Designing the road to the implementation of Heart for Health's eHealth solution at general practitioners

formulating advice for future development

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TU Delft

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Executive summary

The Dutch healthcare system is currently under a lot of stress. Contemporary social, technological, economic and political trends demonstrate an emerging pressure on both primary and secondary care. The trend with the most profound impact, is the growing amount of chronically ill patients, causing a high pressure on the workforce and on limited resources. Additionally, during the past number of years, healthcare costs have been growing substantially. Simultaneously, people expect more services and more involvement in their health.

Partly caused by those trends, Heart for Health seeks for a solution to work towards a "future where remote healthcare prevents unnecessary CVRM patient visits at general practices". But, it has been found that there are currently many obstacles to be overcome for the implementation of such solutions.

This thesis aims to create a complete overview of the complex environment where Heart for Health is currently working in. Even though all stakeholders strive to work towards a healthier population, many conflicts of interests were found. Besides, the concerned stakeholders have complex expectations and desires, that are not easily satisfied.

Like others, Heart for Health has experienced that overcoming those obstacles is challenging. The aim of this thesis is to research and propose how Heart for Health can create new business within the general practitioner sector. Therefore, an extensive research has been done into the current care pathway of CVRM patients and the desires of the stakeholders. In order to create a comprehensive overview, many stakeholders were involved throughout this project.

A product vision has been created to formulate what a product for monitoring CVRM patients at general practitioners should contain. Besides, multiple requirements were found to develop such products.

This thesis discusses why Heart for Health is currently struggling with the development and implementation of their pilot. And explores how this struggle could be overcome by taking a more customer centered approach. To do so, an explorative session has been executed to find opportunities for creating new values.

This exploration has led to a proposal of a more comprehensive product than Heart for Health is currently making. To realise the development of this product, a step-by-step approach has been proposed. It is argued that Heart for Health should first focus on creating a product for patients before including general practitioners.

The proposed approach is translated into a roadmap, describing the different steps that Heart for Health can use to work towards the future that they envision. This thesis strives to give a realistic and strategic perspective on the proposed solution by repeatedly testing on desirability, feasibility and viability.

Glossary

CCN	Cardiologie Centra Nederland
CVRM	Cardiovascular risk management
EHR	Electronic Health Record system
EPD	Electronic Patiënt File (Elektronisch patient dossier)
GP	General practitioner
HIS	General Practitioner Information System (Huisartsen Informatie Systeem)
KIS	Ketenzorg Information System (Ketenzorg Informatie Systeem)
NHG	Dutch Healthcare Institute (Nederlandse Huisartsen Gemeenschap)
NZa	Dutch Care authority (Nederlandse Zorgautoriteit)
VWS	Ministery of health, welfare and sports (Ministerie van volksgezondheid, welzijn en sport)
Primary care	Day-to-day healthcare given by a health care provider
Secondary care	Necessary treatment for a short period of time
Tertiary care	Specialized consultative health care
Health literacy	"The degree to which individuals have the capacity to obtain, proves, and understand basic health information and services needed to make appropriate health decisions" – Institute of Medicine (2004)
Blended care	A combination of face-to-face treatment and online health assistance
Ketenzorg	A way of organized collaboration between primary care providers within the Netherlands
DHoTS	Digital Health from Technology to Services, Heart for Health's pilot study at general practitioners
HartWacht	Application for heart monitoring developed by Heart for Health
Heart for Health	A reference to Heart for Health ICT BV

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1

INTRODUCTION

This chapter describes the first orientation of the company and the project. It introduces the company to the reader in terms of history, company vision and current products. Besides, it describes the project aim and the approach that has been used throughout this thesis. It concludes with an explanation of how strategy was applied during this thesis.

1.1 Heart for Health

The founders of Heart for Health started in 2006, in collaboration with Cardiologie Centra Nederland (CCN). Founded by two cardiologists with their own perspective on healthcare, their goal was to improve secondary care (where patients go to the hospital). The traditional care procedure often caused long treatments for patients and there was not much room for innovation. An appointment for check-up with a cardiologist could take weeks to plan. In order to shorten those waiting times and come up with a faster diagnostic, CCN introduced the 'zorgstraat', in which patients go through different rooms for a variety of tests during their visit. To establish the 'zorgstraat', CCN had to develop their own EPD. This was the beginning of Heart for Health as an IT company of CCN in 2007 (see figure 1).

To make use of the 'zorgstraat', patients need to be referred by their GP. After the referral, tests like an ECG and cycling test are performed. However, some diseases can't be measured at any given time, such as heart rhythm disorders. To solve this problem, CCN and Heart for Health decided to focus on telemonitoring, which resulted in 'Hartwacht'. Hartwacht is an application which allows users to send their blood pressure, weight, heartbeat and or heart rhythm to an analysis centre from home. At the centre, a system filters the critical measurement and sends them to a nurse. The nurse looks into them and if needed, forwards them to a cardiologist. If the cardiologist is concerned about a patient, an appointment can be made with them. Heart for Health developed the software in order to make telemonitoring possible.

Heart for Health currently

Heart for Health proved their ability to develop various successful concepts for CCN such as HartWacht and their EHR system CardioPortal. These successes led to an interest in a broader application of the software programs. In 2020, Heart for Health became an independent company, separate from CCN. Heart for Health is currently developing both the EHR EPD and HartWacht into standalone systems implementable for a broader range of care stakeholders such as hospitals and private clinics. They would like to reform the regular EPD systems of hospitals (secondary care). Besides the reformation of the EPD, they are investigating whether eHealth programs, that patients can use to measure at home, can be implemented in the different levels (primary, secondary, tertiary) of healthcare.

Heart for Health's vision

Heart for Health's company vision is:
"We come from healthcare. We know healthcare can be better, more efficient and more accessible, as we noticed that software doesn't follow healthcare processes. Instead of adjusting your processes to fit our software, we create software to fit your process. That's why we build user-friendly and modular software to configure and support smart care pathways."

In correspondence with this vision, Heart for Health believes in the necessity of creating a software system which connects all care layers (primary-, secondary-, and tertiary), to work together more fluently.

Since Heart for Health originates from healthcare, they experience many problems in healthcare and expect those problems to increase in the future. The costs of healthcare keep growing, therefore efficiency should be improved. Currently, the workload on GPs is growing, and Heart for Health believes that with their experience of HartWacht, they can mitigate this workload. They believe that care provided at GPs should be more place independent (remote health care). Using internal interviews about the vision at the general practice, a future vision of Heart for Health has been formulated:

"A future where remote healthcare prevents unnecessary CVRM patient consults at general practices."

Heart for Health wants to facilitate GPs in enabling remote healthcare, using integrated software for measuring at home, decision support and advice, thereby avoiding unnecessary patient consults at GPs, which enables GPs to focus on patients that need health support, resulting into a higher efficiency. Later in this project, this vision will be expanded to become more concrete.

