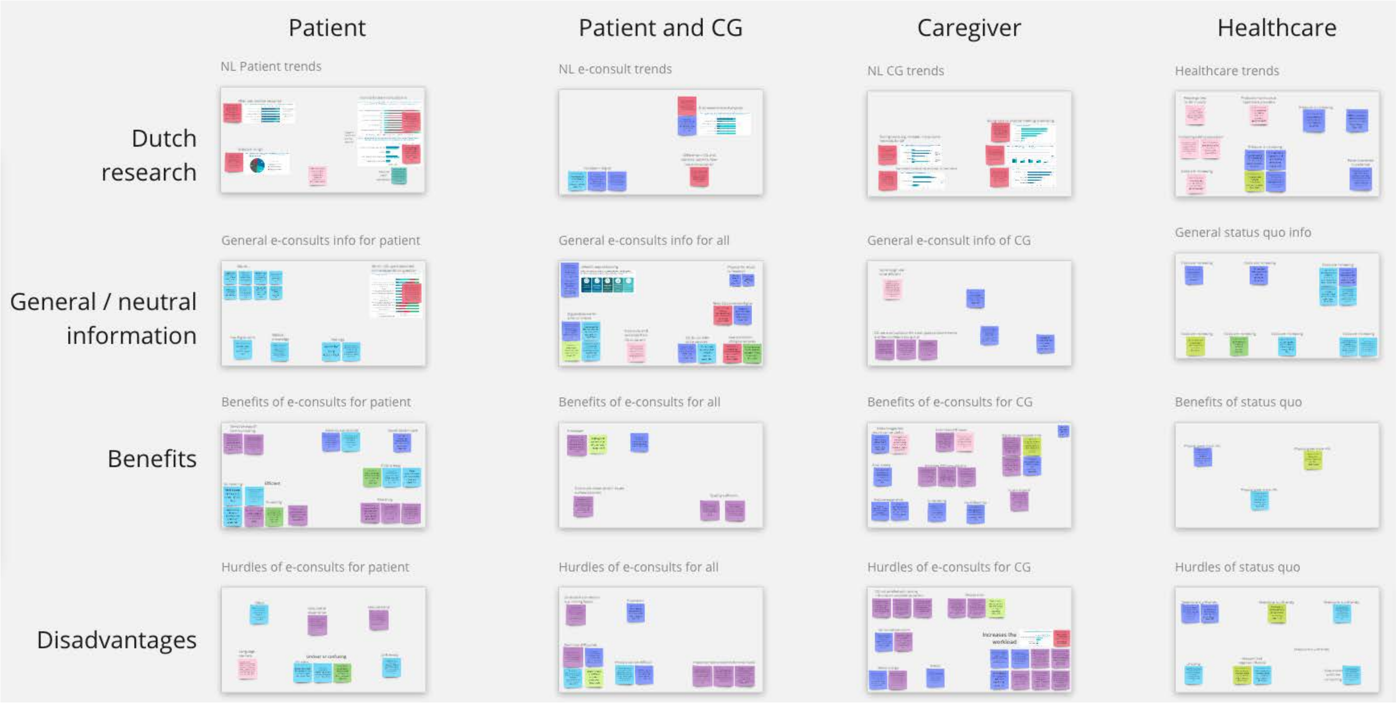


Figure 19, Miro indication of the first categorization of the insights from the literature study, observations and the qualitative studies

		LITERATURE STUDY		QUALITATIVE STUDY		OBSERVATIONS		
		Interna-tional	Dutch	Patient	CG	Digi HAP	Practice	Pat. Me
CONSULT								
Choice - when	Digital/distance for small or checks	■		■	■	■		
	Physical visit at home if you have to				■			
	Physical when in doubt				■			
	Physical when research is needed				■			
	Care from distance is preferred			■				
	Patient does not want to travel			■				
	Easier to discuss			■				
	For first consult			■				
Choice - who	Caregiver decides			■	■			
	Caregiver lacks e-method			■	■			
	Caregiver encourages digital				■			
	Patient dependent				■			
	Corona influenced to distance			■				
	Determined by complaint			■				
	Option for patient			■				
Experience - Digital - Positive	Easy for caregiver				■			
	Efficient for caregiver	■			■	■	■	
	Efficient time-saver	■		■				
	Clearly explained			■				
	Is easy			■				■
	Modules are a nice addition				■			
	Pleasant for patient	■	■		■			
	Positive opinion about it	■	■	■	■			
	Provides flexibility for caregiver				■			
	Provides flexibility for patient	■						
	Image/video can be useful	■			■			
	Sensitive communication way	■						
	Quick response time	■						
	Raises unsurfaced problems	■						
	E-consults enhances face-to-face meetings	■						
	Helps in difficult cases	■						
	Saves the specialist money	■						
	Is secure							■
Experience - Digital - Negative	Can be frustrating	■			■			■
	Has technical difficulties	■		■	■	■		
	More effort	■		■	■	■		
	Unclear and confusing	■		■				■
	Not user-friendly			■				
	Less personal; less suited for mental complaints	■						
	Language barriers are more prominent	■						
	Less overall experience	■						
	Inappropriate problems for e-consults	■						
	Lacking information given by patient	■						
	Misuse e-consult, get consult faster	■						
Experience - Digital - Neutral	Photo's can be difficult			■	■			
	Financial investment				■			
	First time distance			■				
	E-consults shift workload from caregiver to patient	■						
Experience - Care at distance	Misses part of communication				■			
	Is shorter				■			
Experience - Telephone	Determined timeslots				■			
	Waiting line				■			
	Telephone for short contact			■				
	Telephone efficient due to multitask						■	
Experience - Physical	Gives more information				■		■	
	Costs more time				■		■	
	Past consults have been physical			■				
Experience - Total - Negative	Unclear communication			■				
	Negative assistant experience			■				
	Busy GP and slow process			■				
	Inconvenience			■				
Process - Communication	First contact with assistant				■			
	First contact usually by phone				■			■
	Most practises have e-consult information online		■					

Figure 20,

	No or bad promotion of digital							🟥
	Low promotion of video calling (NL)		🟦					
	Assistant answers small questions						🟥	
DEALING WITH								
Regular checks	Chronic care has regular checks				⬛			
Corona	Clear and good measures			🟫				
	Inconveniences			🟫				
Patient-centred or caregiver-centred	Patient-centred preferred than caregiver-centred due to motivation				⬛			
DIGITAL INNOVATION								
Basics	Different modality is new way of working				⬛			
	Suits some, but not everyone				⬛			
Examples	Digi HAP way of working				⬛			
	Digi HAP works well				⬛			
	Digital practice has good patient care				⬛			
	Digital practice way of working				⬛			
Reason why	Interesting for caregivers				⬛			
	Patient can handle digital				⬛			
	Patients wants it				⬛			
Reason why not	Is for the new generation				⬛			
	Has early kinks	🟩			⬛			
	Is effort				⬛			
	Scepticism		🟦		⬛			
	Corona forced e-consultations; "second best" feeling		🟦					
	Need to resist e-approaches		🟦					
FUTURE								
-	Back to pre corona		🟦		⬛			
-	Change is needed				⬛			
-	Is digital with supportive tools				⬛			
-	Patient in control				⬛			
-	Specialisation of the GP?				⬛			
					⬛			
TRENDS								
Consult	A lot of physical or by telephone		🟦		⬛			
	Corona promotes care at a distance		🟦		⬛			
	Patients low e-consultation rate		🟦					
	Increase e-consults methods for GP		🟦					
	Big increase in video calling		🟦					
	People go less to GP in pandemic		🟦					
	Contact urgent HAP without urgency					🟧		
High pressure	Number of consults increases				⬛			
	Patient expects more				⬛			
	Pressure is high and increases				⬛		🟥	
	Population is getting older	🟩						
	Healthcare costs are increasing		🟦					
Digitalisation and e-modalities has started	Digitalisation and e-modalities has started				⬛			
Lack of practitioners	Lack of practitioners				⬛			
Many eHealth applications	Many eHealth applications				⬛			
PATIENT								
Has	Has digital skills			🟫				
	Feeling that GP can be scary			🟫				
	Knows own body			🟫				
	Possibility to medical knowledge			🟫				
	Thinks digital is difficult for elders			🟫				
Wants	A solution			🟫				
	Accessible care			🟫				
	Care that fits their schedule			🟫				
	Give complaint in detail			🟫				
	Options and a discussion			🟫				
	Quick care			🟫				
	Improvements			🟫				
Wants - GP	Listens and understands			🟫				
	Friendly and trusted			🟫				
	Other characteristics			🟫				
Digital use	Which info users searched online depends on question		🟦					

Table 7. Insights of the literature study, qualitative interviews and observations combined and categorized

4.3. Scoping

Primary care is a very wide field. Due to the time limitations of this thesis, it is needed to converge multiple times. This is a skill sometimes referred to as scoping because the solution field gets narrowed.

Not focused on chronic care
IZER as an organization specialises in the support of GPs in chronic care and the digitalisation of practices. Still, in the beginning, it was chosen not to focus specifically on chronic care. This influenced the sampling process of both qualitative types of research. Two of the eight caregivers were POHs that were specialised in chronic care, and no patients were interviewed with chronic complaints. Therefore, the decision was made to exclude chronic care from the focus and to focus on regular care. This was agreed upon by the client.

Focus on the front
The user journey (in figure 18) in chapter 3.5. shows a line that moves positively or negatively based on the experience of the patient. This “experience line” was made subjectively by my own opinion. It was chosen to focus on the phases where the patient experience is currently negative, to have the most gain. Therefore, the scope was set between the ‘contact practice’ and ‘estimate appropriate method by caregiver’.

Digital capable people
When critically looking at the interviewees, for both caregivers as patient most of them were either young, adequate with digital technology, or both. In the time frame of this project, a good balance between caregivers and patients that differ in digital skill and opinion about e-consultation in primary care was not reached. This was especially present in the patients’ interviews because more ‘digital sceptic’ caregivers were interviewed. The research that has been done must be recognized for its value, and therefore the scope is adjusted to a more digital able audience.

4.4. Future Vision

In the next step, the data was taken out of their original categories and placed in more overarching categories. These categories illustrate the underlying reason for some insights. Images of these categories can be in figure 20 and 21. These trends are the main trends of the research. In the next steps, the relationship between these main trends and patients and caregivers is evaluated.

4.4.1. The patients

Reflecting upon the main trends and their relationship to the patient, resulting in four different themes:

The patient lacks control
The caregiver insights showed that the shift is needed from caregiver-centred focus to patient-centred focus. The argument was that this would create more intrinsic motivation and thus a more committed patient and a more successful treatment. This insight was endorsed in the interviews with the patients, stating that they preferred more dialogue and influence during the primary care process. During my patient observation, the caregiver was the one making decisions. In the future, the patient needs to be in more control during the different steps of the consultation process.

Patients want accessible care
During the patient interviews, it became clear that patients value accessibility and quick care. The observations, especially at the emergency practice, showed that patients want to quickly check something. For the future, this means that care needs to be accessible, both in speed and in the methods of contact.

Digital is trouble
During both types of interviews, the observations and the literature study showed that technical difficulties and increased effort hinder the digital consultation process. This can be linked to the lack of clarity that was seen in the categorization. As a patient myself, I experienced technical problems as well and the feeling of frustration and ‘ok I will just

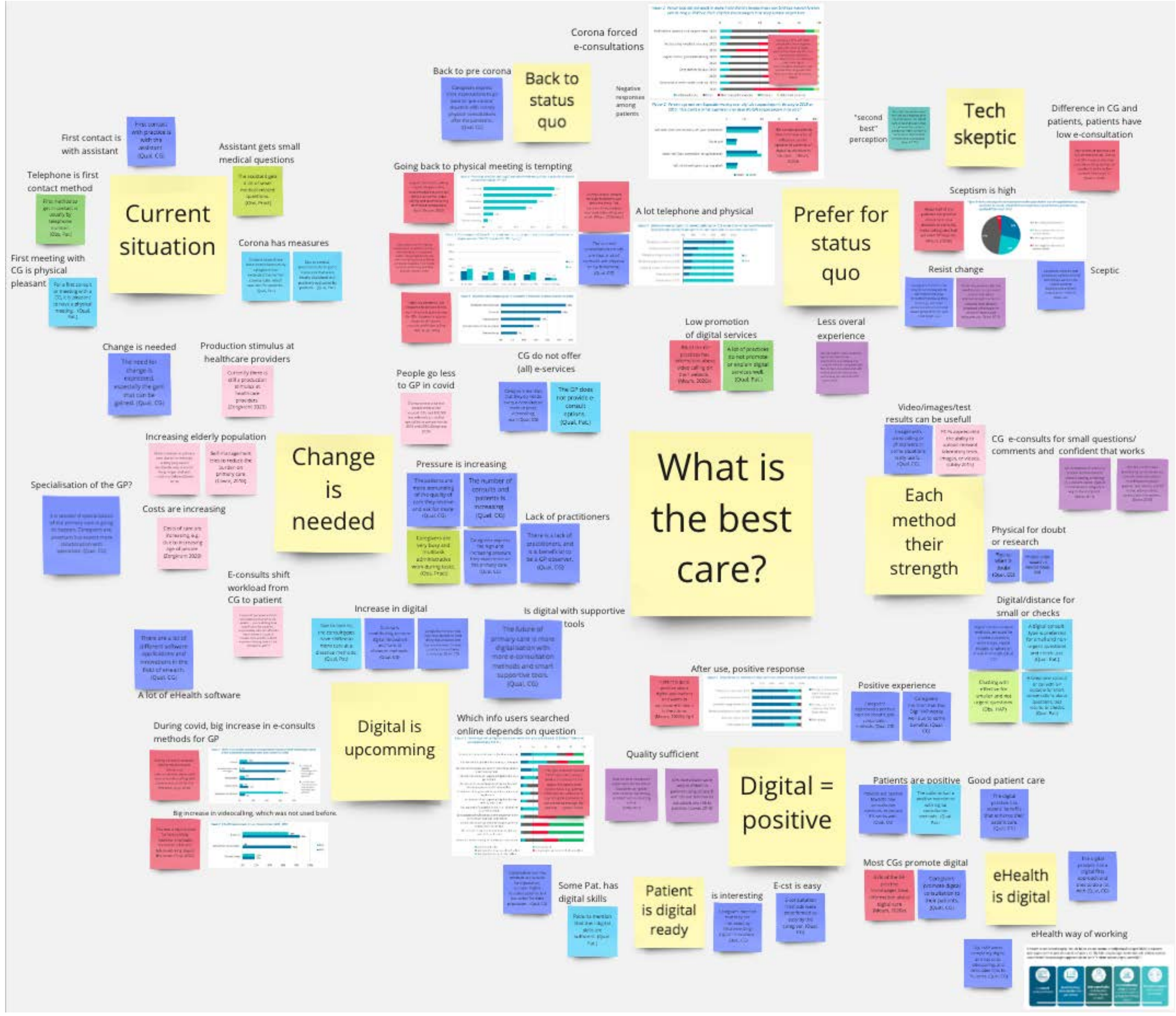


Figure 20, One side of the clustering of the insights. This side was focused on the differences between e-consultation and more traditional consultation methods

Figure 21, The other side of the clustering of the insights. This side was focused on the underlying needs and wishes that the insights had.

call and ask the assistant to do it' were present. In the future, care needs to be an effortless experience that works clearly and easily.

Listening
In the data from the patient interviews, it becomes clear that patients highly desire a GP that listens well. Communication was a recurring theme and is intertwined with a care professional that listens to the patient.

These four aspects were chosen to make a future statement for the patient. This resulted in the following keywords for the future vision of primary care for the patient: control, effortless, clarity, accessibility, and listening.

4.4.2. The caregivers

The same process was done for caregivers, reflecting on their relationship with the main themes.

Digital is trouble
The frustration and effort that e-consultations bring were also seen in the data with the caregivers. Therefore, caregivers also need an effortless experience. The lack of clarity was not seen in the data from the caregivers.

Care is inefficient
In the caregiver interviews, the high and increasing pressure was a recurring theme. Furthermore, during the observations and in the literature study this high pressure was endorsed as well. A change in primary care needs to happen and the efficiency has to increase. In the future, primary care has to be efficient for caregivers.

Caregivers need to be digitally supported
During the interviews, the caregivers speculated about the future of their work. A strong force in the future was the supporting role of technology during the whole consultation process. This just not means support as a communication method (what most e-consultation currently is) but on a broader eHealth level.