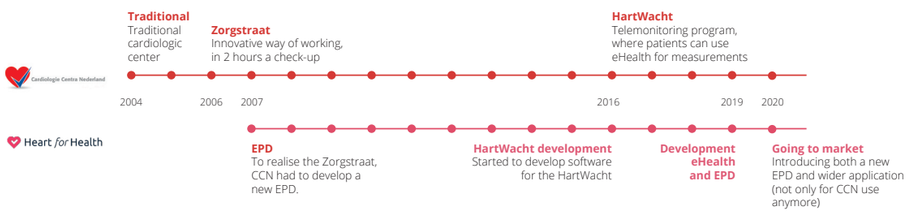


Figure 1 |*A timeline describing the history of Heart for Health*

1.1.2 The product

This project will focus on the further development and implementation of DHoTS. DHoTS is a pilot which was introduced at ROHA, a care group in Amsterdam. DHoTS enables self-measuring for patients at general practitioners. Heart for Health aims to use their experience with HartWacht and DHoTS to roll out an eHealth product. DHoTS is only the first step of what Heart for Health envisions to do with eHealth. Table 1 displays a short description of HartWacht and DHoTS.

DHoTS 2.0

Heart for Health wants to develop an improved version of DHoTS, using their experience with HartWacht and making use of the opportunities on the current market. Many uncertainties complicate Heart for Health's search for the right product development strategy. Some boundaries of what the product contains were already set at the beginning of this project.

The starting point of DHoTS 2.0 has the following criteria:

It focusses on primary care (general practitioners)
Heart for Health currently has some experience within the primary care, with currently 20 users.

It enables self-measuring by patients
Heart for Health enables self-measuring with HartWacht and DHoTS. They are able to connect multiple devices to their software. The first focus is blood pressure measuring, since this built on their experience with DHoTS

It gives (at least) an interpretation of the data
The data will be analysed/processed before they come in

It is a monitoring device
DHoTS and HartWacht both focus on monitoring the risk of patients. This means that it is used after diagnostics.

Why blood pressure monitoring?

Heart for Health's ambition is to start with the monitoring of blood pressure. The use of self-measurement devices has been growing over the last number of years. Before, devices were often regarded as being unreliable. Yet nowadays, there are many certified devices that can be used for self-measuring. Blood pressure is influenced by factors such as stress and lifestyle. A stress-free environment can give more accurate measurements, since the stress levels for some patients are higher when they are at a doctor (Mileski, 2017). Additionally, the monitoring of patients makes it possible to adjust medicines and health care plans based on an average of multiple measurements. This can help to get the risk of high blood pressure under control, which continues to contribute to a better health in general. High blood pressure can, in the long term, cause more severe cardiovascular diseases.

	HartWacht	DHoTS
Who?	Patient and (CCN-) cardiologist (secondary care)	Patient and general practitioner (primary care). Currently 10 GPs of ROHA are using DHoTS, with a total of 130 patients.
What?	A digital cardiology service, where patients can measure their vitals (blood pressure, weight, hear-trate/heartbeat) at home, and send it to a center (telemonitoring) (24/7). When there is a deviating value, the center gets in contact for the follow-up steps.	A digital CVRM program, where patients measure their blood pressure (telemonitoring). The service gives an automatic recommendation to GPs for protocoled actions.
Where?	Used at home and at CCN	Used at home and at GP practices (currently imple-mented as 'pilot')
When?	On (determined) measure moments	On (determined) measure moments
Why?	To gain better patient insides and track symptoms. A side effect is that the program proved to be effec-tive in lowering unnecessary hospital visits.	To lower unnecessary hospital and GP visits and keep healthcare affordable
How?	By analyzing the data in a center, where nurses and cardiologists monitor the data.	By analyzing incoming data according to the NHG protocols, sending the appropriate protocol to the GP.
Finance	HartWacht is reimbursed by health insurances out of the secondary care budget.	DHoTS was paid from attributed funding
Service, hard- and software	Blood pressure, heartbeat and heart rhythm measu-rement device App for patients, where they can fill in questionnai-res and send in measurement HartWacht team, providing telemonitoring from a center	Blood pressure measurement device Portal for general practitioners, giving an overview of measurements and the corresponding protocol App for patients, where they can fill in questionnai-res and send in measurements

Table 1 |*A table describing the feaures of HartWacht and DHoTS*

1.2 The project

Heart for Health aims to expand their current focus on secondary care to include primary care at general practitioners. From their experience with cardiology and the fact that the pressure on primary care is growing, they decided to develop DHoTS. However, they are currently struggling with the development and implementation of DHoTS.

This is not an uncommon circumstance in healthcare. Despite the big interest in eHealth, the implementation of such products is often complicated. The values for stakeholders are often unclear, and there is a lack of knowledge about the possibilities of eHealth. Also, many health initiators are unable to establish a market after a subsidised pilot has been performed.

From this, the following research question has been formulated at the start of this project:

'How can Heart for Health implement its software at general practitioners?'

The aim of this project is to research and propose how Heart for Health can create new business within the general practitioner sector. This project will focus on software applications of Heart for Health and their most important stakeholders. Those stakeholders are caregivers and patients within Ketenzorg. To scope this research, hospitals and international stakeholders will not be included.

Heart for Health has been exploring multiple implementation strategies for how they can deliver DHoTS to a broader audience. The initial idea was to introduce the product as a KIS-system. From a strategic perspective, research has been done into the possibilities for the markets into which Heart for Health desires to enter.

Project stakeholders

This project has been executed in collaboration with Heart for Health and the TU Delft. In addition, a variety of stakeholders has been involved to gather more knowledge. This stakeholder group consisted of personal contacts and contacts of Heart for Health.

Personal motivation

I am driven to improve healthcare through design. This is one of the reasons behind my decision to specialise myself in the Medesign track. I believe that eHealth can become the future of healthcare since healthcare becomes more expensive due to ageing. Nevertheless, there are still many gaps in the user-perspective in this field. Of course, it can be proven that eHealth products improve people's health. But what drives me is why people want to use eHealth products (the value), not why they should use them.

As a result of my interest in eHealth, I have written a paper entitled 'Design of a Care Pathway for Preventive Blood Pressure Monitoring'. Together with two other students, I described the possible implementation of self-monitoring prescribed by the GP. During this project I gained experience with interviewing patients and doctors on the topic of eHealth. This has provided me with a wealth of expertise on the subject that I can use during this project.

To me, this project is a way to develop myself even further, and to ultimately become an expert in designing for the general practitioner sector.

1.2.1 The approach

The approach of this project has been inspired by the English Design Council with its **double diamond method** combined with the **strategic perspective** of Calabretta, Gemser and Karpen (2016). A visual representation of the approach is given in figure 2.

Double diamond method

In order to structure the project, the double diamond method of the English Design Council (2004) has been used as a guideline. The double diamond method is commonly used in design processes. Within the double diamond, the following steps are formulated: discover, define, develop and deliver. The double diamond is a fluid process, which means that the process involves a lot of iteration.

Strategic perspective

Besides the double diamond, a strategic approach has been applied throughout the whole project. According to Calabretta, Gemser and Karpen (2016), "'strategic' implies being able to influence innovation decision-making by jointly and explicitly taking into account the desirability, viability and feasibility of a decision outcome, be that it in a vision, a business opportunity or a new product." Hence, multiple evaluation moments will be planned in various stages of the double diamond process.

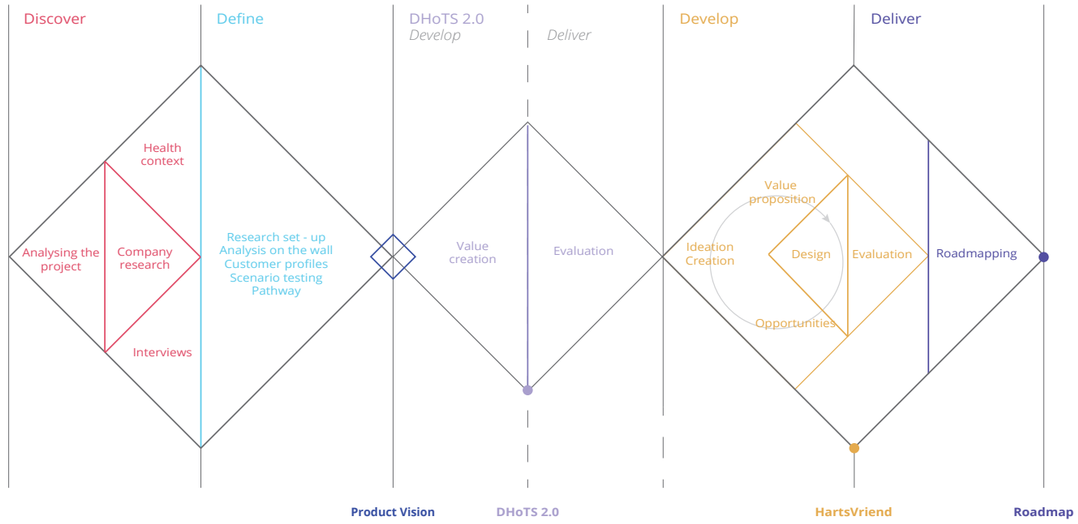


Figure 2 | *The dubble diamond method used during this thesis*

Discover

The goal of this phase was to get acquainted with the project by **researching** the company, project context, possible competitors and relevant stakeholders. This phase gave a better understanding of the problem.

Define

The goal of this phase was to **synthesize** the data and to find opportunities and gaps for design. During this phase, input from many stakeholders has been incorporated. To synthesize the data, Analysis on the Wall has been performed. Additionally, **customer profiles** and a **service pathway** have been created. From the first gained insights, quick **scenarios** were created and discussed with stakeholders in order to redefine the project.

Product vision

To conclude the discover and define phase, a **product vision** has been created. A product vision is used to guide the development phase. It is a statement that formulates the 'why' of the final solution. For the creation of a product vision, the **ViP** (Vision in Product Design) method of Hekkert and van Dijk (2011) is applied.

DHoTS 2.0

For the aim of this project, the development phase was extended with an extra diamond. First, **value generation** was performed to explore the desirability of DHoTS 2.0. From the value generation, the product scope was defined. With the insights gained from previous phases, the idea was evaluated in terms of **desirability, feasibility and viability**. From the performed evaluation, it emerged that DHoTS (2.0) as Heart for Health imagined it, is currently not feasible and viable. Therefore, new idea generation was performed to investigate how Heart for Health can progress from what they have now onto what they envision to deliver.

Develop

The **ideation** in the development phase has been done by **individual brainstorming** and a **creative session**. The most promising ideas and opportunities where selected for further exploration. The idea was further developed by exploration of opportunities. Then, the idea was evaluated for **desirability, viability and feasibility**. Stakeholders were involved to evaluate the idea.

Deliver

In the delivery phase, a **roadmap** was created to clarify the different innovations necessary to work towards the created vision. In this phase, the horizons were elaborately discussed. Then, the roadmap was evaluated based on previous research.

1.3 The strategic design perspective

This project has been executed from a strategic design perspective. The emphasis was on translating the company's strategy and the project context into a desirable, feasible and viable service. Mullins and Walker (2010) described strategy as *"a fundamental pattern of present and planned objectives, resource deployments, and interactions of an organization with markets, competitors and other environmental factors."*

According to Calabretta, Gemser and Karpen (2013), strategic design is *"design that influences the strategic decision within companies, by using principles, tools and methods. Those strategic decisions include the decisions that have long term impact on companies, involve several stakeholders and require a substantial commitment of monetary and non-monetary resources."*

Heart for Health envisions to broaden their market to new target customers, shifting from primary to secondary care. At the same time, with DHoTS, they are divaricating themselves from their core business: EPD systems. This strategy has been plotted in the **Ansoff Matrix** (Ansoff, 1957), a tool used to specify four different product-market combinations. Heart for Health's vision is on the intersection of market development (new target) and diversification (new products). According to Mullins and Walker (2010), this intersection is a risky strategy (see figure 3). A strategic approach can help minimise risk by identifying the needs and wishes of the new customers and the market, in order to create long term (sustainable) impact.

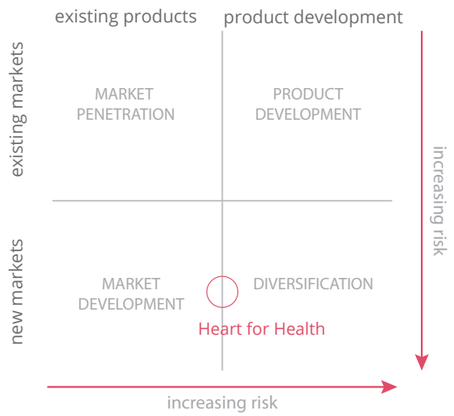


Figure 3 | *The Ansoff matrix (1957), used to illustrate the risk of entering the general practitioner market with a new product*

Principles, tools and methods

I applied multiple principles, tools and methods that I mastered during my education. Some methods and tools have been used in a broader sense or as a guideline, to make them applicable for the aim of this project.