Quality care
The caregivers' feelings of scepticism are partly grounded in the doubt that the benefits of e-consultation are overestimated. New e-consultation methods must prove that they can still provide the quality care that the caregivers are used to.

These four aspects were chosen to make a future statement for the caregiver. This resulted in the following keywords for the future vision of primary care for the caregiver: effortless, efficiency, digitally supported, and quality care.

4.4.3. Future statements

The key aspects were translated into future statements. These statements can be used as a source of inspiration and direction during the ideation.

Patient in 2026:

Care for me is accessible when I want it, and there is someone that listens well to me. The process to care is clear and without any hassle. In the end, I have control and decide how my care is.

Caregiver in 2026:

My job, providing care to patients, is digitally supported. The system that we use works effortlessly and is very efficient. This enables me to focus on what matters: providing quality care to my patients.

4.4.4. Future vision

These future statements were used to create the future vision. The future vision is a translation of the future statement and can be seen in images X, X and X.

CONCLUSIONS

The main trends were uncovered during the categorization and they were translated into a future vision: the desired future of primary care.
For caregivers, this means that care in the future is about: effortless, efficiency, digital support, and the ability to provide quality care. For the patient, this means that primary care in the future is about: control, effortless, clarity, accessibility, and listening.
The project was scoped based on the analysis and it was decided to focus on the phases around the triage due to the negative opinion of patients. Next to this, the scope was set on regular care (not chronic care) for digitally capable people.

Figure 22. Future vision image 1

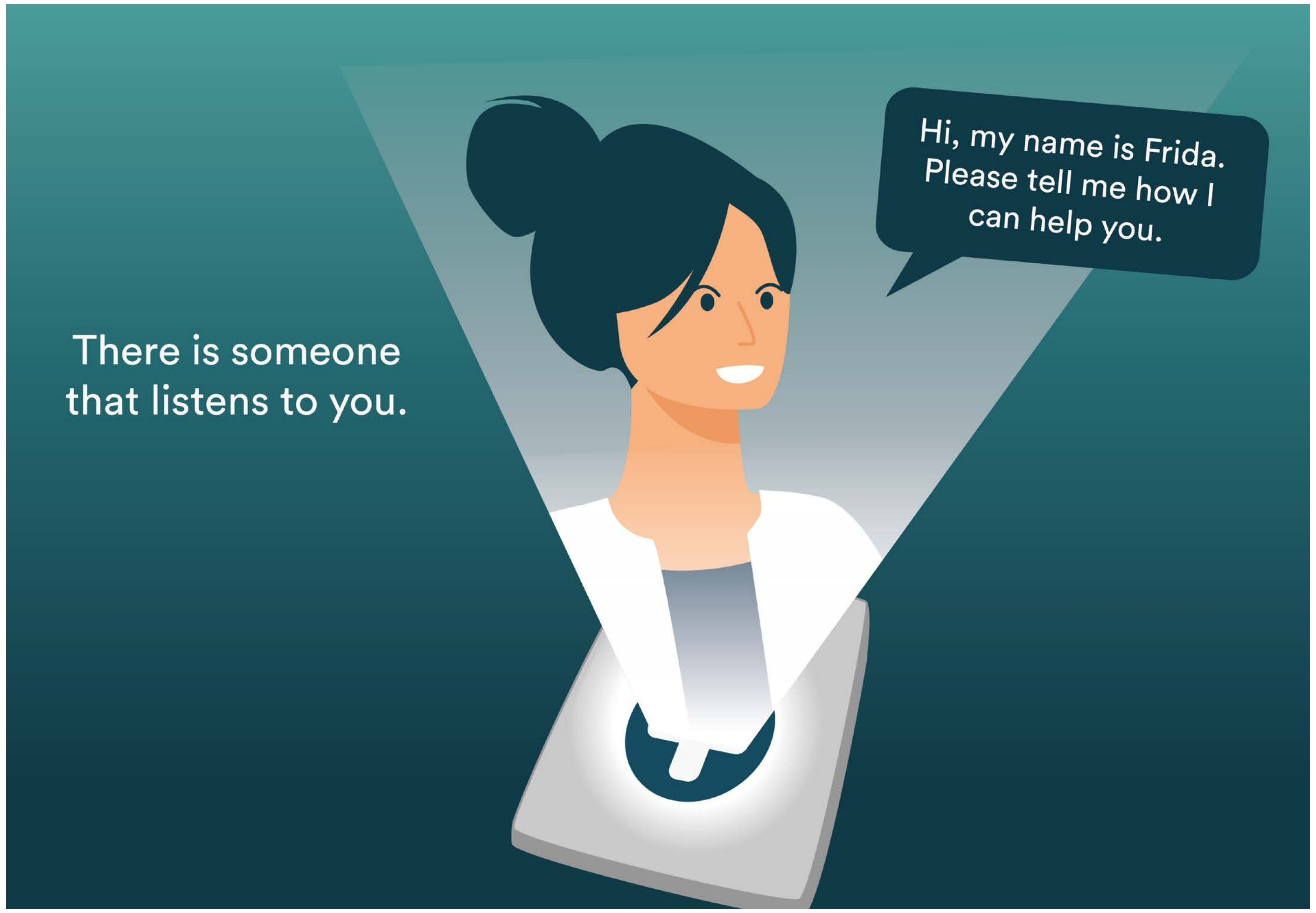


Figure 22. Future vision image 2

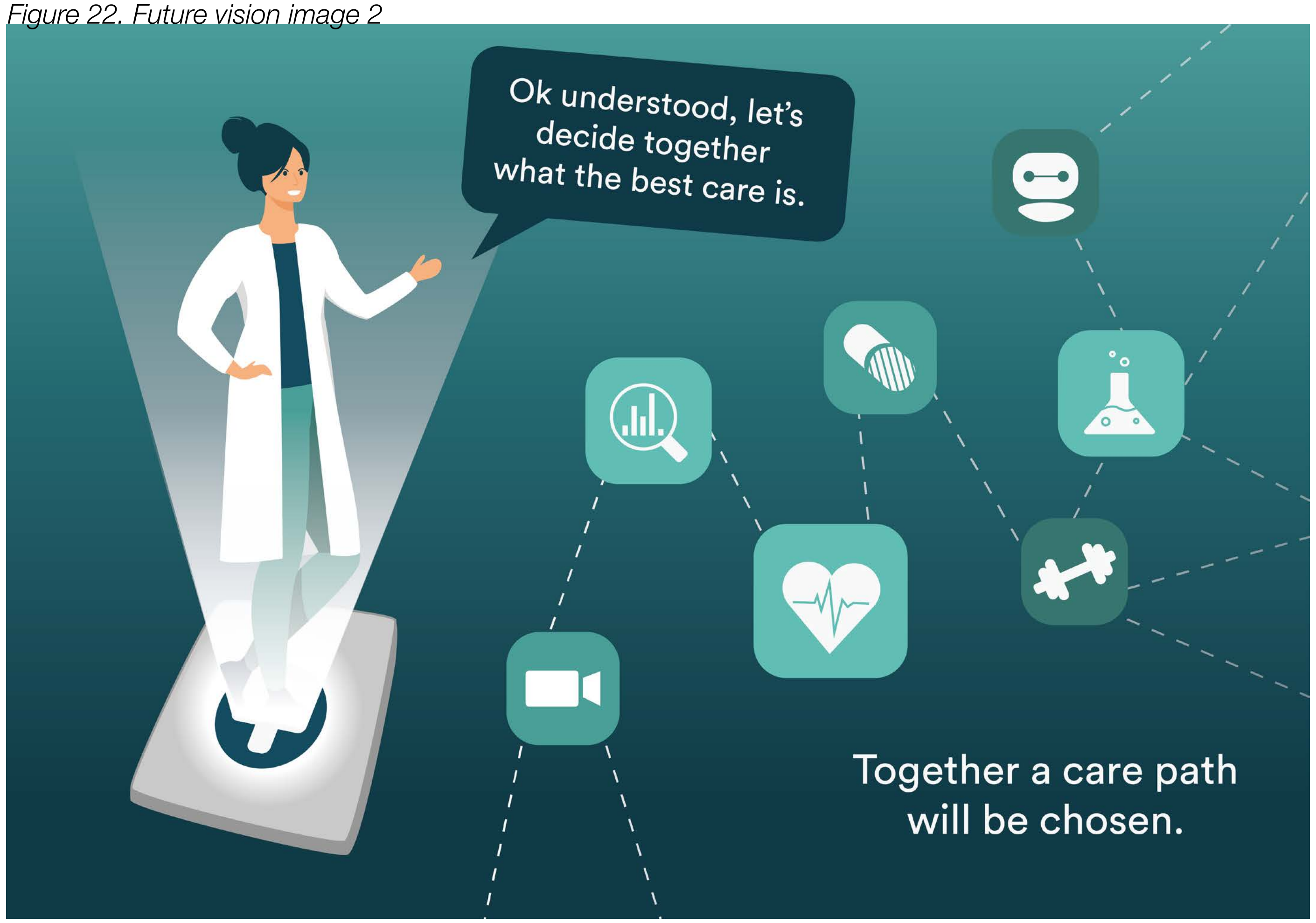


Figure 22. Future vision image 3

Chapter 5.

Translating trends into concepts

5. Roadmap development

5.1. Design Approach

With the Future Vision, an established point on the horizon is made. Next up is how to get there. This will be done by two diverging steps, followed up with two converging steps.

There are two steps done during divergence. At first, a technology scout is done to see what kinds of technologies will be interesting in the field of primary care in the future. In this scouting, the technologies will be categorized. Next up, ideation is done; combining future and current technologies with the future vision that was made earlier. This will end the divergence with many technology-infused ideas to get to the future vision.

Furthermore, to convergence further into a concrete idea, promising ideas will be selected and made into concepts. These concepts will be evaluated and a final concept will be chosen or made. This concept is now mainly based on user trends, so on desirability. To increase the feasibility and viability of the concept, a time pacing strategy is done. During the creation of this strategy, it is important to look at technological, strategic, or governmental constraints to get a realistic strategy. These strategies will be made into Roadmaps.

In this concept, the choice is made to make two roadmaps: one front-end patient focussed roadmap, and one strategic implementation roadmap. This differs from the usual strategic and tactical roadmap as in the normal roadmapping process (Simonse, 2019), however, due to the complexity and uncertainty in this concept, it was chosen to differentiate.

5.2. Technology Scouting

Technology scouting is done in three steps: out-of-the-box scouting, in-depth scouting and mapping of the evolution of strategic technologies. The results from the first two steps are combined on one virtual whiteboard. The out-of-the-box scouting was mainly done by reading technology trend reports about the future of healthcare from sources such as Forbes, McKinsey, Deloitte, and others. The second step, the in-depth scouting, was done by searching for new technological companies or start-ups that design for the primary care field. The last step was not done due to time limitations.

The complete scouting can be seen in appendix 8, but the summary of the scouting can be seen in figure 23. In this Miro image, the different emerging technological trends, new (Dutch) start-ups and technology companies are grouped. In this grouping, their overarching category and motivators, the reason for doing the technology, are placed as well to provide clarity.

As seen in the image, there is a big growth of monitoring and data & AI in primary care. Furthermore, also an increase in accessibility is seen due to the many Dutch start-ups in the primary care field. This technology scout supports the future vision. The fact that there are companies and trends in certain fields that make care more accessible, or gives patients more control (monitoring), supports the needs that patients have. Furthermore, the same can be said for the caregivers' needs due to the supportive tools to enhance the quality or efficiency. These insights will be used during the ideation.

Figure 23. Technology scouting Miro board, clustered

5.3. Idea Generation

The ideation will be in two phases: group ideation with other Strategic Product Design Students and brainstorm based on future statements and technology and trend scouting. The group ideation will be with four students and will follow mainly a guided fantasy approach. In guided fantasy, the participants of the ideation will need to use their imagination to transform in another situation, time or person to ideate from that perspective. In the ideation, the participants need to create a character and come up with a primary care complaint. During the session, the characters and their complaints will gain depth, and eventually, they will "time travel" to the future (2026). In the future, they need to ideate each other's character's complaint to make the situation better. This ideation was created to get more ideas from the patient's perspective and can be seen in appendix 7. Next to this, I ideated by myself with the future statement and the technology and trend scouting. This was done with the "How can you" method, because that method gives more quantity. At the end of the ideation, the ideas from both ideations will be added together. A selection will be made on the potential of the ideas.

5.4. Conceptualisation

5.4.1. The concepts

After the ideation, the conceptualization will commence. The ideas with the most potential will be translated into concepts, and the best concepts will be chosen. As structured as this now seems, this process works very iteratively.

The three most promising ideas were chosen to elaborate further into concepts. It is important to make a template for concepts to test them so that the testing will be done equally. Below are the concepts in the same formats.

CONCEPT 1

Concept name	**T.A.D. - Today A Doctor**
Explanation	“Order today, tomorrow at your door!” is a guarantee that some Dutch delivery companies give. It is the same for the primary care given in this concept. The patient is ensured that a doctor will see you the next day. This works the same as with the emergency post, with several GPs that help you. The system needs to be efficient so it is only possible for complaints that are easy to do by a GP that is unfamiliar with the patient and effective to do through video, chat or mail consults. A GP practice can join this service and the option would be available on the online portal.
Patient USPs	The concept specializes in making primary care more accessible to patients. It reduces the waiting a lot. Next to this, it provides professional advice and more control in the care pathway because it is an option they can choose.
Caregiver USPs	For caregivers, it is attractive to join TAD due to the flexibility in working hours. For practices, this is also a welcome option because it relieves stress on their practices and gives them more time for patients that need more time.
Possible idea bottlenecks	What might be a ‘make or break’ point aspect of this concept is the business concept. For the practices that use this service, it must not sabotage their practice. It could also be a service that does not work together with practices, but that might not have a competitive advantage to Quin or Flexdokters. 

Figure 24. Concept 1

CONCEPT 2

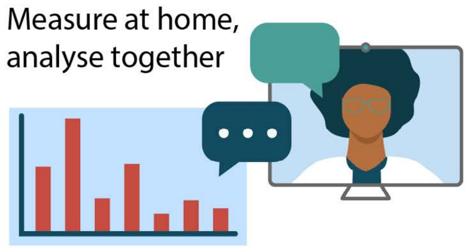
Concept name	**Self-monitoring programs**
Explanation	For some complaints, self-monitoring can be a suitable way to see how your health progresses when advice is followed. If your complaint is suitable for this concept, you are advised to use the regularly fill in your measuring data. If more intensive measuring is needed, the measuring equipment will be sent to your home and lent by the practice. While tracking your health and following advice, positive or negative changes can be seen. In the app, quick questions or feedback can be given by caregivers. If the values reach an alarming state, the caregivers will be notified.
Patient USPs	Self-monitoring teaches the patients more about their complaints and makes them have more ownership over their health. Testing and decision-making give them control. Next to this, it is an accessible and efficient way to interact with your care.
Caregiver USPs	For caregivers, this is a good method to keep an eye on patients. This can result in a lot of prevention, notifying alarming signals before patients see them. Intervening earlier in the process could mean that forming of diseases can be prevented.
Possible idea bottlenecks	It is important to see how applicable this method is to complaints. Still, the concept can be relevant even if it is only valuable for a small number of situations. Next to this, the willingness and motivation of patients must be tested. The mandatory feeling or effort of the measuring can be counter-effective. 

Figure 25. Concept 2

CONCEPT 3

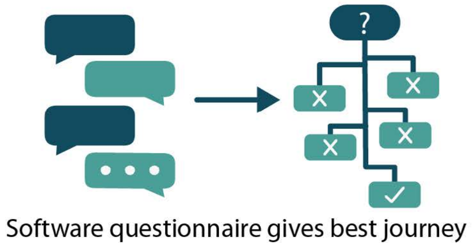
Concept name	**Symptom check care journey choice**
Explanation	During the interviews it was noted that: every e-consultation method has its strengths and weaknesses, and the methods should be used together. In this concept, an algorithm tool calculates what the different options are for the care pathway choice. In this concept, the patients do an online triage that adjusts to their answers. This is currently already done at the Digi HAP. Afterwards, the program calculates the best care pathway choices and presents them to the user. The user can select which logical care pathway suits their preference the most.
Patient USPs	For the user, there are two big changes. First of all the triage is mostly done by themselves. This gives them a lot of accessibility and speed in the process. Secondly, the different presented care pathway options give the user control over their care.
Caregiver USPs	Currently, caregivers tend telephone and physical consultation. This tool helps them see the advantages of different methods. Furthermore, it speeds up the triage, saves the assistant triage time, and prepares the GP better with info.
Possible idea bottlenecks	Patients might abuse the system, decreasing the profit of the system. At the Digi HAP “symptom check questionnaire”, they have some issues of patients redoing the questionnaire until they have the preferred consult. . Next to this, the system needs to be accurate to not miss complaints, which could result in a responsibility problem. 