Stakeholder involvement

Throughout this project, stakeholders were interviewed to get more grip on the context and to create understanding of the stakeholders. This thesis has been researching a complex context with many different stakeholders. Therefore, **preliminary** and **in-depth interviews** were used during the whole project. The insights and information gained from those interviews have been applied in multiple phases of the process. In chapter 3, a more elaborate description of the in-depth interviews is given. The preliminary interviews mostly served as an addition to the information found during research phase.

	business	technology	human
Arthur Gan – *General practitioner*			○
Wilfried Salomons – *General practitioner*			○
Yvette van den Bosch – *Practice assistant*			○
Marc van Wijk – *General medical advisor at ZEL (GP organisation)*		○	○
Dirk Pons – *Former GP and medical director at DSW health insurance*	○		○
Eline Loomans – *Project Leader ICT Healthcare at DSW health insurance*	○		○
Arjan de Kwant – *Medical advisor DSW health insurance*	○		○
David Reijmerink – *General practitioner and lecturer about eHealth*		○	○
Kim de Rooij – *General practitioner*			○
Kit Kattenberg – *IT advisor at IZER (GP organisation)*	○	○	○
Jeroen Stroucken – *General practitioner*			○
Lisa & Jeroen – *ROWHN (GP organisation)*	○	○	○
Ed Mos & Leo Jetten – *Health innovation experts*	○	○	○
Bob Verhagen – *Head of Strategy and Innovation at Heart for Health*	○		
Julie Wolsak – *Business developer at Heart for Health*	○		
Julia Larsen – *Product owner eHealth at Heart for Health*		○	○
Sophie Tiggelaar – *eHealth consultant at Heart for Health*		○	○
Igor Tulevski – *Founder Heart for Health*	○		○
Sebastiaan Blok – *PHD candidate and innovation manager CCN*	○	○	○

1.3.1 Industrial design

The three pillars of Industrial Design at the TU Delft have been described as **technology, human and business**. The interviewed experts have all delivered input into different aspects of the circles. As a strategic designer, my task has been to explore what is on the intersection of these pillars (figure 4)

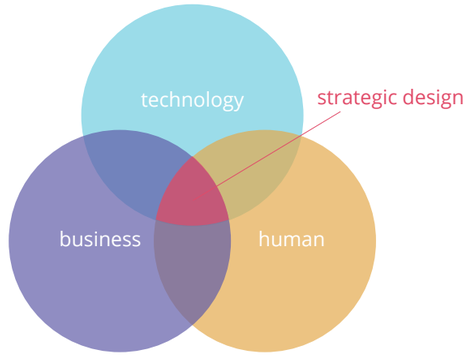


Figure 4 | *The pillars of Industrial Design, with on the intersection strategic design*

1. INTRODUCTION

Heart for Health wants to investigate how they can implement their software at general practitioners. They envision "a future where remote healthcare prevents unnecessary CVRM patient consults at general practices." Their current product is a pilot called DHoTS, which they want to develop into a product that is ready to be implemented on the general practitioner market.

This project will be executed with a strategic design approach. The double diamond method has been used as a guideline to structure the project. Throughout the whole project, many stakeholders have been involved to get more grip on the context and to create an understanding of the stakeholders. From a strategic perspective, the attempt has been to create an outcome that is on the intersection of technology, human and business. Therefore, ideas have been validated on the following sub-questions:

- Is the product desirable?
- Is the product feasible?
- Is the product viable?

2

DISCOVER

The goal of this chapter is to get acquainted with the project by an in-depth research of project context, stakeholders and possible competitors. This phase gives a better understanding of the problem and its context.

2.1 Healthcare context

2.1.1 Health care in the Netherlands

The Netherlands has a universal healthcare system, meaning that all residents are assured of access to healthcare. All residents above the age of 18 are required to have a basic insurance. The Netherlands are known for their high quality healthcare system, but the system is currently under pressure by demographical, economical, technological and social developments.

These developments create a big need for new innovations that can make the system cheaper and more efficient, without the loss of quality (Beard, 2015). According to Wouters et al. (2019) current bottlenecks in healthcare include high administration costs, shortage of care providers, 'unnecessary' health questions and poor exchange of information.

Figure 5 displays the growth of the total amount of money spent on healthcare as compared to other sectors (Rijksbegroting 2019). Evidently, in the past years, healthcare costs have been growing at an accelerated pace. The expectation is that these costs will continue to increase due to the growth of chronically ill patients. The increase of costs is a challenge that Heart for Health wants to positively contribute to, using their software.

Trends

"Trends can be used to scan signals in a global context according to social and demographic developments, science and technology inventions, economic developments and political and regulatory changes" – Simonse, 2017

To give an overview of important trends in the primary care context, a trend analysis has been performed. For this thesis, **Strategic Trend Scanning** is used with the **STEP trend technique**, describing Social, Technologic, Economic and Political trends. The most important trends are described in figure 6, a more extensive description can be found in appendix A. Trends are essential in order to clarify contemporary developments, and subsequently, to predict what might happen in the future. Some trends were already mentioned by Heart for Health, others provide new perspectives of what the future will bring.

The described trends will have an influence on Heart for Health's products. It is essential that they respond to the trends and events that have impact. The described trends relate to the behaviour of users. They can help describe people's beliefs, wishes and dilemmas (Ansoff, 1980), which can in turn guide Heart for Health's strategy to differentiate itself and more importantly, to meet user expectations.

Purple = Economic, demographic and political
Yellow = Social
Blue = Technological

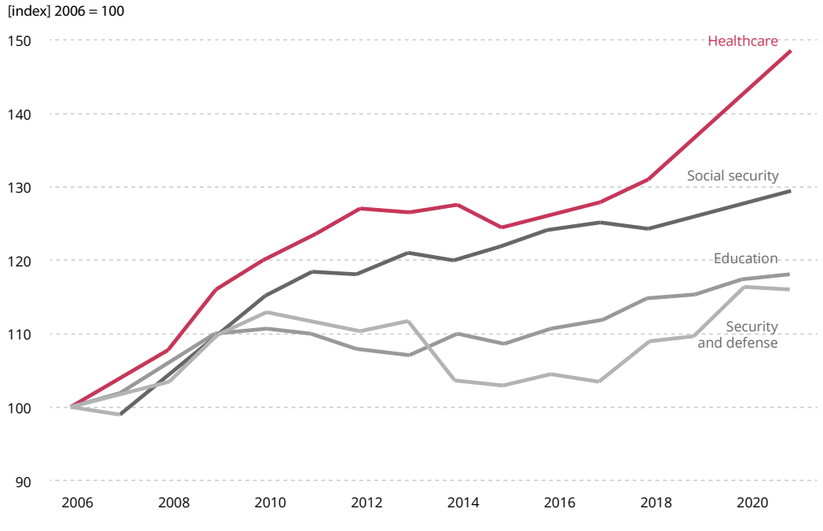


Figure 5 | *Government expenditures to compare healthcare to other expenditures (Rijksbegroting, 2019)*

Limited resources

According to the coalition agreement of 2017, the budget for healthcare will be approximately the same. With the growth of elderly and chronicle ill, this will mean that there should be delivered more care for the same amount of money.

GDPR

The new privacy laws of GDPR protect the personal data of consumers. Companies and organizations are responsible to ensure the safety of data (Trends Business Information, 2019).

VWS objectives

VWS has formulated objectives to stimulate the use of eHealth in the Netherlands. They invest in research and the development of eHealth products.

Growth elderly and chronicle ill

According to InEen (2017) and Ursum (2011), 40% of the population of the Netherlands will have a chronicle disease in 2030. Besides, one-fourth of the population will have an age above 65.