Figure 25. Concept 3

5.4.2. Choosing a concept

For the concept choice, the plan was to take the usual design approach. That would be approximately the following steps: look back at the trends, rank these trends in order of importance, evaluate the concepts based on the trends, and choose the best concept. With this approach, I would have ended up with the best concept based on the requirements that were set.

Data-Driven future

Looking at the concepts and the technology trends, only one concept stands out in terms of vision and strategy: concept three. In this concept, data provided by patients with similar complaints or in similar situations is used to diagnose the patients and to plan out further pathways. There are three reasons why this concept is chosen:

1. Concept three uses data to give patients the control they wanted and provides a place for patients to tell their story.
2. For the caregivers, it provides efficiency in the process that spares GPs and caregivers time.
3. The last main reason for choosing this concept is due to the possibilities with data. During the technology scout, from digital practice assistant to AI monitoring software, gathering and using data has proven to be a valid supportive medical technology.

The concept was named DagKo meaning: data-driven complaint support (DAta-Gedreven Klacht Ondersteuning). This first part of the name reflects a greeting, symbolising that this software service is the first contact that patients have with primary care.

Lacklustre concept

However, the result was still lacking and did not meet every requirement when looking back at the future vision that was presented.

The current concept chooses the best care pathway for the patient. However, looking at the current pathway shows that the available options are still not sufficient enough. Therefore, what is currently lacking is more options. Figures X to X illustrate this thought process. Here are four axes with four insights ranked to each other. Two patient insights were chosen **control** and **accessibility**, and two caregivers insights **efficiency** and **quality care**.

With all the research done into different consultation methods, the different methods are placed in the axes. In green are the more traditional methods and in blue the “recently” added. As seen in the axes, there are gaps in the quadrants that focus on high control, high accessibility (for the patients) and high efficiency (for the caregivers).

5.4.3. Combining concepts

Therefore, it was decided to look back at the ideation for ideas that would compliment this design. These complementary ideas had the requirement to fill in the gaps that the current axes show. In the end, four different ideas or concepts were suitable and added to the concept.

The previously mentioned concepts were added due to their fit in the axes. If the complaint is suitable for self-monitoring; the patient goes into the self-monitoring trajectory. If the patient prefers to see a GP very quickly, or the complaint needs to be treated very quickly by a professional and the GP is busy, then a T.A.D. a doctor can be seen. Next up, other ideas were added as well.

Thuisarts.nl treatment

During the observations at the emergency practice and the GP practice, it became clear that people call fast and also a lot for not necessarily complicated questions. The new add-on: Thuisarts.nl Treatment links the person’s complaint to the Thuisarts.nl tips. Thuisarts.nl is a website with professional information on all kinds of primary care needs. For patients, this would give them quick care that maybe eases their worry. Next to this, patients will learn more about their complaints and a better-educated patient is better for the prevention of diseases (SOURCE). For the caregivers, this would make their care more efficient and lets them focus on patients that need their help.

Rob.Doc.

The concept is based on gathering data about complaints and care pathways. This means roughly how bigger the data set becomes, how more successful the proposed care pathway can be. At a point in the future, you can say that a computer not only predicts the care pathway but can also treat the patient completely and react well to the newly presented information. This is the concept of Rob. Doc.: a data-driven virtual doctor that completely treats the patients. This concept has different stages. In the beginning, the Rob.Doc. will propose care pathways and treatments and then a GP will confirm or adjust. Later, when the Rob.Doc. is not having technical difficulties and prescribes perfect care pathways and treatments, then the control of the GP can be loosened up a bit.

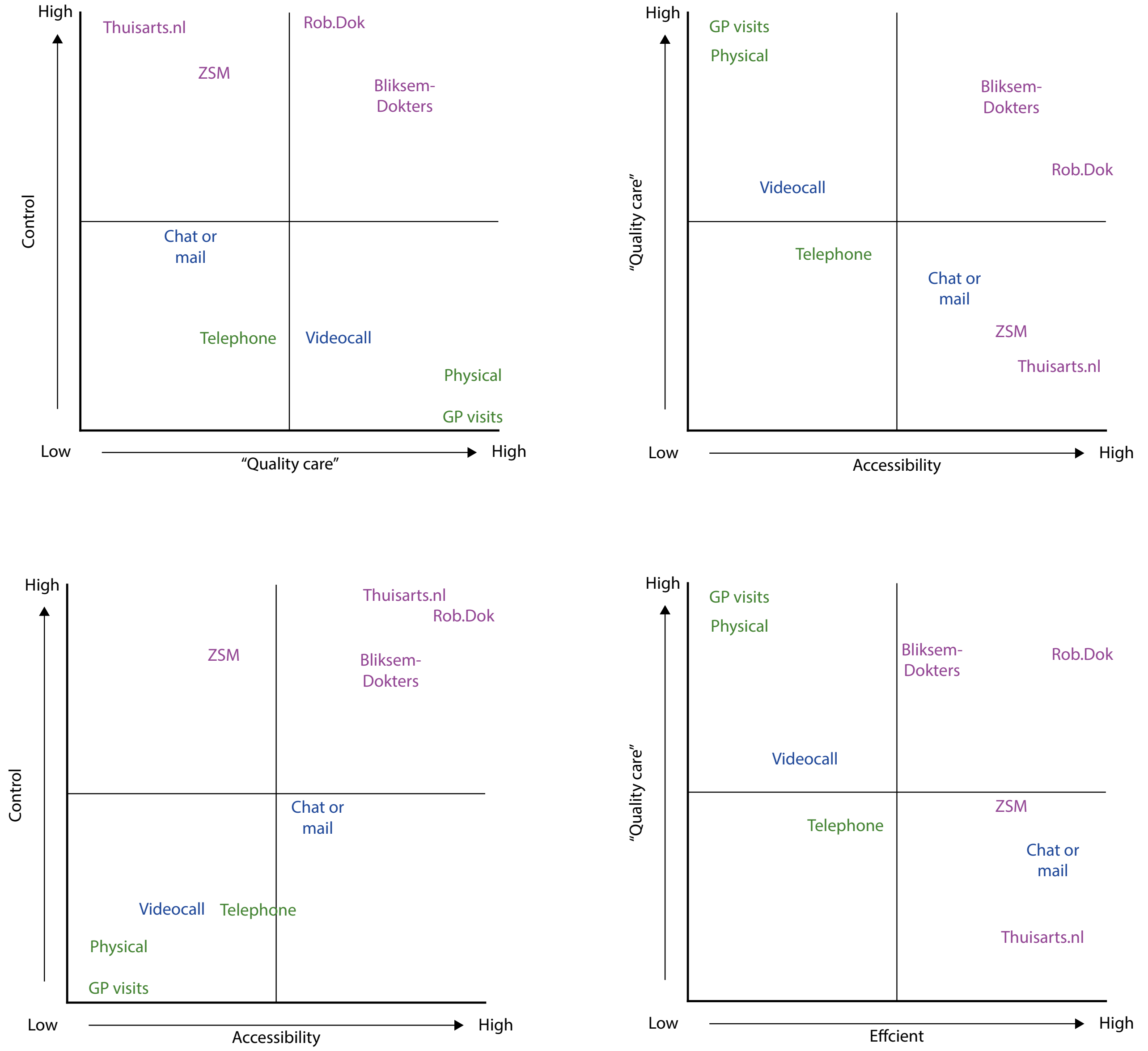
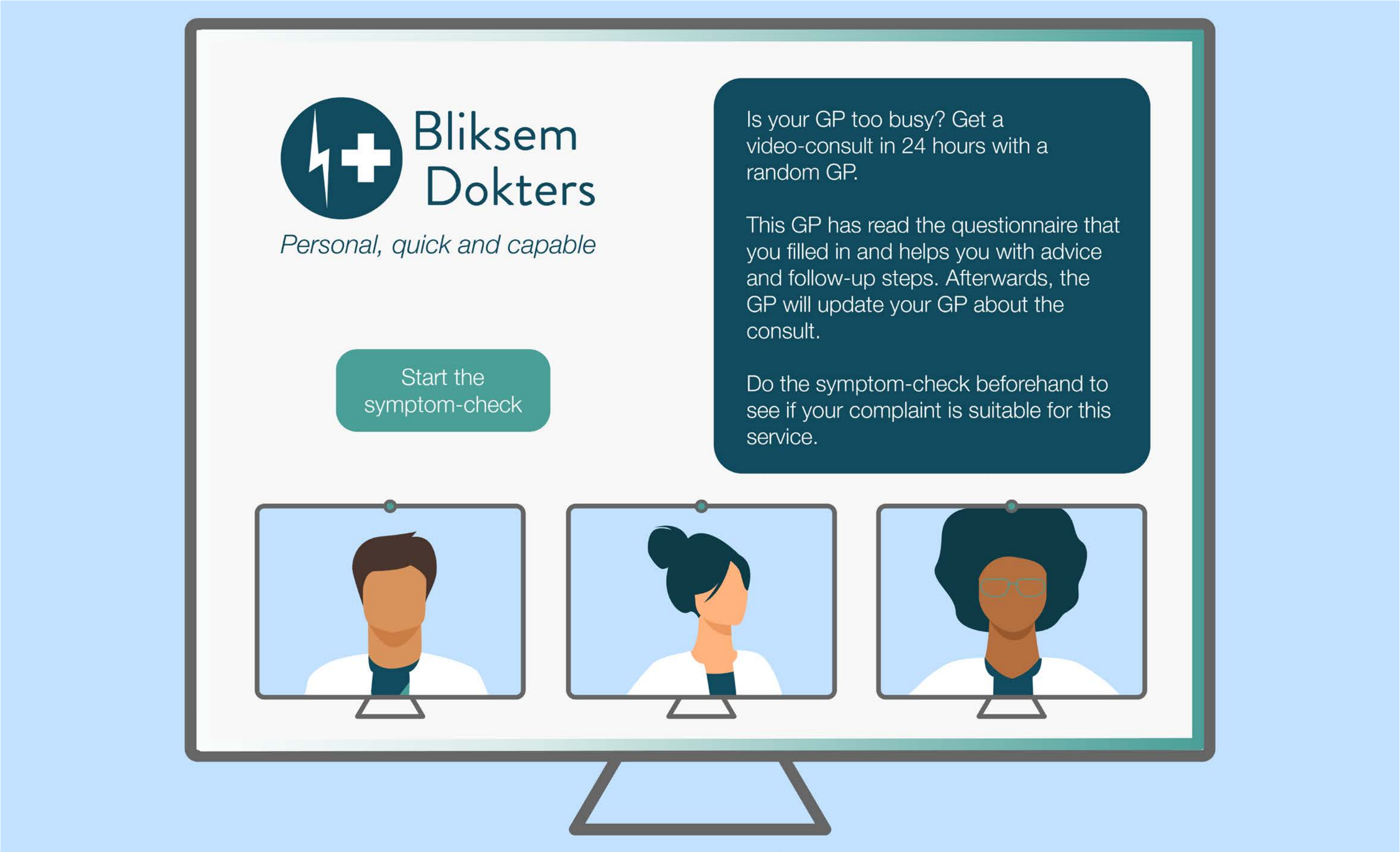


Figure 26. Four axes analysing the different consultation methods to each other based on control, accessibility, efficiency and quality care.

CONCLUSIONS

The technology scout and the ideation resulted in three main concepts. From these concepts, concept three was chosen to develop further: a primary care decision algorithm for patients. The concept was named DagKo meaning: data-driven complaint support (DAta-Gedreven Klacht Ondersteuning). This concept is a software service for patients that supports caregivers in their work.

Furthermore, the choice was made to add four sub-concepts. The main reason for this decision is that a service that determines the most efficient consultation method, would benefit from additional options. These options were added based on their high score with earlier set trends: accessibility, control, quality care, and efficiency.


Bliksem Dokters

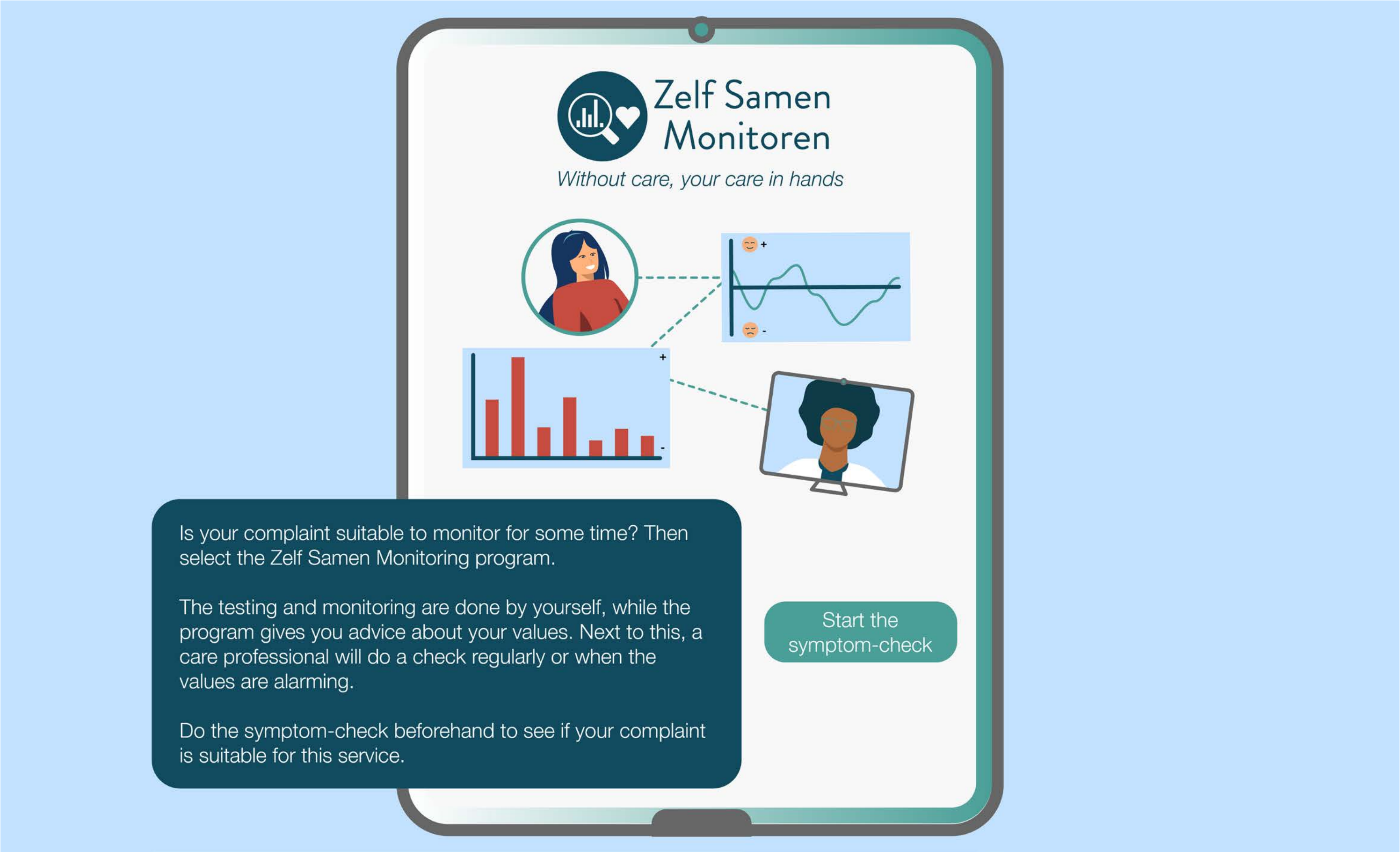
Personal, quick and capable

Is your GP too busy? Get a video-consult in 24 hours with a random GP.

This GP has read the questionnaire that you filled in and helps you with advice and follow-up steps. Afterwards, the GP will update your GP about the consult.

Do the symptom-check beforehand to see if your complaint is suitable for this service.

Figure 27. Explanation of BliksemDokters, part of the sub-concept


Zelf Samen Monitoren

Without care, your care in hands

Is your complaint suitable to monitor for some time? Then select the Zelf Samen Monitoring program.

The testing and monitoring are done by yourself, while the program gives you advice about your values. Next to this, a care professional will do a check regularly or when the values are alarming.

Do the symptom-check beforehand to see if your complaint is suitable for this service.

Figure 29. Explanation of Zelf Samen Monitorn, part of the sub-concept


Rob. Dok.