Pressure on the workforce

Due to the growing population in need of care, the demand for care givers is increasing. Currently there are not enough healthcare providers. This results in a heavy work load for the current workforce.

Changing roles

The role of the general practitioner and the patient are changing (McColl-Kennedy, 2017; Eyck and Smit, 2016). Patients are becoming more articulate and involved in their own health.

Transmural care

In transmural care, healthcare providers of all care lines are collaborating. To enable transmural care, agreements have to be made for integral and personal collaboration, aligning and planning.

24-hours society

People are expecting a 24-hour service, also from healthcare. Consumers (and patients) do not expect that they should make time for the services, but the services should deliver in their time.

Self-care

The WHO's (2019) definition of self-care is "the ability of individuals, families and communities to promote health, prevent disease, maintain health, and cope with illness and disability with or without the support of a health-care provider."

Patient centered-care

Within health care, patient centered-care is becoming more and more important. Patient-centered care is the practice of caring for patients (and their families) in ways that are meaningful and valuable to the individual patient (OneView, 2015).

Shared decision making

Shared decision making is becoming more common in healthcare. This is one of the reasons of the changing role of the doctor. Shared decision making can contribute to more effective healthcare and a better doctor/nurse-patient relation .

Demand of GPs

Caused by demographical, epidemiological and social cultural developments, the job of GPs has changed. Over the last years there has been a shift of tasks from secondary to primary care. Making GPs have become more important and at the same time busier.

Increase of technologic solutions

The rise of many technological solutions is expected to grow even further (InEen, 2017). The up come of technological solutions enables prevention, telecare, lifestyle coaching and self-management.

PGO

Per 2020, patients have to get the possibility to communicate via their own personal health environment (PGO) and get access to their medical file.

Everybody online

According to CBS (2019), more than 86% of the Dutch population uses internet on a daily basis. . Currently 68% of the 75 plus elderly is using internet.

AI development

The rise of AI offers possibilities for health care to give intelligent support for recommendations and predictions and decisions. AI gives the opportunity for doctors to combine the data found by the machine and their own knowledge.

Figure 6 | *Selected trends from the trend analysis*

2.1.2 A new way of organizing healthcare

By virtue of the rise of eHealth-products, and due to contemporary developments, people and organisations are starting to rethink the Dutch healthcare system. Heart for Health desires to take part in this change. Within healthcare, there is a growing interest in making changes to organisational structures. GPs and hospitals are looking for new ways to make healthcare more efficient.

A vision that many stakeholders share, is that 'network' care can be used as a new way of organising healthcare. The federation of medical specialist has included network care in their vision for 2025. Network care refers to healthcare organised around the patient. The lines between primary care and secondary care will fade and physical consults will partly be replaced by virtual healthcare (blended care).

An organisation that is focusing on this new approach to healthcare is the taskforce 'De Juiste Zorg op de Juiste Plek', set up in collaboration with VWS. They want to avoid (expensive) care, move care (to people's homes) and replace care (for example with eHealth) (De juiste zorg op de juiste plek, 2019). According to the taskforce, people should be in charge of their healthcare, and care providers should be there to support them. Additionally, they see the importance of reducing the fragmentation of healthcare by way of increased collaboration between different care providers and care financers.

One general practitioner, who is trying to change healthcare within his practice, is Vladan Ilic. He uses eHealth to free up more time for personal care. His goal was to make healthcare more efficient, cheaper and to have more and better communication with his patients. This would increase patient satisfaction, as well as his own quality of work higher. His patients can have online consults, via a special web application. The web application is very simple and most of his patients are able to use it. With his online approach, he is organising his practice very differently than most other general practitioners. According to the ANW (2018), his revenue is lower than other general practices. However, due to the ability of saving other costs such as those for practice assistants, his profit is higher.

These are just some examples of people and organisations who are reflecting on how they can improve healthcare. In the future, it is likely that our strategies for organising healthcare will change rapidly. Organisations will get closer to one another and the boundaries between primary, secondary and tertiary care will partially disappear. These changes in healthcare confirm Heart for Health's ideas for location-independent care and might well be an entry into finding first adopters for the implementation of DHoTS 2.0.

2.1.3 A closer look into eHealth

eHealth has many definitions, but a definition that has been cited regularly, was written by Eysenbach (2001): *"e-Health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology."*

The World Health Organization describes eHealth as *"the use of information and communication technologies (ICT) for health."*

Nictiz (2019), a Dutch independent healthcare knowledge organisation, describes eHealth as *"the application of both digital information and communication to support and/or improve health and healthcare."*

In the context of the previously described trends and developments, eHealth is often mentioned as a way to improve healthcare (Murrey, 2012). The benefits of eHealth are frequently identified as increased efficiency, accessibility, a lowered threshold and a relief of pressure on doctors. Although there is a consumer interest towards eHealth applications (Medic Info, 2019), there are several obstacles for the successful implementation of eHealth. The slow adoption of eHealth is, among other things, triggered by factors such as that many users are unaware of the possibilities of technology in healthcare (Nieboer, 2014 and Medic Info, 2019), the uncertainty of the cost-effectiveness of eHealth products (Bergmo, 2015) and the willingness to pay for healthcare. Furthermore, downsides such as a decrease in personal contact and the sense of technology being less reliable, are serious disadvantages for potential users. Therefore, despite a big need and interest in eHealth products, successful implementation is commonly still difficult for many companies.

2.2 Stakeholders

Initially, the focus of Heart for Health was on 'ketenzorg'. Ketenzorg is a care model in the Netherlands where general practitioners and other care providers (eg. physiotherapists, dieticians) work together regionally to support chronically ill patients (ketenzorgnu, 2019). The healthcare providers collaboratively deliver protocoled care. Besides working together to support patients, the care providers make collective agreements with health insurances about the amount of money they receive for each ketenzorg patient. Ketenzorg has been a solution to the fact that costs for health care have been rising for the last years (Rosendal, 2017). The most relevant stakeholders for a product at general practices are selected and described in this chapter.

Patients

Within Ketenzorg, there are patients with diabetes, COPD, heart- and cardiovascular diseases and elderly care. It is not uncommon for patients to suffer from more than one of these diseases. In 2018, 5.4 million people in the Netherlands had a consult regarding a chronic disease, which amounts to 33% of the Dutch population (Volksgezondheid en zorg, 2019). This number is expected to keep growing in the future (Ursum, 2011; InEen, 2017). According to the Engelfriet (2012), we can expect that by 2025, the number of heart failures will increase with a shocking 50% of the Dutch population. In the context of this potentially explosive growth of chronically ill patients, it is of great importance to come up with solutions that keep healthcare accessible to everybody. In appendix B, a more elaborate description of the different ketenzorg patients is given.