Datagedreven zorg

Is a real caregiver not available and you want a quick consult? Get immediately a video call consult with a virtual robotic doctor.

This data-driven doctor gives you a consult by calculating what the best care is for you. A caregiver checks the consult that is given and approves the following steps before they are set in motion.

Do the symptom-check beforehand to see if your complaint is suitable for this service.

Figure 28. Explanation of Rob.Dok, part of the sub-concept


Thuisarts.nl treatment

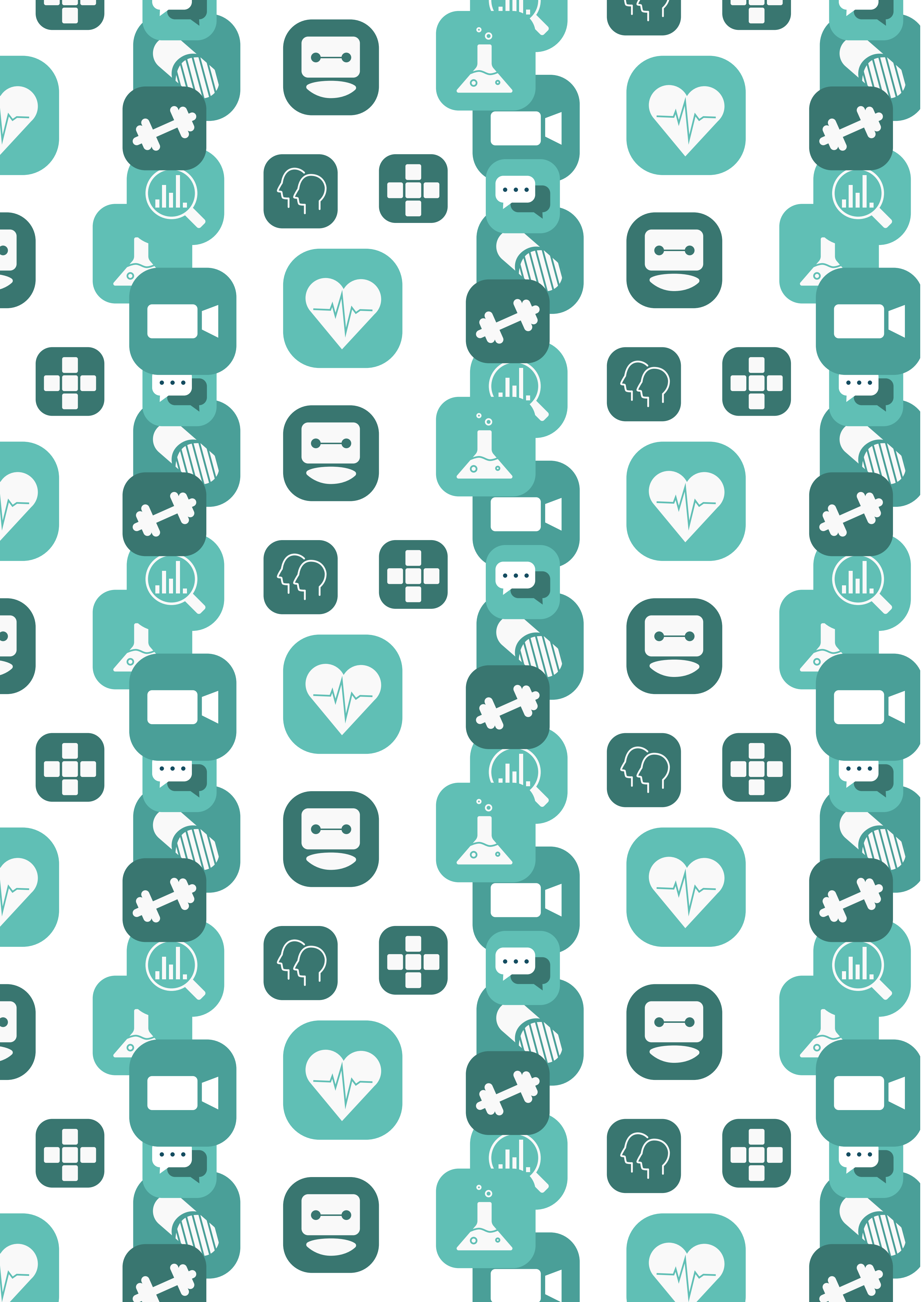
Your care done independent

Is your complaint suitable to solve with good advice and tips? Then select the Thuisarts.nl treatment.

With this treatment, you take control of your care with professional and general advice. You can always decide to have a different consult method if the advice does not work,

Do the symptom-check beforehand to see if your complaint is suitable for this service.

Figure 30. Explanation of Thuisarts.nl Treatment, part of the sub-concept



Chapter 6.

Roadmap development

6.1. Design approach

The software service is now mainly based on user trends, this means that the desirability of the service is well established. To increase the adoption and implementation, research is done into the feasibility aspects of the service. These insights will be translated into a strategy. The insights were gathered by interviewing a data science expert and by desktop research into data and medical regulations.

These insights will be translated into two roadmaps. In this concept, the choice is made to make one front-end patient focussed roadmap and one strategic implementation roadmap. This differs from the time pacing process and the strategic and tactical roadmap as in the normal roadmapping process (Simonse, 2019), however, due to the complexity and uncertainty in this concept, it was chosen to differentiate.

6.2. Time pacing

Time pacing is done to strategise how the service needs develop over time to get to the desired final stage. Therefore, the technological and organisational steps that must be taken in this concept should be analysed. The concept's main aspect: using data to develop a triage and care path decision-based algorithm, should be analysed at first.

6.2.1. Data expert Daniel

To analyse the strategic development of the data algorithm, an expert was interviewed. This data science expert, Daniel Kapitan, is a data science expert and professor at the Jheronimus Academy of Data Science. An interview was held with Daniel Kapitan to speak about the feasibility, viability and time pacing of the concept. The whole interview can be seen in appendix 10. The main insights from the interview are as follows:

The concept is feasible

The expert explains that medical decision support software for process optimisation is do-able. In terms of feasibility, this software can be made. The expert stresses that this is something that has been done for year numerous times. Especially telephone companies, such as T-mobile, have made patient profiles and 'next best action based on profile'-algorithms for a long time. The expert notes that it is important that you have enough data and that enough data will be gathered. In the interview the example was approved by the expert to start with 50 practices that have around 20.000 patients (4000 patients per practice). This would generate enough data to make a working prototype.

Medical data is not private

The expert explains that in this concept, it is important to collect all of a person's medical data and to build a database. A persons medical record, even if it anonymised, will fall in the pseudo-anonymous category. Pseudo-anonymous data is a term used for data that is perceived as private, while it actually is not. For example: knowing someone's age, diagnosis, amount of practice visits, etc., will eventually lead you to the specific person if the data is backtracked. The difficulty is that the system functions well when all that extra data is added, so leaving out data to protect a person's privacy would work contradictorily. To protect a person's privacy, there are European and Dutch laws. In the EU this law is called the General Data Protection Regulation (GDPR), or in the Netherlands, it is called the Algemene Verordening Gegevensbescherming (AVG). For these laws, it is important to communicate clearly and to ask for a person's permission. The expert explains that asking for permission can work. The reason to gather the data is for a good cause, to help others with similar complaints or diseases. The final result, the algorithm, can be anonymous.

Making database is the problem

The expert explains that the big problem lies in the creation and maintenance of datasets. Every practice works with its own program called a HIS (Huisartsen Informatie System). These datasets of all the practices need to be linked into one central data warehouse. The expert expresses that 80 to 90% of all the effort (resources and money) is put into the creation of the data warehouse. For example, IZER has approximately 225 GP practices as members of their organisation, and all of their 225 HISses need to be joined. That is a difficult process. It is likely that legal constructions have to be set up before the data warehouse can be created.

Test before develop completely

The expert advices first to do a feasibility study or a pilot. A test version of the algorithm can be made to see if the desired effect occurs and if it suits the purpose. There are multiple ways to do a test version, however, the expert recommends to use the platform of the Central Bureau of Statistics (CBS) of the Netherlands. With their support, a pilot can be performed in a safe environment.

Choose in or out of the MDR?

With the main service, but also with the sub-concepts, it is important to know if the Medical Device Regulation (MDR) is applicable. If this is the case, for example with the monitoring concept, then that piece of software has to be tested to medical device standards. These regulations can be quite limiting, therefore the expert recommends to look into this aspect.

An explainable algorithm is better

In this concept, it is difficult to trust in autonomous decisions. In the end, it is all based on statistics and statistical learning. Results in the past do not give a guarantee for the results in the future. The decision for both the triage and the care path must be explainable. Therefore, a bad but explainable algorithm can even be better than an good unexplainable algorithm.

6.2.2. Privacy and law

As mentioned in the expert interview, it is important to look at the privacy and medical device regulations.

GDPR / AVG

In 2018 the GDPR law was applied in the EU to protect a person's fundamental rights to protect their data. Personal data is considered as any information that is relatable to a person. It is specially mentioned that any data that is held by a medical professionals is in this category. This also includes anonymised data, it is stated that *"Personal data that has been de-identified, encrypted or pseudonymised but can be used to re-identify a person remains personal data and falls within the scope of the GDPR"*. This means that the service will need to abide by the GDPR regulations (European Union, 2016). In the Netherlands, this law is called the AVG. There is no difference between the GDPR and the AVG (Autoriteit Persoongegevens, 2018).
It is possible to collect a person's data, especially if it is for healthcare benefits such as this service. To collect this data a person's consent must be given by the patients. There are rules to ask this consent, a few are: it must be freely given, the person must be informed, the data must be used for a specific purpose, the type of data must be explained. Furthermore, the law also has rules on how the consent must be asked, and how the accessibility of the information must be (European Union, 2016).

The data law is a hurdle and an extra step in the process, however, it does not hinder the idea. The GP practices that will use the software should implement consent forms on their website. Practices should inform the patients about the reason for collecting this data and that this would benefit people with complaints or situations like theirs, and could help them in the future as well.

MDR

Next to the data regulations, there are also European rules for medical aid tools and medical technologies. The purpose of these laws is to provide safety to the people that use them, especially when the effects of new technologies and products are still unknown. These laws are called the Medical Device Regulation (MDR), and the In-Vitro Diagnostic Device Regulation (IVDR). The MDR accounts for medical devices that include: *"products used for diagnoses and treatments in the healthcare sector or products that can help prevent or predict diseases or disorders"* (Netherlands Enterprise Agency, 2020). This includes software, such as the service and the sub-concepts, as well. Furthermore, the IVDR operates for a separate type of device that analyses human samples. This regulation does not apply to the service or the sub-concepts. Three steps need to be done to comply with this regulation: [1] the medical device must be classified according to the risk and that classification determines the safety requirements, [2] medical research needs to be done to account for the safety, and [3] the device must get a CE-marking to show that the product complies with the legal requirements.

The classification matters for the safety requirements that apply to the concept. When reviewing the classification system that is currently used by the MDR, it appears that it is unclear how this service will be classified.

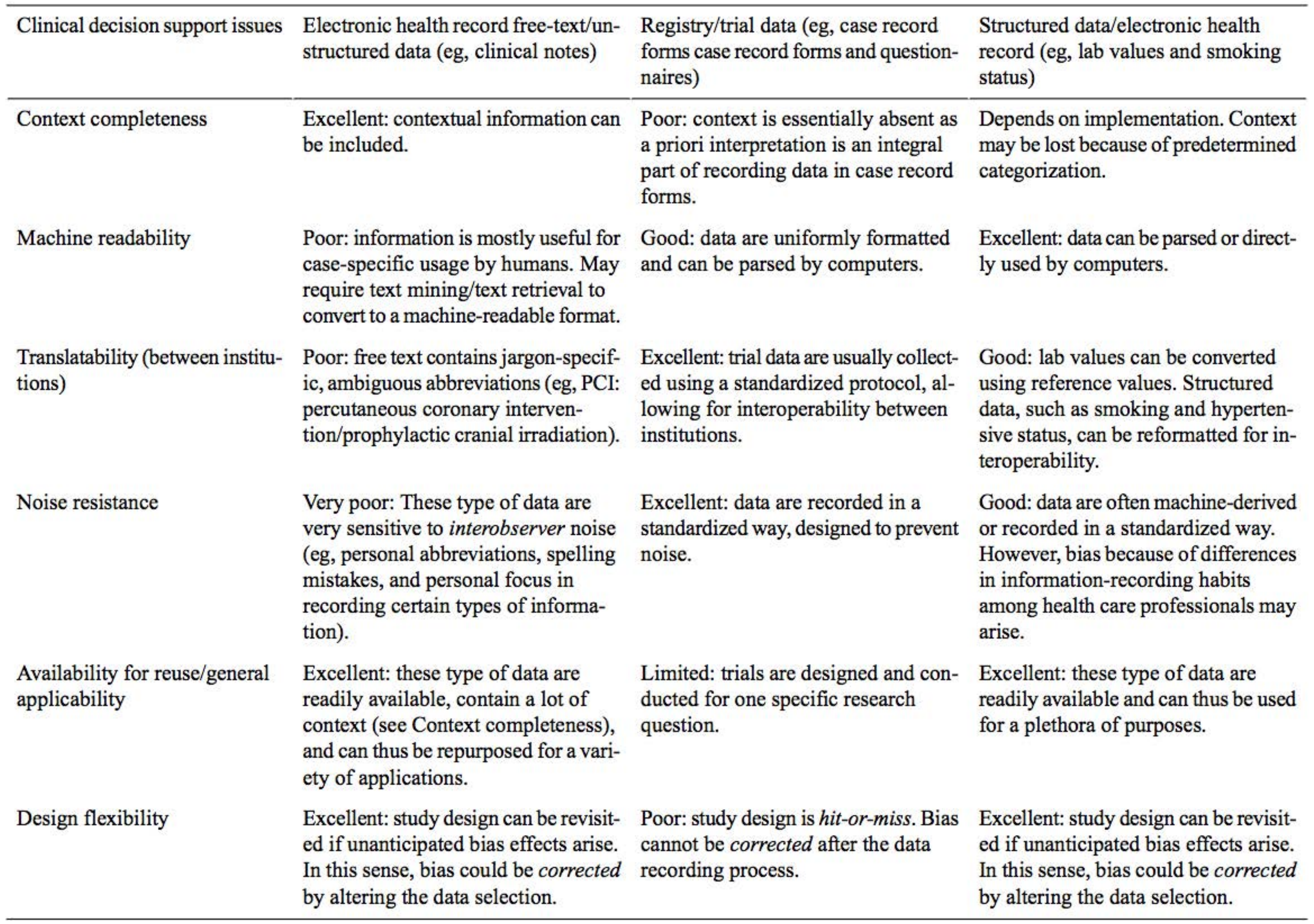
"Software intended to provide information which is used to take decisions with diagnosis or therapeutic purposes is classified as class IIa, except if such decisions have an impact that may cause: death or an irreversible deterioration of a person's state of health, in which case it is in class III;" (European Union, 2017)

It can be argued if the decisions that the software can influence can cause death or an irreversible deterioration of a person's state of health. However it is likely that the service will be classified in class III, meaning that there will be stricter rules applied. It is important to note that this is only for a system that "provides information that is used to make decisions". If the service would work completely autonomous, then the classification might be different. The current law does not provide more information about that kind of service. Still, it is unlikely that caregivers would want an autonomous system that makes decisions by itself. In the end, there should always be someone that can be held accountable, which is especially important when the software makes decisions about a persons healthcare. In this service, the software would only work as a supportive tool.

6.2.3. Types of data

For the service to work, data is needed and should be gathered. However, for the service to work it is important to specify the kind of data that will be collected. In the current HIS (Huisartsen Informatie Systeem) caregivers save information about their patient. There are however multiple types of medical data. Medical data for clinical decision support systems can be categorised in three different types of data: free text, registry/trial data (e.g. questionnaires), or structured data/electronic health record (e.g. test results, yes or no questions). In table 8, Bezemer et al. (2019) compared different types of data and their suitability to clinical decision support systems. As seen, the current Electronic health record free-text or unstructured data is ranked poorly on machine readability, translatability (between institutions) and noise resistance. This means that an algorithm based on this kind of data would have a hard time analysing the free speech data, would have big differences between institutions and would not be suited to deal with noise data. This is logical, due to the high amount of variation that can be caused by writing style, or the noise effect that typos can have. On the other hand, registry/trial data and structured data (usually) lack the richness of the context provided by the free text. For the concept to work well it is important to test how the algorithm works the best. A suggestion could be to do some iterations on the format of the registry/trial data to see how the richness of the context could be included in there as well.

Table 8. Table comparing different types of clinical data on some important point for clinical decision support system (Bezemer et al., 2019)



Clinical decision support issues	Electronic health record free-text/unstructured data (eg, clinical notes)	Registry/trial data (eg, case record forms case record forms and questionnaires)	Structured data/electronic health record (eg, lab values and smoking status)
Context completeness	Excellent: contextual information can be included.	Poor: context is essentially absent as a priori interpretation is an integral part of recording data in case record forms.	Depends on implementation. Context may be lost because of predetermined categorization.
Machine readability	Poor: information is mostly useful for case-specific usage by humans. May require text mining/text retrieval to convert to a machine-readable format.	Good: data are uniformly formatted and can be parsed by computers.	Excellent: data can be parsed or directly used by computers.
Translatability (between institutions)	Poor: free text contains jargon-specific, ambiguous abbreviations (eg, PCI: percutaneous coronary intervention/prophylactic cranial irradiation).	Excellent: trial data are usually collected using a standardized protocol, allowing for interoperability between institutions.	Good: lab values can be converted using reference values. Structured data, such as smoking and hypertensive status, can be reformatted for interoperability.
Noise resistance	Very poor: These type of data are very sensitive to *interobserver* noise (eg, personal abbreviations, spelling mistakes, and personal focus in recording certain types of information).	Excellent: data are recorded in a standardized way, designed to prevent noise.	Good: data are often machine-derived or recorded in a standardized way. However, bias because of differences in information-recording habits among health care professionals may arise.
Availability for reuse/general applicability	Excellent: these type of data are readily available, contain a lot of context (see Context completeness), and can thus be repurposed for a variety of applications.	Limited: trials are designed and conducted for one specific research question.	Excellent: these type of data are readily available and can thus be used for a plethora of purposes.
Design flexibility	Excellent: study design can be revisited if unanticipated bias effects arise. In this sense, bias could be *corrected* by altering the data selection.	Poor: study design is *hit-or-miss*. Bias cannot be *corrected* after the data recording process.	Excellent: study design can be revisited if unanticipated bias effects arise. In this sense, bias could be *corrected* by altering the data selection.

6.2.4. Pilot

As proved by the previous paragraph about the different types of data, there is uncertainty in the result. Therefore, it is important to do a test or pilot. This is also logical from the perspective of IZER because it can be a huge financial investment to set this software up and to make this. The CBS, the Central Bureau of Statistics gathers a lot of data about the Dutch population, economics, and also healthcare. They offer the opportunity to work with their data under strict regulations. In return the CBS asks for a financial contribution and that you publish your results so that everyone can benefit from it.

This pilot is a good option to test the software. If the software has significant positive results, then the choice can be made to continue with the project. This is further explained in chapter 5.6.

6.3. Design Roadmap

The final concept is not reached easily. Therefore two roadmaps were made to strategically guide the company towards the desired concept. The choices that were made during this process will be clarified. The roadmaps can be seen in figure 31 and 32.

6.3.1 Horizon one

The first horizon is called 'Finding a new eConsult way'. The name originates from the uncertainty that the concept still has and that this has to be analysed. Therefore, the best option at first is to do a pilot test and that is the main part of horizon one. A pilot beforehand has several benefits:

- **Evaluate the outcomes.** The main reason for the introduction of the pilot is to prove the benefits of the concept. As stated earlier, the concept is feasible, however, the benefits and the size of the benefits are still unsure. Additionally, the concept may have side-effects that are unknown and therefore need to be researched as well.
- **Avoid high costs.** Several tasks need to be done to introduce the software to the market (e.g. setting up the software, connecting the data portals from the GPs to one data warehouse, etc.). These tasks cost time and money. That would be a big investment to make for IZER, without a clear profit. The pilot delays the decision to continue with the project after the software has been tested and the profit has been estimated. A smaller investment still has to be made to set up the pilot and to analyse the research.
- **Need evidence to convince.** Scepticism and the uncertainty of profit were barriers for caregivers for the integration of e-consultation and digitization. Caregivers need to be convinced before joining. With the pilot, academic research will be done to analyse the effect of the software. This means that convincing caregivers and patients to use the software will be an easier action to do in horizon two.

Patient in horizon 1

As seen in the patient-centred roadmap, horizon 1 is an introduction of the software to the patient. With the created algorithm, the software will be tested on patients. The reaction of the patients towards the software will be analysed. For this research, it is important to evaluate the set benefits of the system:

- Does the software provide an increased feeling of control to patients?
- Does the software make the patients feel heard/listened to?
- Do patients experience higher accessibility with the software?

Strategic implementation in horizon 1

In the strategic roadmap, it is seen that this phase has two main actions with CBS. CBS is chosen because it is a unique organization that offers interesting benefits:

At first, one of the big problems mentioned earlier is setting up the data warehouse where all the patient data of the GPs will be stored. CBS has the facilities to provide a place to store the data. The opportunity to use these data warehouses to test the concept is very beneficial because the effort and costs are diminished.

CBS has data in all kinds of categories already, also medical data from patients. The organisation has experience in collecting and storing medical data. IZER is an organisation that is currently unskilled with the collection of data, so their support would be beneficial in the development of this project. CBS does not provide details of their medical data, so it is unclear if it is suitable for the creation of the algorithm.

In the strategic roadmap, organisational steps are taken into consideration to highlight important actions. At first, on an operational level, the CBS application process has to start and has to be completed successfully. Afterwards, the necessary steps need to be taken to set-up the research such as the recruitment of the research and software team. The software team analyses the data and the algorithm will be created. The algorithm will be tested with patients and updated according to results. This process will happen several times, until the deadline at the end of 2022, then the choice will be made if the software is beneficial enough for both caregiver and patient to continue.

At last, several partners are added in this phase to support the development. IZER is a regional organisation, and in the Netherlands, several organisations provide similar support in their region. Not only the region Rotterdam-Rijnmond could profit from this new technology, and that is why a collaborative approach is chosen. IZER should contact and convince several regional care groups to join this project. In exchange for a financial contribution, these regional care groups will get access to the technology in the beta phase. The national partner for primary care, InEen, should also be considered as a partner due to their large member group and experience with digitalisation (InEen, 2021). Furthermore, an organization such as Hechte Huisartsenzorg, which promotes and strengthens regional collaboration between primary care organisations, is a strong collaborative partner as well during this project (Hechte Huisartsenzorg, 2021).

6.3.2 Horizon two

If horizon one ended with the approval of the project, then horizon two commences called: "Welcoming eConsult support". In this horizon, the prototype algorithm will be adjusted to the beta version and officially launched at GPs in the region Rotterdam-Rijnmond.

Patient in horizon 2

The prototype changes to a real software system. Patients are no longer analysed in a research pilot, but use it as a way to interact and connect with their general practitioner. In this phase, more control will be given to the patient. At first, this is done by implementing Thuisarts as a regular aspect of the service. When the patient went through the questionnaire, a link to Thuisarts will be given for their complaint, this will be further explained in chapter 6. Next to Thuisarts, the monitoring service called 'Zelf Samen Monitoren' would be introduced in the second half of horizon two as well. Both additions will increase the self-reliance of the patient, and provide them with more control. These additions should be closely monitored for their effect with extra safety measures.

Strategic implementation in horizon 2

In this horizon, there are three main strategic focus points: legal aspects, adding practices to the data warehouse, and monitoring. As stated earlier in chapter 6, the software should abide by medical device and privacy laws. It is important that before the beta launch, this software is tested and has the right medical and privacy quality labels.

Furthermore, general practices should be convinced to adopt the software and to collect patient data. A promotional campaign is a set-up to communicate to GP practices and to provide the positive research results of the software. Alongside this should a data warehouse be set-up to collect the data. A partner of IZER, Pharmeon, that has experience with websites, patient portals, and apps in the primary care sector, would be the recommended partner to organize this data warehouse. Especially because the company is experienced in working with data integrations from several GP HIS (Huisartsen Informatie Systeem) (Pharmeon, 2018). Next to this, Pharmeon has facilities to create the software service for patients as well. At last, the monitoring service 'Zelf Samen Monitoring' is added in the second half of this horizon. A partner that specialises in monitoring software should supply the software. Due to the uncertainty of the effect, a review is done at the end and the software will be approved or rejected.

6.3.3 Horizon three

Horizon three is called 'Opening more eConsult paths', to show the last two options that patients will get.

Patient in horizon three

The two options, BliksemDokters and Rob. Dok., are added to the decision software. This will enhance the speed and accessibility of the care provided to patients. Both options should be closely monitored to recognize and prevent negative effects.

Strategic implementation in horizon 3

The final stage focuses on the implementation of BliksemDokters and Rob.Dok., and the improvement of the algorithm. Due to the many years of gathering data and of improving the algorithm, the algorithm has become quite good at predicting the future. It is possible to re-evaluate the division of responsibility if the algorithm became significantly better in performing triages than caregivers.

At last, to optimize the function of Rob. Dok., it would be advised to partner up with digital assistant and voice recognition software companies. By combining these two companies, an immersive virtual consult can be imitated.

CONCLUSIONS

The research has proven three main insights:

- The algorithm of the software service is easily feasible and is realised in a short time.
- Setting up the data warehouse is the main hurdle due to obstacles in the integration of GP software systems.
- DagKo has to abide by medical device and privacy regulations that can be crucial to the realisation.

All insights were taken into account during the realisation of the two roadmaps. Furthermore, a pilot phase is added to evaluate the effects and gains of DagKo before fully committing to the implementation.

DagKo - Patient Roadmap

Data-Gedreven Klacht Ondersteuning

2021

1st Horizon

Finding a new eConsult way

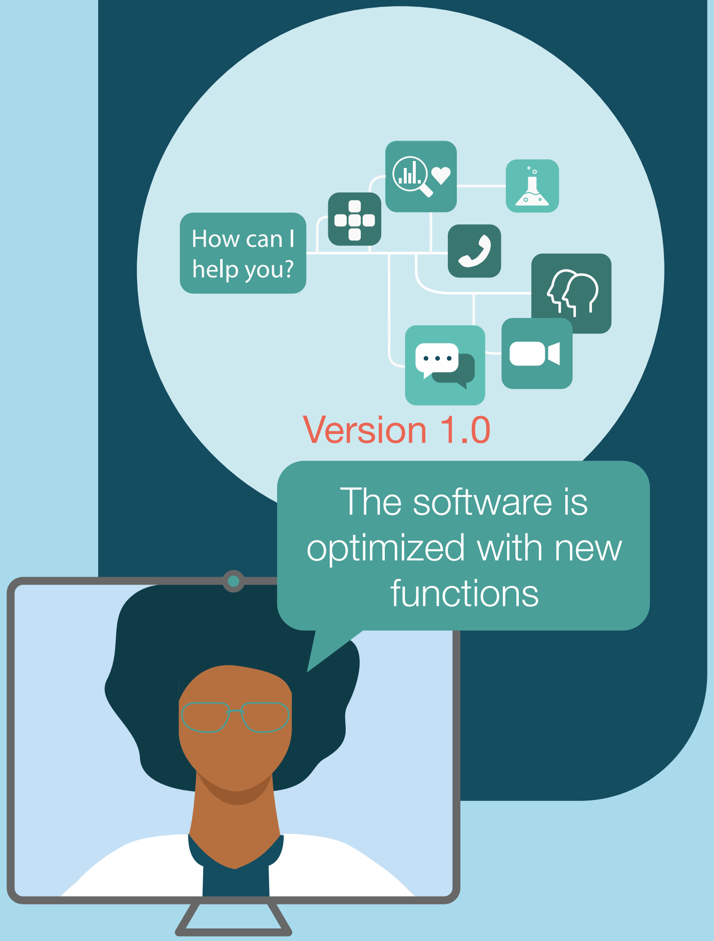
- The data will be gathered and analysed, and eventually made into an algorithm.
- The algorithm will decide the most efficient and effective method in that situation.
- The algorithm is still a pilot, meaning that patient research will be done to see the effect.

2023

2nd Horizon

Welcoming eConsult support

- Launch the complaint to care pathway algorithm at practices in Rotterdam Rijnmond.
- Implementing Thuisarts.nl as regular feature after the triage has been done.
- Adding Zelf Samen Monitoren, the independent monitoring service.



2026

3rd Horizon

Opening more eConsult paths

- Introducing the RobDok, an robotic doctor that provides datadriven care.
- Bliksem Dokters. A service where you get a consult from a random dokter in 24 hours.

2028

DagKo

Accessible care

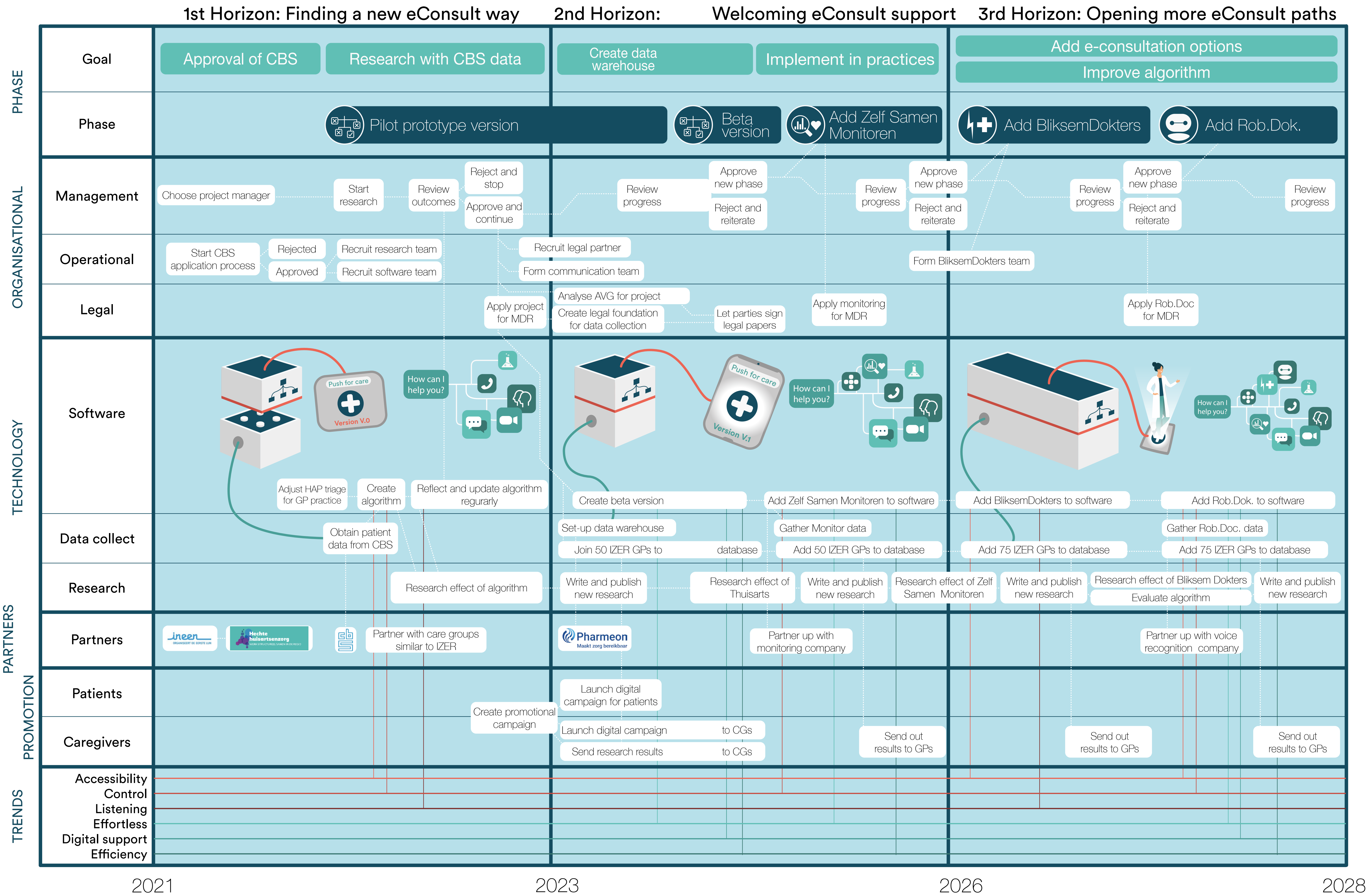
in control of the patient

supported by data-driven efficiency.