Patient focus

For this project, a focus within ketenzorg was necessary to be able to obtain deeper and specific knowledge. DHoTS 2.0 will focus on cardiovascular risk management (CVRM). The first reason for this is the fact that cardiovascular diseases have been the second largest cause of death, as can be seen in figure 7 (Hartstichting, 2019). As stated before, this number is expected to grow in the coming years. Secondly, Heart for Health has extensive experience in the field of cardiovascular disease. Their current pilot with DHoTS has included the CVRM protocol. Additionally, Heart for Health has experience in cardiology since they started as the IT department of CCN. This experience can help demonstrate their expertise in cardiovascular disease to stakeholders.

The goal of ketenzorg for heart- and cardiovascular patients is to prevent (new) damage by providing aligned care, a healthy lifestyle and appropriate medication. Patients included in CVRM care often experience a high blood pressure, putting them at risk for more severe (cardiovascular) diseases.

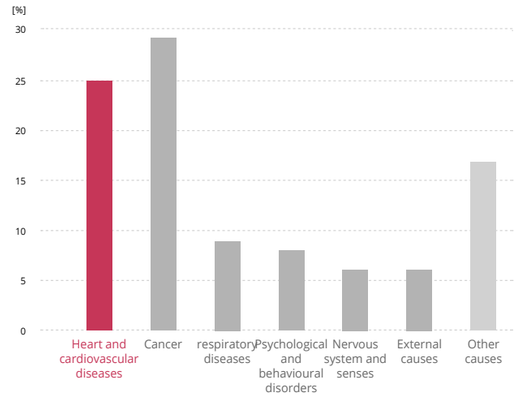


Figure 7 | *Causes of death in the Netherlands (Hartstichting 2019)*

General practitioners

The GP is the first point of contact when people have questions about their health or when other care providers (and partners) have questions. Besides this, GPs give guaranteed 24/7 care and they are 'the gatekeeper' for secondary care (specialist care). Their main objective is to keep their patient population healthy.

Practice assistant

The practice assistant takes over some of the work from GPs. The practice assistant is able to spend more time per patient to guide and care for chronically ill patients than the GP. The practice assistant focuses on preventing a worsening of the disease, through medication adjustments, measuring and lifestyle coaching.

Regional care organisations

Care organisations are organisations that unite and represent care providers. In the Netherlands, every region has their own primary care- or GP organisation. Within those regions, care organisations conclude ketenzorg contracts with health care insurances concerning multidisciplinary and integrated care (Out & de Jong, 2017). Besides ketenzorg contracts, care organisations are concerned with policies, innovations, GP support and elderly care. Together with their members, they formulate goals and strategies for the improvement of healthcare within the region. The care organisations always act according to the best interest of their members.

National care organisations

InEen

InEen focuses on the affordability and quality (both for care and work) of primary care. They represent primary care providers in conversations with health insurances, health insurance groups, VWS and the national health authority. InEen works together closely with the NHG and the LHV.

NHG

The NHG (the Dutch GP society) creates standards for Dutch GPs. They develop methods and materials (for example the protocols) to make implementation of the NHG-standards possible. These methods and materials focus on knowledge, explanations for patients, support of practice, quality and support for IT solutions.

LHV

The LHV (the National GP union), supports the general practitioners. In conversations with health insurances, health insurance groups, VWS and the national health authority, the LHV represents GPs. They focus on the strategic position of GP care, material advocacy, joined forces of GPs, improving quality, support of practices and policy making and member formation.

Health care insurance

The core task of healthcare insurances is implementation of the healthcare law. This means that they are bound to a number of rules as to what is insured and what is not. Some of the requirements of insured healthcare are as follows:

- Healthcare should be delivered when somebody is sick or has a medical indication. This means that primary preventive care is not insured in the basic package (which is fixed by law).
- The delivered care should meet the standards of science. This means that the effectiveness should be scientifically proven.
- The care should be performed by a professional who is qualified to perform the task.

Then, when the care is insured, the health insurance company pays for the delivered care. How they arrange the payments is different for all health insurance companies. They are allowed to make contracts with healthcare providers (Kringos, 2015), but within the rules of the NZa.

Healthcare costs are partly paid out of the pocket of VWS and partly by paid premiums and deductibles paid by insured members.

The government

The final stakeholder included is the government. In the Netherlands, the Ministry of Health, Well-being and Sports (in Dutch; VWS) is responsible for public health. Amongst other things, they formulate the policies that apply to hospitals, healthcare insurances, medicines, medical expenses and GPs.

NZa

The NZa (Dutch Care authority) is the 'market manager' in the market of care providers, care takers and healthcare insurances. They decide on what should be included in the basic package. The NZa is under supervision of the minister of VWS.

2.3 The competitive landscape

In order to learn more about the opportunities for Heart for Health, it is crucial to know which competitors are relevant. Relevant competitors are competitors that (partly) satisfy the same customer needs as the product of Heart for Health (Shankar, 2012). A competitive advantage can be created by performing different actions, or to perform actions differently than competitors do (Porter, 1996). The competitors listed provide an overview of what is currently on the market, on how Heart for Health positions itself, and on how they should differentiate themselves. According to Porter, when entering an emerging market such as the eHealth market, there is a high level of uncertainty about the needs of customers, the products and services that will prove to be the most desired, and the best configurations of activities and technologies to deliver them. Therefore, it is essential to define the competitive advantage at an early stage.

The competition circle

Within a **competitive analysis**, it is important to not only look at direct (and very obvious) competitors. A product can experience competition on a variety of levels. For this thesis, the competition has been split up into three levels: product form and -category competition, generic competition and budget competition. Product form competition describes products with similar values. Product category competition competes in the same category. Generic competition fulfils (some of) the same needs. Lastly, there is the budget competition, which describes different products the user could buy with any money that they save if they do not buy the product.

Since DHoTS 2.0 is not fully defined yet, three different markets that were defined as interesting by Heart for Health are explored: the KIS–market, GP self-measurement products and products that include decision support for GPs.

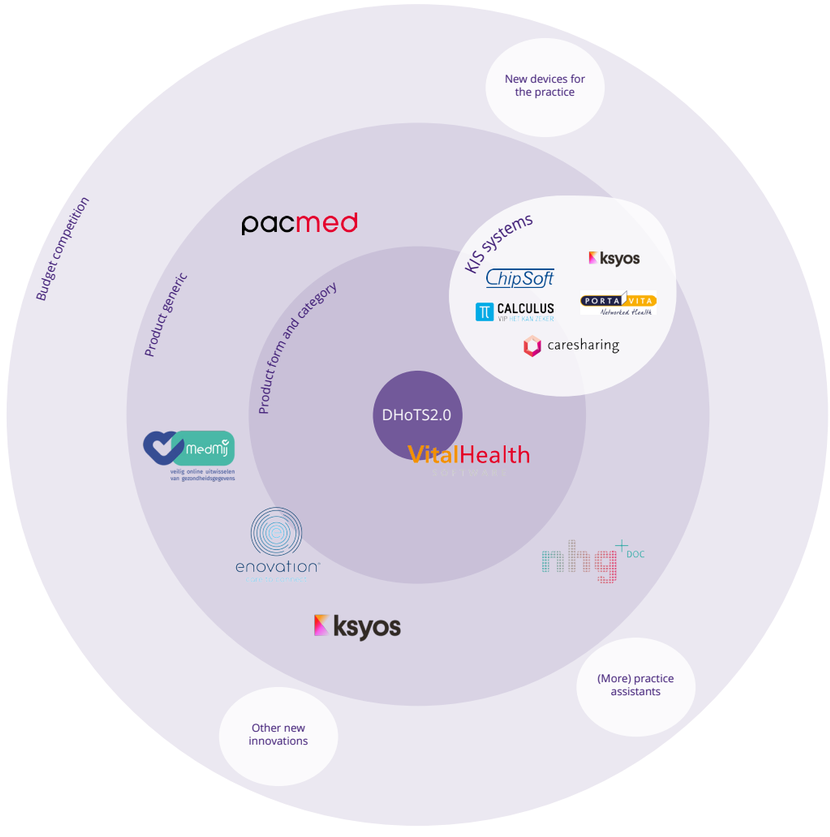


Figure 8 | *Competition circle, illustrating the exploration of competition in three levels; product form and -category, product generic and budget competition*

For the **competition circle** (figure 8), DHoTS 2.0 is described as: *"a platform which enables patients to measure at home and send their data to GPs. The software is used for monitoring risk."* The software analyses the data and provides suggestions for what the GP should do with the information. Because the product use is not yet fully designed, the competition circle is built up from 3 levels: product form and category, product generic, and budget competition. Product form and category are visualised together because the product is not specified enough to differentiate itself within those levels. Product generic are products that partly contain the same features, such as decision support for general practitioners. An extensive explanation about the different competitors is described in appendix C.

Using the **competition circle**, we can find out which products are closest to DHoTS 2.0. Within the circle, VitalHealth is closest to the product form/category of Heart for Health. The product generic products all offer a part of what DHoTS 2.0 is offering, yet they do not offer it as one package. Budget competition can be investments that general practitioners can make in their practice.

KIS systems

Heart for Health sees an opportunity for entering the market with a KIS-system (Ketenzorg information system). KIS has a focus on ketenzorg, which could provide favourable circumstances. It appeared that the HIS system was not suitable for the intensive collaboration between care professionals (Timmers, 2019). To deal with this problem, KIS-systems were developed. The first KIS-systems focused primarily on the administrative side of Ketenzorg. Nowadays, KIS-systems are focusing more and more on the healthcare side of Ketenzorg. They are beginning to offer features to enhance the collaboration between care providers. In the Netherlands, 80% of the general practitioners are currently using KIS-systems.

KIS-system overview

The overview of table 2 shows the differences between KIS-systems. There are some basic functionalities that a KIS-system needs to have (registration, referral, consultation, data analysis and declarations). If Heart for Health decides to enter the market as a KIS-system, they will have to include those functionalities and add a differentiating functionality or feature.

	VitalHealth	VIPLive	cKIS	Portavita	HiX
eConcults/ questionnaires	✓	✓			✓
Self-measuring	✓				✓
Extensive collaboration care providers	✓		✓	✓	
Decision support	✓				
Patient insight	✓		✓	✓	✓
Registration	✓	✓	✓	✓	✓
Referral	✓	✓	✓	✓	✓
Consultation	✓	✓	✓	✓	✓
Declarations	✓	✓	✓	✓	✓

Table 2 | *Differences of the KIS-systems that are currently on the market*

Other competitors

Ksyos

Ksyos enables patients to do self-measurements and sends the analysed data to general practitioners. Ksyos might be a relevant competitor since they enable patients to measure at home. A fundamental difference is that Ksyos is used for diagnostics, where Heart for Health aims to focus on treatment as well.

NHG Doc

In correspondence with DHoTS, NHG Doc helps the general practitioner to estimate the risk of patients who have a disease, according to the NHG-standards (protocols). NHG Doc is a plug-in of the HIS system, and only uses this data whenever there is a patient who is not yet in treatment. Heart for Health wants to keep track of the changing health status of patients and give advice on any occurring changes in the patient's health.

myhealthConnect (enovation)

As opposed to Heart for Health, myhealthConnect does not analyse the data before transferring them to the HIS systems. It merely enables the connection between eHealth applications and the care provider's systems.

Pacmed

Pacmed offers a solution to very specific target groups, which differ from the focus of Hearth for Health (currently CVRM). Pacmed might become a relevant competitor if they were to use their knowledge in the same market as Heart for Health.

PGOs (MedMij)

There is still a lot of uncertainty about PGOs (personal health environments). Currently, very little to none PGOs are in use, but they will be introduced from June 2020 onwards. PGO might become a serious competitor once patients are able to send measurements to their GP, even though the exact functionalities are still unknown. For transferring information with PGOs, MedMij is the Dutch transfer standard. The goal of PGOs is to give patients insight into and ownership of their data. Multiple companies are involved in creating PGO's, including Philips, Quli, MIJNPGO and Patients Know Best.

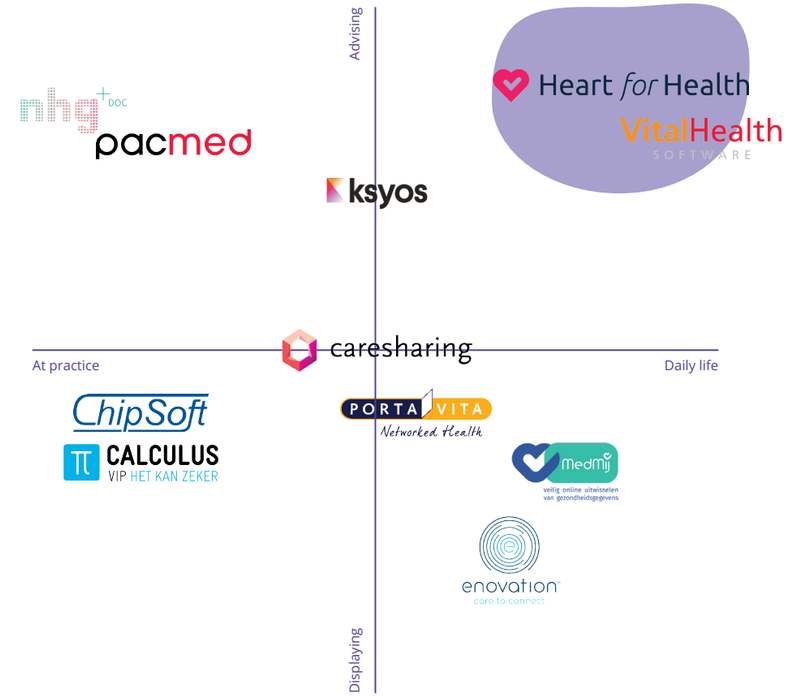


Figure 9 | *Competitative axis daily life vs at practice and displaying vs advising*

2.3.1 Heart for Health

Heart for Health is entering a rapidly emerging market. To become and remain a relevant competitor, a sustainable strategy is vital. In order to gain a strategic advantage, it is necessary to find out where Heart for Health can differentiate itself. Therefore, a **competitive axis** (figure 9) has been created to assess where Heart for Health is positioned, and where it should position itself in the GP market.