Figure 31, DagKo Patient Roadmap

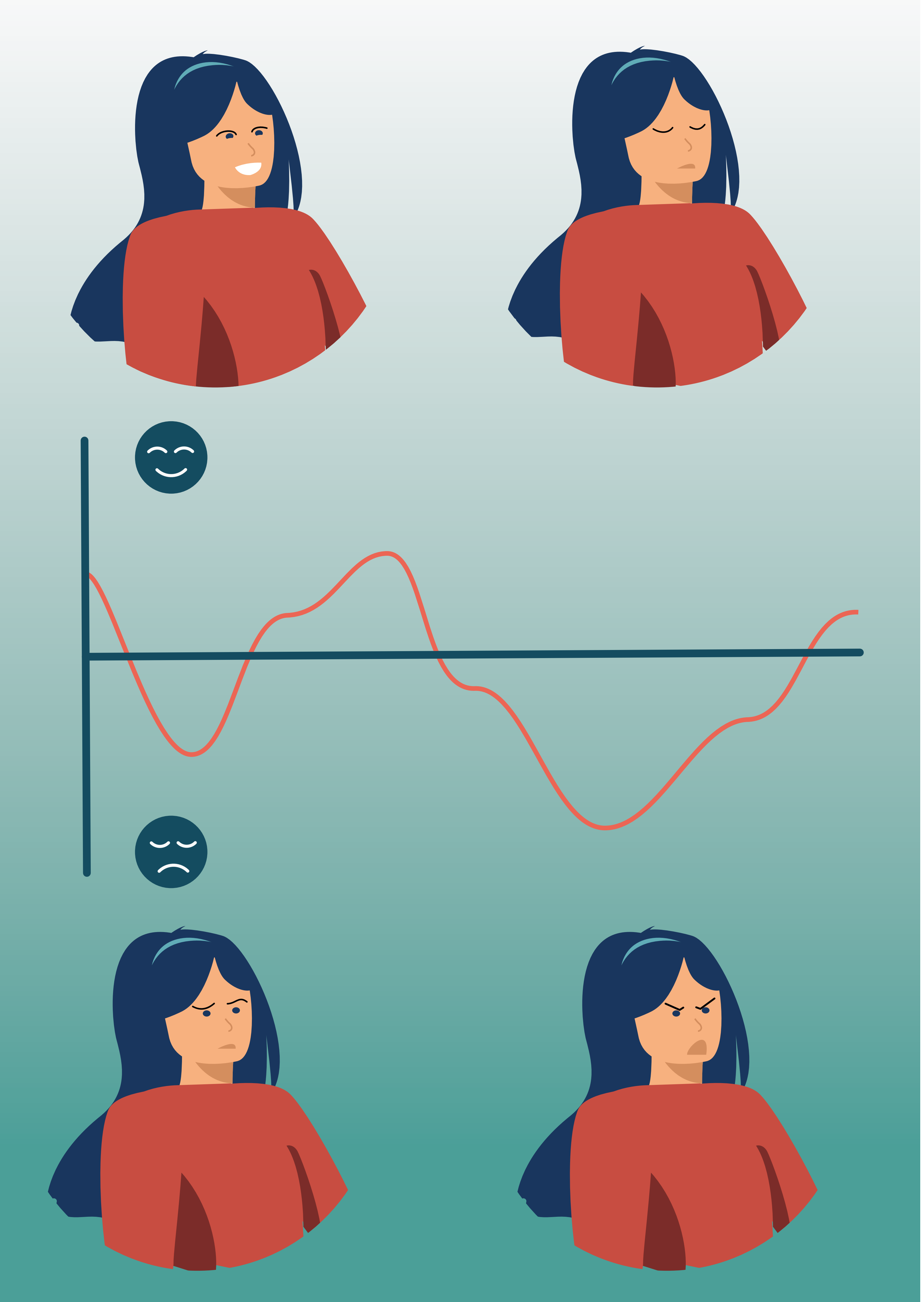
DagKo - Strategic Roadmap

DagKo. Accessible care, in control of the patient, supported by data-driven efficiency.



		1st Horizon: Finding a new eConsult way	2nd Horizon: Welcoming eConsult support	3rd Horizon: Opening more eConsult paths
PHASE	Goal	Approval of CBS Research with CBS data	Create data warehouse Implement in practices	Add e-consultation options Improve algorithm
	Phase	Pilot prototype version	Beta version Add Zelf Samen Monitoren	Add BliksemDokters Add Rob.Dok.
ORGANISATIONAL	Management	Choose project manager Start research Review outcomes Reject and stop Approve and continue	Review progress Approve new phase Reject and reiterate Review progress Approve new phase Reject and reiterate	Review progress Approve new phase Reject and reiterate Review progress
	Operational	Start CBS application process Rejected Approved Recruit research team Recruit software team	Recruit legal partner Form communication team Form BliksemDokters team	
	Legal	Apply project for MDR	Analyse AVG for project Create legal foundation for data collection Let parties sign legal papers Apply monitoring for MDR	Apply Rob.Doc for MDR
TECHNOLOGY	Software	Adjust HAP triage for GP practice Create algorithm Reflect and update algorithm regurarly	Create beta version Add Zelf Samen Monitoren to software	Add BliksemDokters to software Add Rob.Dok. to software
	Data collect	Obtain patient data from CBS	Set-up data warehouse Join 50 IZER GPs to database Gather Monitor data Add 50 IZER GPs to database	Add 75 IZER GPs to database Gather Rob.Doc. data Add 75 IZER GPs to database
	Research	Research effect of algorithm	Write and publish new research Research effect of Thuisarts Write and publish new research Research effect of Zelf Samen Monitoren	Write and publish new research Research effect of Bliksem Dokters Evaluate algorithm Write and publish new research
PARTNERS	Partners	ineen ORGANISEERT DE EERSTE LIJN Hechte huisartsenzorg WERK STRUCTUREEL SAMEN IN DE REGIO cbs Partner with care groups similar to IZER	Pharmeon Maakt zorg bereikbaar Partner up with monitoring company	Partner up with voice recognition company
PROMOTION	Patients		Launch digital campaign for patients	
	Caregivers	Create promotional campaign	Launch digital campaign to CGs Send research results to CGs Send out results to GPs	Send out results to GPs Send out results to GPs
TRENDS	Accessibility Control Listening Effortless Digital support Efficiency			

Figure 32, DagKo Strategic Implementation Roadmap



Chapter 7.

Validation of DagKo

7. Validation of DagKo

7.1. Validation Approach

The validation will be different for patients and caregivers. With patients, there will be a minimum of ten patients that will be tested. For caregivers, this will be a minimum of four.

Patients

The patient validation tests have several goals:

- Evaluate how the patient gets influenced by the match score and the duration.
- Evaluate the patients reaction to multiple options.
- Evaluate the options from each other separately.
- Ask for aspects of improvements

In the test with the patients, I will talk them through the scenario presented above. While all the options are presented, the patient is asked what option they would choose and why. Then, the complaint changes and so also the match score and the duration of the consult (see figures 33 to 37). Again the same question will be asked to the patient: what they will choose and why. Changing the scenario will happen two times more. During this process, it will be tracked what the patient chooses and why. Due to recurring feedback, it was decided to change the way the service communicates to the patient in the middle of the user tests, as seen in figure 36. This means that four patients and two caregivers got the scenario presented in figure 34 and 35, and four patients and two caregivers got the scenario presented in figure 36. In the end, a questionnaire is presented to the patient. This questionnaire can be seen in figure 37.

Caregiver

The caregiver validation has the following goals:

- Evaluate their opinion about the added options and the concept as a whole.
- Ask for bottlenecks and improvements.

The test with the caregivers is easier. The scenario will be presented to the caregivers and the different options will be explained. Afterwards, the opinion of the caregiver is asked on the total concept, so a clinical decision tool to improve the triage and diagnosis, and about each specific addition to the modalities.

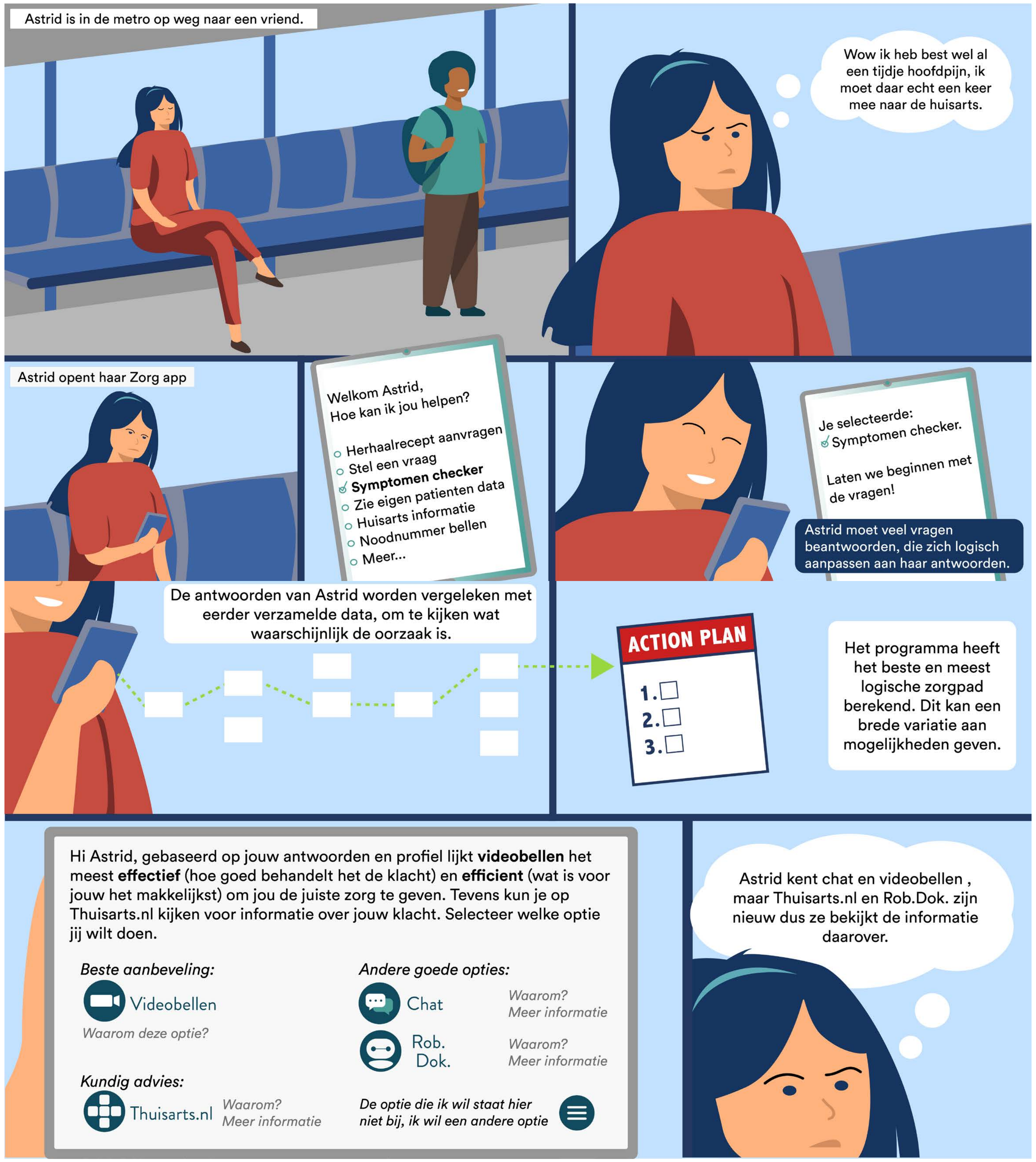


Figure 33. The beginning of the user-test cartoon for the validation

Hi Astrid, gebaseerd op je antwoorden zijn de mogelijke acties geselecteerd en geordend op **effectiviteit** (hoe effectief behandelt het de klacht) en **efficientie** (wat is voor de patient het makkelijkst). Selecteer uw voorkeurs keuze om dat consult te beginnen.

Je eigen huisarts:

Chat
Verwachte wachttijd: 1 dag
Match: 70%

Videocall
Verwachte wachttijd: 3 dagen
Match: 90%

Zelf behandelen:

Thuisarts.nl behandeling
Begin direct
Match: 40%

Zelf Samen Monitoren
Begin direct
Match: 85%

Snelheid:

Bliksem Dokters
Verwachte wachttijd: 4 uur
Match: 70%

Rob. Dok.
Begin direct
Match: 70%

Figure 34. In the first user-test, the lead persona in the cartoon gets to choose different option based on match scores. These match scores are calculated on effectiveness and efficiency.

Hi Astrid, gebaseerd op je antwoorden zijn de mogelijke acties geselecteerd en geordend op **effectiviteit** (hoe effectief behandelt het de klacht) en **efficientie** (wat is voor de patient het makkelijkst). Selecteer uw voorkeurs keuze om dat consult te beginnen.

Je eigen huisarts:

Chat
Verwachte wachttijd: 2 dagen
Match: 60%

Videocall
Verwachte wachttijd: 4 dagen
Match: 30%

Zelf behandelen:

Thuisarts.nl behandeling
Begin direct
Match: 95%

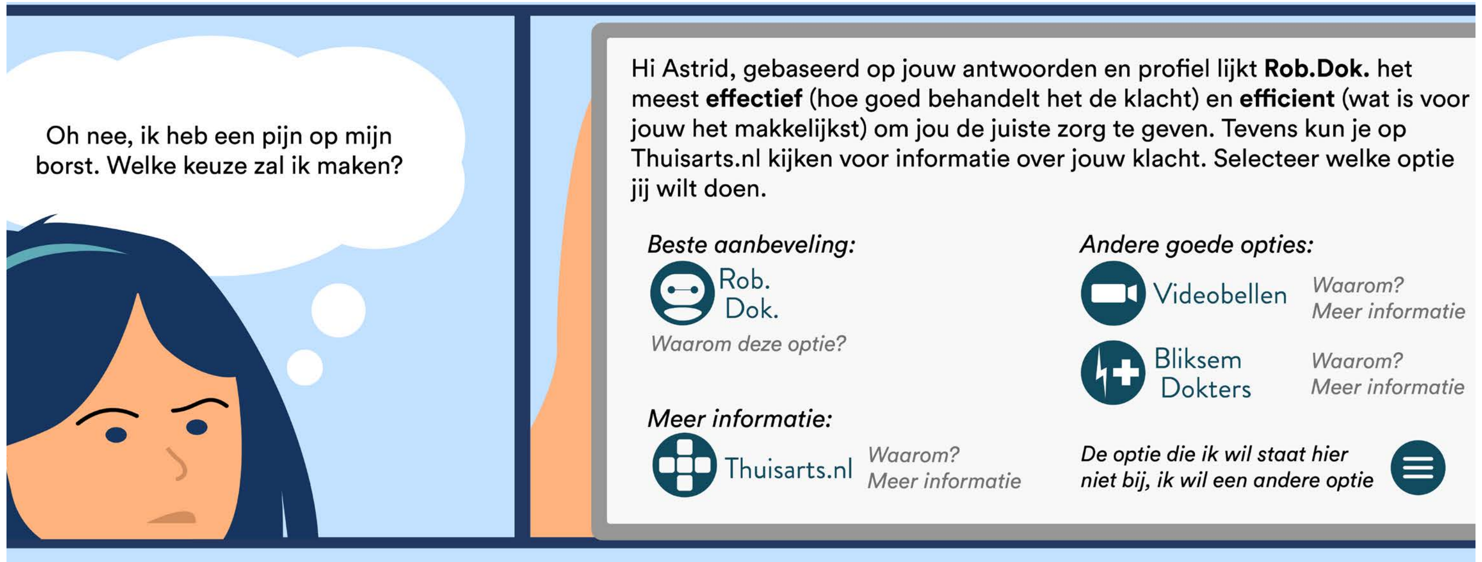
Zelf Samen Monitoren
Begin direct
Match: 10%

Snelheid:

Bliksem Dokters
Verwachte wachttijd: 3 uur
Match: 50%

Rob. Dok.
Begin direct
Match: 70%

Figure 35. Four different complaints were presented with different match scores. The participant was asked what they would do if they were in that situation and why.



Hi Astrid, gebaseerd op jouw antwoorden en profiel lijkt **Rob.Dok.** het meest **effectief** (hoe goed behandelt het de klacht) en **efficient** (wat is voor jouw het makkelijkst) om jou de juiste zorg te geven. Tevens kun je op Thuisarts.nl kijken voor informatie over jouw klacht. Selecteer welke optie jij wilt doen.

Beste aanbeveling:

Rob. Dok.
Waarom deze optie?

Meer informatie:

Thuisarts.nl — *Waarom?* *Meer informatie*

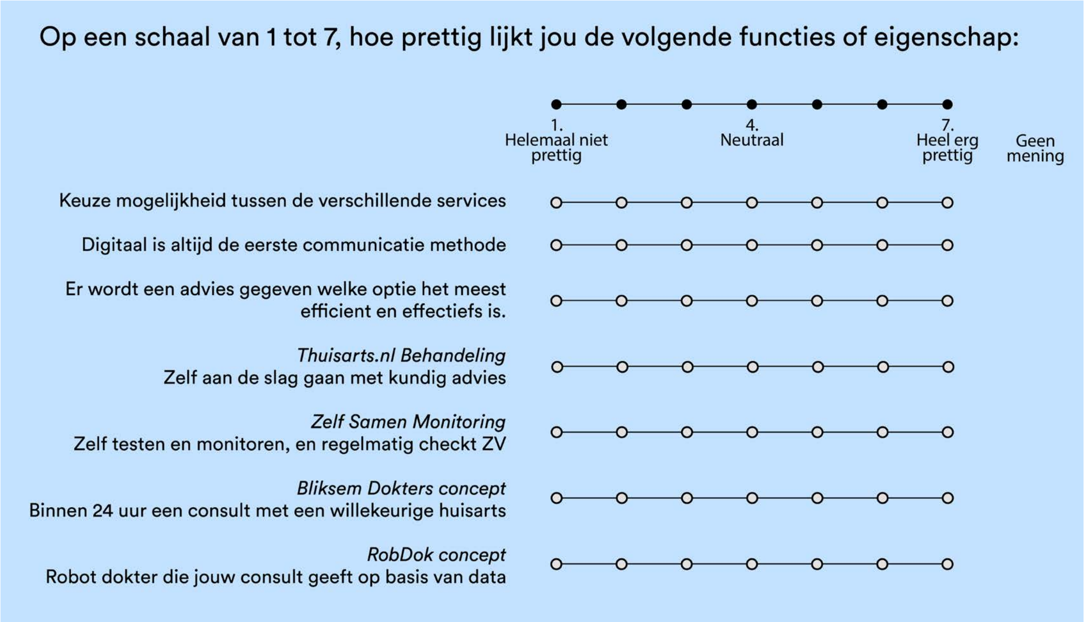
Andere goede opties:

Videobellen — *Waarom?* *Meer informatie*

Bliksem Dokters — *Waarom?* *Meer informatie*

De optie die ik wil staat hier niet bij, ik wil een andere optie

Figure 36. In the second user-test, the lead persona gets a couple of recommendation, with one being the best option. The match scores are not present anymore. The participant were asked what they would choose.



Op een schaal van 1 tot 7, hoe prettig lijkt jou de volgende functies of eigenschap:

	1. Helemaal niet prettig			4. Neutraal			7. Heel erg prettig	Geen mening
Keuze mogelijkheid tussen de verschillende services	○	○	○	○	○	○	○	
Digitaal is altijd de eerste communicatie methode	○	○	○	○	○	○	○	
Er wordt een advies gegeven welke optie het meest efficient en effectiefs is.	○	○	○	○	○	○	○	
Thuisarts.nl Behandeling Zelf aan de slag gaan met kundig advies	○	○	○	○	○	○	○	
Zelf Samen Monitoring Zelf testen en monitoren, en regelmatig checkt ZV	○	○	○	○	○	○	○	
Bliksem Dokters concept Binnen 24 uur een consult met een willekeurige huisarts	○	○	○	○	○	○	○	
RobDok concept Robot dokter die jouw consult geeft op basis van data	○	○	○	○	○	○	○	

Figure 37. At the end of both user-tests, the participants had to fill in this small questionnaire, ranking the features of the service and the sub-concepts from 1 (not pleasant) to 7 (very pleasant).

7.2. Validation Outcom

7.2.1. Main insights software service

Neutral feedback Patients

- Most patients used the highest match or the best recommendation as a guideline. Only if they disagreed they chose another one.
- Noticeable, the concept made patients think more about their complaint:
  - Can it wait? By providing waiting times and recommendations the people started to make decisions if they agreed that the complaint could wait. Chat, monitoring or video calls are for complaints that could wait. Rob.Dok. or BliksemDokter is for quick care.
  - Can I do this by myself? Patients would estimate their self-reliance in the situation to see if Thuisarts or Rob.Dok. was a good option.
  - What is the severity? Less severe means more autonomous options, more severe means the need for a real person.
  - How complicated is the complaint? For a more complicated complaint, a real doctor is preferred, otherwise, an algorithm is sufficient.
  - Is my medical history important? If this is the case then my own doctor would be mandatory, otherwise, it does not matter.
- Efficient was not experienced as a good word, it does not sound nice to make everything efficient. The patient suggested the word 'pleasant'.

Neutral feedback caregivers

- Caregivers mention that it can work well for some people, but it is not for everyone.
- They find the concept very futuristic.
- The concept might take a long time to work.
- Some caregivers suggest involving the assistant more in the concept as she can do a lot of the actions.
- Caregivers express that patients see their own complaint as urgent, so phrase it differently, suggested: "this complaint can be planned".
- There was some doubt if people would focus on the matches or just on the waiting time.

	Pat. 1	Pat. 2	Pat. 3	Pat. 4	*Mean T1*	Pat. 5	Pat. 6	Pat. 7	Pat. 8	*Mean T2*
Age	61	62	31	25		25	25	32	28	
An advice is given for the most effcient and effective option	7	4	6	5	5,5	6	6	6	7	6,25
Option to choose between different services	7	2	6	5	5	7	7	5	7	6,5
Digital is always the first communication method	6	6	5	5	5,5	4	6	4	5	4,75

Table 9. Patients ranking (1 not pleasant, 7 very pleasant) about several aspects of the service

Positive feedback caregivers

- They mention that some people would love this.
- They see the efficiency and reduce of work.
- Combining 'efficient' and 'effective' is good.
- You have a very different view of care, which is nice.
- The concept really differs well between quick fixes, simple care and more complicated care. It filters a lot of the complaints.
- It is great that the patient gets control and speed
- I really like the concept because it is patient operated.
- The decision support is good.
- It is good that you see the potential of data.

Positive feedback patients

- The concept is great to get a "running start" in a consult.
- The option to choose is very pleasant. You can estimate yourself what you think is good.
- The recommendation is pleasant. Patients were interested in how this recommendation was made and wanted transparency.
- The concept is efficient.
- The concept shows that the added value of going to the doctor is overestimated.

Negative/improvement feedback caregivers

- People always fill in a higher urgency.
- Some patients will "abuse" the software to get what they want.
- Knowing people makes triage sometimes easier.
- The concept is dangerous for care avoiders, they will not get the care they need.
- There are a lot of choices.

Negative/improvement feedback patients

- The first user-test had too many options, which felt too much to read and look into.
- The advantages of the options are unclear, especially for the futuristic options.
- A patient was offended when the program calls the complaint "not urgent". You are not the one who decides that.

7.2.2. Reflection software service

The interviews with the caregivers and the patients showed the potential of the general concept. Giving people more control, options to choose from and more accessibility was reviewed as positive by both parties. This can be seen in the rather high numbers that the patients ranked the first two options of the questionnaire, as shown in table X. However, in the first test, patients mentioned that the number of options was too much and that was the reason for the lower ratings from patients two and four. In the second test, the patients were more steered into the option with the highest match (rating on effectiveness and efficiency) and the process was a bit easier. A different effect the options had, was that it made the patient more reflective towards their own complaint. With the options given, patients would review the need for personal care, speed, self-reliance, severity and the importance of medical history themselves. This increase in the independence of the patients was a beneficial addition.

The caregivers were enthusiastic and recognized the gains in terms of efficiency. The concept that some care is simplistic and therefore can be treated with a lower involvement method was seen as advantageous. Some caregivers expressed that the system could easily detect complaints such as STDs, urinary tract infection, and skin complaints, and guide them towards an efficient option.

Caregivers also mentioned quite strong bottlenecks of the concept. The fact that the concept is not for everyone is logical, which is the same as for other eHealth applications. However, caregivers mentioned that this concept could be dangerous for care avoiders because they will downplay their complaint and not receive the care they actually need. Next to this, the caregivers mention that some people would misguide the system to always get the consultation method they want, as currently seen with the Digi HAP. There is not an easy answer to both problems. Ideally, the system would recognize these two types of people and could react appropriately. This should be taken into account during the pilot phase.

7.2.3. Main insights sub-concepts

Bliksem Dokters opinion by caregivers

- It is a shift in the primary care mindset.
- The concept was described as interesting.
- Caregivers doubt if the concept would be financially sustainable if it got a lot of complaints. The business case needs to be defined .
- The assistant can do many of these tasks as well.
- Caregivers agree that there is a big market for this and that some people would like it.
- There are doubts about the moral aspect, do you want patients that want to check everything immediately?

Bliksem Dokters opinion by patients

- The option is considered good to have and very dependant on the urgency of the complaint.
- Patients mention the lack of value they sometimes have towards their own GP.
- The distinction between this option and emergency care was sometimes unclear.

Rob.Dok. opinion by caregivers

- Can be a good option for some symptoms.
- Caregivers saw it as the integration of “do I have to go to the GP?”.
- The caregiver would restrain the RobDok in the actions it can perform (e.g. reference to secondary care).
- The concept was seen as needed, but currently too difficult technologically and futuristic.
- Increasing the self-reliance of patients is good.

Rob.Dok. opinion by patients

- Patients liked the speed of the option.
- Patients suggested to start always with RobDok and incorporate it as the starting phase of the decision algorithm.
- Some patients were curious and see the potential.
- Other patients were sceptical due to chatbot experiences and therefore do not trust it.
- Most patients expressed that they would try it to see how it goes.

	Pat. 1	Pat. 2	Pat. 3	Pat. 4	Mean T1	Pat. 5	Pat. 6	Pat. 7	Pat. 8	Mean T2
Age	61	62	31	25		25	25	32	28	
Thuisarts will always be mentioned, and adviced if it can help in the situation	6	3	5	5	4,75	6	6	3	7	5,5
Zelf Samen Monitoren. Test and monitor yourself, and frequently a caregiver checks	4	5	5	4	4,5	7	7	6	3	5,75
Bliksem Dokters, In 24 hours a consult with a random GP	6	6	7	6	6,25	5	5	5	7	5,5
RobDok, a datadriven virtual GP gives you an advice based on data	6	5	5	5	5,25	4	6	2	4	4

Table 10. Patients ranking (1 not pleasant, 7 very pleasant) about the sub-concepts of the service

Thuisarts opinion by caregivers

- Caregivers mention that it is a good first check and that patients should do it before coming in.
- Framing this as a treatment was interesting.

Thuisarts opinion by patients

- This concept was perceived as a good first step. However, patients recommend not to label it as a treatment because they saw it as an advice.
- After looking up the information, patients did an evaluation to see how satisfied they were with the information.
- There was also doubt: “I think the advice would be too standard and I do not want that.”

Zelf Samen Monitoren opinion by caregivers

- It is currently not done due to bad technical developments.
- Caregivers mention the potential and were positive and enthusiastic.
- It was noted that some monitoring complaints can be dangerous so the doctor should confirm it beforehand .
- Caregivers express that people would love this.
- Proper use might save a consult.

Zelf Samen Monitoren opinion by patients

- Some patient express that this concept is new, therefore a bit scary or has unknown possibilities
- With this concept, you go to the GP prepared.
- The patient recognized that some complaints just need time, and this concept gives that.

7.2.4. Reflection sub-concepts

The sub-concepts were reviewed quite positively as well, however, it can be said that the review was more difficult than with the overarching concept. Especially the two concepts RobDok and Zelf Samen Monitoren were quite new to people. This means that during the test, this was hard to envision for some patients and caregivers. Therefore, due to more room for their own interpretation, the comments were less consistent than the ones with the main concept.

BliksemDokters was seen as a good and inevitable concept by caregivers because there are complaints where this is well applicable. However, the lack of a business plan put the caregivers in doubt. Patients did not pick the option often but were glad that this option existed. The arguments for not picking this option was mostly due to a lack of urgency.

Caregivers were enthusiastic about Rob.Dok., due to the filtering function of some complaints (e.g. it is great for treatment of STDs). Still, current technological difficulties made it futuristic. With the patient user-test, there was a split between more “tech enthusiastic” people and “tech sceptics”. This is completely logical and was also seen in earlier qualitative research.

Thuisarts is a very interesting sub-concept because both parties agreed that this is a good first step for patients to do. However, this option was not evaluated as a treatment, but as an option to gain more information (as seen in test version two).

At last, Zelf Samen Monitoren was rated positively by caregivers. It was expressed that this would attract attention, especially with the increasing mindset that people want to monitor more. With the patients, there was a clear difference between patients that had done some monitoring already (patients 3, 5 and 6) and the other patients that did not. The advantages were harder to grasp for those with lacking experience.

7.3. Conceptual Changes

The comments by the caregivers resulted in conceptual changes, or in future recommendation (chapter 7.3.). In this part, the four main conceptual changes will be explained. In some cases the new user journey of DagKo will be referenced, this can be seen in figure 38.

Thuisarts advice
One big conceptual change was the use of Thuisarts. Both patient and caregivers did not want it as a treatment, but as a standard option after the triage. In the new user journey, it is an option to choose when the e-consult options are presented. With this implementation, patients can decide for themself if they would want it.

Number of options
A difference between the first and the second user-test was the number of options. As stated in the reflection, the patients and caregivers did not want all the options. In the new user journey, the best consult methods are determined by DagKo and are presented to the patient. The patient has three options: select one of the proposed methods, view their complaint on Thuisarts.nl, or disagree with the proposed methods and select a new one. This set-up is beneficial because there is a chance that patients will be nudged towards an efficient method.

Limited autonomy
The next big change is due to responsibility. In conversations about the concept and in the interview with the data expert, it became apparent that the responsibility of the software service would need to be at a caregiver eventually. If the algorithm would make autonomous decisions, then the producer (IZER) would be responsible. This discussion has similarities to the discussion about responsibility with autonomous vehicles. At last, it is decided that in some cases, it is mandatory to have the approval of the assistant. This means that any complaints that might be dangerous always need to be approved by an assistant or other caregiver (e.g. pain in the chest) if those are not already been sent to the right modality with the right urgency. Complaints that have no sign or extremely low signs to have a dangerous effect could proceed to the next step without approval from the assistant.

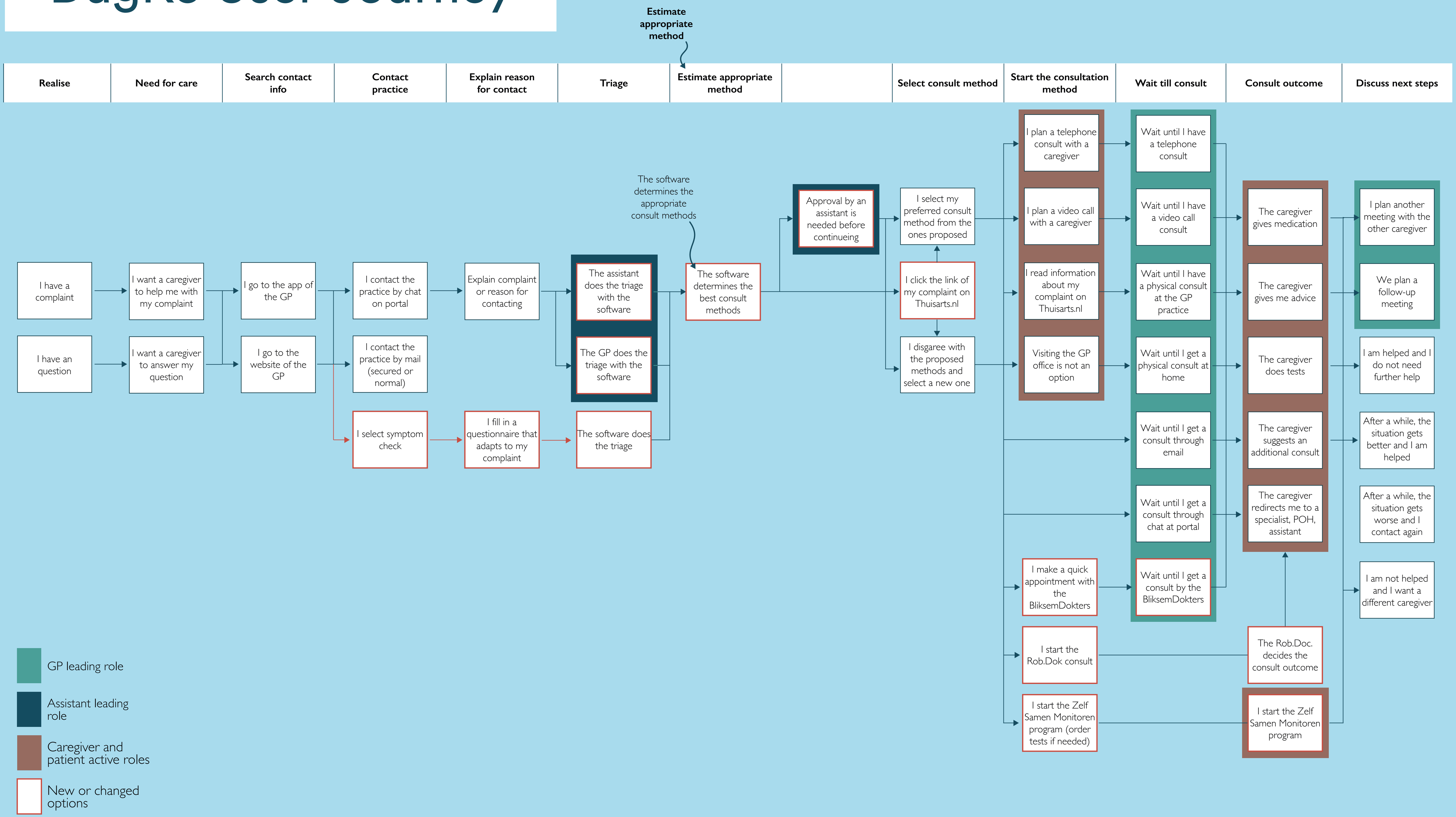
Transparent choices
This is in line with another insight during the validation interviews and user-tests. Caregivers and patients wanted to know how the decision in the software was made. This means that the software algorithm needs to be transparent. The DagKo software service must be able to explain why certain choices were made. This added feature needs to be programmed into the software that both parties can opt for the option of why choices are made.

CONCLUSIONS

DagKo has been tested with users and discussed with caregivers. The main insights are:

- Overall, the software service was positively experienced by both parties.
- Caregivers recognized the efficiency gains and supported that this service could work well for small and simple care.
- Patients positively experienced the functions of the service and acknowledged the increase in control and accessibility.
- Thuisarts has been reduced to advise and not a treatment.
- The number of options that are given to the patient will be limited.

DagKo User Journey



Estimate appropriate method

Realise | Need for care | Search contact info | Contact practice | Explain reason for contact | Triage | Estimate appropriate method | Select consult method | Start the consultation method | Wait till consult | Consult outcome | Discuss next steps

I have a complaint

I have an question

I want a caregiver to help me with my complaint

I want a caregiver to answer my question

I go to the app of the GP

I go to the website of the GP

I contact the practice by chat on portal

I contact the practice by mail (secured or normal)

I select symptom check

Explain complaint or reason for contacting

I fill in a questionnaire that adapts to my complaint

The assistant does the triage with the software

The GP does the triage with the software

The software does the triage

The software determines the appropriate consult methods

The software determines the best consult methods

Approval by an assistant is needed before continueing

I select my preferred consult method from the ones proposed

I click the link of my complaint on Thuisarts.nl

I disgaree with the proposed methods and select a new one

I plan a telephone consult with a caregiver

I plan a video call with a caregiver

I read information about my complaint on Thuisarts.nl

Visiting the GP office is not an option

I make a quick appointment with the BliksemDokters

I start the Rob.Dok consult

I start the Zelf Samen Monitoren program (order tests if needed)

Wait until I have a telephone consult

Wait until I have a video call consult

Wait until I have a physical consult at the GP practice

Wait until I get a physical consult at home

Wait until I get a consult through email

Wait until I get a consult through chat at portal

Wait until I get a consult by the BliksemDokters

The caregiver gives medication

The caregiver gives me advice

The caregiver does tests

The caregiver suggests an additional consult

The caregiver redirects me to a specialist, POH, assistant

The Rob.Doc. decides the consult outcome

I start the Zelf Samen Monitoren program

I plan another meeting with the other caregiver

We plan a follow-up meeting

I am helped and I do not need further help

After a while, the situation gets better and I am helped

After a while, the situation gets worse and I contact again

I am not helped and I want a different caregiver

🟩 GP leading role

■ Assistant leading role

🟫 Caregiver and patient active roles

☐ New or changed options

Figure 38, DagKo Improved User Journey

Chapter 8.

Conclusion

8. Conclusion

8.1. Discussion

In this graduation project, research and design are combined to create a final concept. The literature study, the qualitative studies and the observations were translated into patient needs, caregiver needs, and overarching primary care insights. These results are combined into trends, and with the help of a technology scout, formed the basis of the final result. The previous research insights can be seen in the final design. The final design still has some imperfections and shortcomings that needed to taken into account when assessing future recommendations. During the project, two main discussion points were identified: weaknesses of the qualitative research, and the lack of concept profit.

8.1.1. Qualitative research shortcomings

From the three methods that were used to gather insights, the qualitative study contributed the most, mainly due to the richness of the qualitative results. The qualitative study had its flaws though, as mentioned in the scoping of this project (chapter 4.2.). Three types of people were under-represented in the qualitative study: elderly patient (approximately 70 and older), patients with chronic diseases, and "digital sceptic" caregivers. This means that the concept would likely function better, and is more attractive to a younger, more digitally engaged population. The user-tests support this statement because the concept was evaluated positively in general. A more diverse population will likely react differently to this concept. It can be speculated that because of the difference in digital skills that these under-represented groups have, that their efforts to adjust to the service would be outweighed by the benefits.

8.2.2. Unclear efficiency

The second main discussion point was identified during the time pacing. As mentioned thoroughly in chapter 5, there are quite some organisational and financial actions that must be executed to obtain the final service. Examples are setting up the CBS pilot document, pilot research, regulate according to the privacy laws and the MDR, and creating a data warehouse. These actions do not make the concept infeasible but require a certain dedication from IZER and other collaborative partners with resources and financial investments.

8.2.3. Concept assumptions

During the research phase and the development of the concept, many assumptions were made. Most assumptions were addressed within the report and taken into account (e.g. that e-consultation is better than normal consultation, chapter 2). However, some assumptions were left unaddressed. A good example of this can be found in chapter 5.4. While analysing the concept, numerous sub-concepts were ranked based on their accessibility, control, "quality care", and efficiency (figure 26). Based on these insights the sub-concepts were added. While having done quite a few interviews and user-tests during this project, it is still a very subjective ranking. In figure 26, contact through the phone is ranked less accessible than chat or mail due to constrained calling hours, however for someone else the phone might be way more accessible. As a designer, it is important to acknowledge these assumptions and to reflect regularly during the process on these assumptions.

8.2.4. User-testing focus

At last, the results of the user-test can be discussed as well. The concept was evaluated as a whole, while only a part of the concept was tested. The participants were read a short story of how the software service would work. Then, screens with the advice were shown and the participants were asked to make a choice. In reflection, this was a flaw in the user-test design because the participants only interacted with a specific part of the concept and not with the whole concept. For example, if the participants had to fill in the amount of the questions that were normally asked, would they still pick the same recommended concepts? It can be assumed that due to the high number of questions, a higher level of trust in the software would be reached. This could lead to a faster choice of the recommended option. However, the tediousness of the questions could also negatively affect the total experience of the concept. In conclusion, the user-test was a prototype that tested the assumptions that patients mainly wanted more control and accessibility, and should not be extrapolated on the total service experience.

8.2. Conclusion

The corona pandemic heavily increased the digitalisation in the primary care field in the Netherlands. However, research shows sceptic and negative comments from the patients and caregivers side towards this digitalisation trend. It can be argued that this increase was forced upon people. Therefore it is possible that after this pandemic, both groups return to the previous status quo, regardless of the benefits that eHealth and e-consultation can bring.

The goal of this graduation project was to increase the adoption of e-consultation in primary care together with IZER. During the research, caregivers and patients were thoroughly analysed to search for trends and wishes about primary care. The major trends that were discovered were the need for higher efficiency in the process due to the high effort of digitalisation, the demanded shift in control to the patient, the need for accessibility for the patient, the wish for digital to support the process, and the need for good communication. Together with a technology scout, an ideation was performed to scout for suitable solutions.

The result is DagKo: the Data-driven complaint support for patients in primary care (Data-gedreven Klacht Ondersteuning). DagKo is a software app that supports patients to do their triage independently and guides them towards the best next step concerning their complaint and medical history. The app uses data from previous patients with similar situations to analyse the most efficient and effective methods in a specific situation. Additionally, new consultation options are added to enhance the right care in the right situation. These additions consist of a data-driven virtual doctor, a monitoring program and a quickly accessible doctor service. To strengthen the implementation of the concept, a strategy was made in the form of two roadmaps. Next to this, the user-journey was improved according to the new service.

The needs and wishes of the patients and caregivers were translated into DagKo. The software provides increased accessibility and control for the patients. It is an app that listens carefully to the user and gives options for the best suitable care. This app is not only beneficial for patients. Because of the smart use of data, caregivers will be supported with suitable advice during their triage. Caregivers just have to confirm the suggested modality by the software. This will result in an increase in efficiency for the caregivers, letting them give more attention to patients that need it by spending less time on simple situations.

During the user-testing, patients experienced the two characteristics of the concept, the option to choose and data-driven advice based on effectiveness and efficiency, as positive. The additional modalities were ranked relatively positively, but due to the futuristic aspects were also harder to grasp. Caregivers also expressed support for the concept of DagKo. The caregiver acknowledged the potential of the gain in efficiency and it was recognized that the service is especially useful for filtering easier complaints. The technical difficulties in the realisation of the concept were mentioned by a data expert and caregivers and recognized during the strategy. In the strategy, it became apparent that the biggest bottleneck of this concept was the centralized data warehouse that needed to be created. Strategic suggestions were made to ease the transition towards the set final concept. One important aspect of this strategy is to validate the concept by the use of a pilot performed at CBS.

8.3. Discussion & Recommendation

For the recommendations, the future of the concept and the research field were taken into account. The current shortcomings mentioned in the discussion will be tackled to turn into opportunities. Next to this, new recommendations will be added.

8.3.1. Diversify the research

More diverse research needs to be done to get a more complete opinion of the general population. Three actions can be done to test if this concept can also work properly for the broader population.

1. Firstly, similar qualitative research must be done to the needs and shortcomings of the care of chronic and elderly patients.
2. Secondly, more “digital sceptic” caregivers should be interviewed about their opinion on newer digital modalities.
3. At last, during the pilot phase, it would be recommended to analyse the results based on age, type of care (e.g. chronic care), and digital skills, to see if the concept applies to these audiences as well.

However, it can be difficult to interpret these results. If the results show that this concept is mostly beneficial to a younger population, then a choice has to be made for a specific target audience of this concept. If this target audience is set for everybody, because a big part of primary care consists of chronic care and elderly patients, then the concept needs adjustments. If the concept is meant for younger people and not everyone, then it would not need many adjustments. In my opinion, the latter option would be more advantageous to choose because it was several times repeated during the research that eHealth is not for everybody. This means that with the first option, a situation can be created that a digital concept is forced upon a group that does not want that.

8.3.2. Estimating the efficiency

At the current stage of the concept, it is difficult to dedicate to this level of contribution due to the unknown gains and investments of the concept. Therefore a highly needed action is to estimate both the gains and the needed investments of this concept.

The gains

This should be done in two ways: estimate the amount of time saved by the GP and GP assistant while using the concept, and translate these increased efficiencies into financial gains. To make a good estimation, a recommendation would be to first make a general division of the most common complaints and their most beneficial treatment pathways. For example, during the concept testing, caregivers expressed that a urinary tract infection (UTI) can be easily spotted by the algorithm and that the right actions can be suggested according to the severity. If the amount of time a GP assistant and GP usually take to diagnose and treat a UTI is compared to the time that the new service does that then it gives the amount of time that is saved through the use of the concept. This can be estimated for a single UTI, and therefore for a total practice for one year when compared to the average amount of UTI annually. If this is done for the most common complaints, then the saved time can be roughly estimated. At last, the financial benefits can be estimated by translating the saved time into financial gains (e.g. the practice can give more consults, spent less FTE of assistants and/or GPs, etc.).

The investments

However, besides the benefits, the investment and operational costs of the concept should be estimated as well. The pilot is an effective delay to the high initial investment because the decision to continue can be made after analysing the result. Still, initial investments must be made for setting up the CBS document, setting up the algorithm and testing the algorithm. Next to this, the continuous costs, such as maintaining the algorithm and database warehouse, should be estimated as well before the decision is made to continue with the project at the end of the pilot.

8.3.3. Unknown patient gains

As mentioned in the discussion, assumptions were made that the concept is more accessible, provides the patient with more control, gives the patient better "quality care", and listens better to the patient. Next to this, it is also said that a limited prototype was used in the user-tests. Therefore, during the pilot, it is important to reflect properly on the benefits that were set at the beginning of the project. The project has to provide significant gains for patients to be effective.

8.3. Personal Reflection

For me, graduating was an interesting process that offered opportunities and also hardships. In this personal reflection, I would shortly want to point out the biggest learning points and experiences.

Graduating during a pandemic

The current pandemic, and especially the collateral lockdown, affects our (working) lives tremendously. For me, it had positive and negative aspects. Before the lockdown, I would have a hard time keeping a strict schedule and would get easily distracted. With the pandemic, it resulted in me copying my roommates work ethos and rhythm. Their rhythm showed that using work hours effectively during the day can provide you with time to relax in the evenings.

However, as a strategic designer, I am less enthusiastic about the current context of the pandemic due to two major aspects. At first, as a designer, you need and want to collaborate with others. Those abilities to bridge the gap between users, stakeholders, technology, is what makes us an addition to teams and is done by listening and challenging those groups. Due to the restrictions, these important actions of interviewing, user-testing, creative sessions were all done online. While there is software that enables communication for these purposes (Miro, Zoom, etc.), in some form it lacked the richness that physical sessions would have. Next to this, because of the increased effort or required learning, in some situations, I noticed that I would opt for more standard formats. For example, at the start of my project, I tried to let an interviewee create their user-journey in Miro which was a bit of a hassle. In the end, I went with a standard interview format because it was easier.

Secondly, I think that as a strategic designer it is important to be creative and to provide a fresh perspective. Creativity is a difficult process, which gets influenced by many factors. During my graduation, I noticed that my creativity was a bit lower than usual, maybe because of the low overall stimuli of being at home most of the time. This can be seen in the result of the ideation, conceptualisation and the final result. To me it does not completely reach the excitement level I normally strive for while designing.

Thorough vs effective

The influence of the pandemic should be taken into account, but should not be exaggerated. When reflecting on the process of my graduation project other, more influential factors, affected the process. One aspect that was difficult for me was the trade-off between being thorough and being effective. This was mostly seen in the qualitative study and planning. The interviews were done to understand patients and caregivers better. To make it a thorough and academic research, I decided to analyse it with the GTM theory. In the end, eight caregiver and ten patient interviews were analysed with that method into two separate codings. This is detailed work, which I enjoyed to do. However, looking back the question lingers: Was this the best use of my time? What would the result be if I chose another quicker method that provided me with more time and a more agile process? I know that I will not get an answer to these questions, however, this process taught me to value my time more. Next to this, time management is not only important when looking at the results, but also for a person's wellbeing. Falling behind on my planning made me feel rushed during the process. In further projects, I will put more time into planning and time management at the beginning of projects. The tasks must be estimated on actions, duration, and outcome, which will result in the thoroughness that is needed in these projects.

Proud student

Still, all improvements and hurdles aside, I look back proudly and content on my graduation project. One aspect that I am proud of is the balance in the result. To me, the result is a direct translation of a (strategic) IDE student: combining insights from people, opportunities from technology to create a strategy.
The process was sometimes rather difficult as mentioned earlier, however there were a lot of enjoyable moments as well. This was mostly because of social interactions. Interviewing people, co-creating with other designers, validation user-tests, coaching meetings, are all actions that motivated me throughout this project.
At last, a positive aspect of my graduation project was that the process taught me more about myself and my future desired career. This process confirmed that I want to work in the medical field, but also gave me an insight into a more specific task. During the process, technology and innovation interested me a lot. One example of this was the interview with Daniel Kapitan about the wide use of data. Conversations such as these triggered me to dive more into the technical aspects and to develop my concept further to make it more realistic. In the future, I think a medical company or start-up that works with an innovation that has some patient and caregiver interaction would interest me a lot.

Chapter 9.

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9. References

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