The x-axis describes the time at which the patient is interacting with the product. This is described as '*practice vs. daily life*'. In case of practice, the product only has impact and/or is used during a consult at the practice. Daily life describes products that also influence the time before and after a consult (Figure 10). This can be advantageous for doctors, since the software will be able to take over some tasks, for example through the use of questionnaires.

The y-axis describes the difference between competitors that give input or feedback (such as decision support) and products that do not. On the axis, it is described as '*advising vs. displaying*'.

Heart for Health places itself in the top right corner, considering their advisory role and in the impact their product has on 'daily life'. VitalHealth (Philips) is in the same corner.

Philips

VitalHealth is currently in the same market as Heart for Health. VitalHealth has originally been founded by Mayo Clinic and Noaber Foundation in 2006. In 2017, VitalHealth became part of Philips Healthcare. Philips's mission is to improve people's lives through meaningful innovations, with the slogan: *"Innovation and you."* According to an article on their website, Philips has a deep understanding of people's needs and desires, they are trustworthy in technology and sustainable by measuring the impact of their technology (Philips, 2013).

Philips VitalHealth offers a broad modular package for care groups, mental care institutions, hospitals and nursing, care and home care. Rather than positioning themselves as just a KIS-system, they are working more towards a self- and population management platform. This strategy appears to imply a confirmation of the expectation that KIS-systems are not future proof.

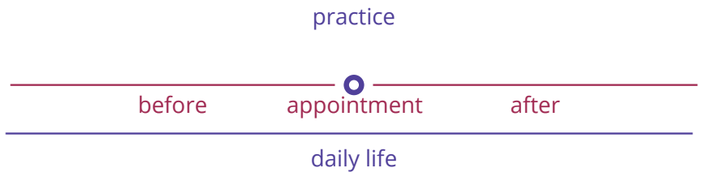


Figure 10 | *Explanation of at practice and daily life*

2. DISCOVER

The Dutch healthcare system is currently under a lot of stress. Contemporary social, technological, economic and political trends demonstrate an emerging pressure on both primary and secondary care. The trend with the most profound impact, is the growing amount of chronically ill patients, causing a high pressure on the workforce and on limited resources. Additionally, during the past number of years, healthcare costs have been growing substantially. Simultaneously, people expect more services and more involvement in their health.

The current developments make eHealth an attractive solution, although implementing eHealth still appears to be difficult. Nonetheless, care providers do agree that the healthcare system as it is right now, has to change. Heart for Health wants to contribute in this difficult context by taking away tasks at the practice, using remote healthcare.

In order to succeed at creating a relevant product, the ongoing trends in healthcare have to be taken into account. Firstly, by creating a product that enhances patient involvement and lowers pressure on GPs and other care providers. Secondly by making the product sustainable and future-oriented. Health care organisations are changing, and it is hard to predict where they are going. Making the product modular and adjustable for care providers will keep the product relevant in the future.

At this moment in time, the eHealth market is very crowded with new entrants, start-ups and established companies. Heart for Health's current advantage is their focus on both 'in' practice care and 'out of' practice care, combined with their advising features for GPs.

Heart for Health is still unsure of how exactly to position themselves. From research, it has been found that KIS-systems are not an attractive market, even though Heart for Health regarded this as a promising market in the past. The first reason for its unattractiveness is that there are currently already five big suppliers on the market and according to stakeholders, this is already too many. One interviewee said during a preliminary interview:

"Why would Heart for Health try to enter such an overcrowded market?"

Secondly, with the prospect of a new way of organising healthcare (e.g. network care), KIS-systems are likely not to be appropriate to satisfy the changing needs of stakeholders. Therefore, it is recommendable for them not to develop their platform as a KIS-system.

Finally, GPs with an interest in KIS-systems are likely to have already purchased one. It is well-known that general practitioners do not like switching systems, due to the temporal and financial investments involved. If Heart for Health still wants to proceed in making a KIS-system, both the effort and costs involved with a switch should be minimised.

3

DEFINE

The goal of this chapter is to synthesize the data and to find opportunities and gaps for design. During this phase, input from many stakeholders has been incorporated. To synthesize the data, Analysis on the Wall has been performed. From the first gained insights, quick scenarios were created and discussed with stakeholders in order to redefine the project. Additionally, customer profiles and a service pathway have been created.

3.1 Research set-up

After exploring the literature and context, the method of interviewing was selected to obtain a deeper understanding of the stakeholders. The goal of interviews was to get more insight in the (most important) stakeholders, therefore semi-structured interviews were conducted.

An **interview guide** was used to structure the topics that had to be covered, while still maintaining the freedom for interviewers and interviewees to elaborate on what was important to them (Patton, 2015). An example of an interview guide has been included in appendix D. The interviews have been audio recorded and transcribed. Then, the interviews were analysed with the method of **Analysis on the Wall**.

Besides **semi-structured interviews**, some **informal interviews** have been conducted. Those interviews entailed more open conversations, and they were not recorded. Notes were taken to gather data.

With internal- and external interviews, first knowledge on the topic and stakeholders was collected. Many researchers question the ability of consumers to articulate their wants and needs (Mullins, 2013). This is often caused by the fact that those wants and needs are often not on the surface of what people say and do. To get a complete overview of the values of GPs, a complimentary method should be used to dig deeper in the topic. For this thesis, the method of generative sessions has been used. Figure 12 shows the **Do, Say and Make model used** in the convivial toolbox (Sanders, 2012). Generative sessions are used to obtain tacit and latent knowledge, but often include explicit and conservative knowledge.

To obtain this tacit and latent knowledge, toolkits (figure 11) were used to enable the participants to work visually. Multiple **visual toolkits** where used during this thesis:

- *Stakeholder mapping toolkits, describing the stakeholder involvements and interactions.*
- *A timeline describing the interaction with CVRM patients of both the practice assistant and GPs.*
- *Two sketched scenarios for different ways of monitoring, aiming to enable participants to give input.*

A more elaborate explanation about the toolkits and scenarios can be found in appendix E.

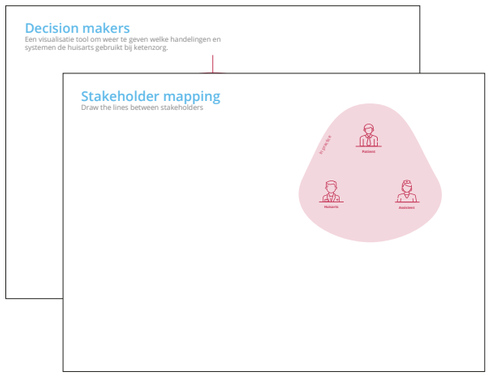


Figure 11 | *Quick representation of the used toolkits*

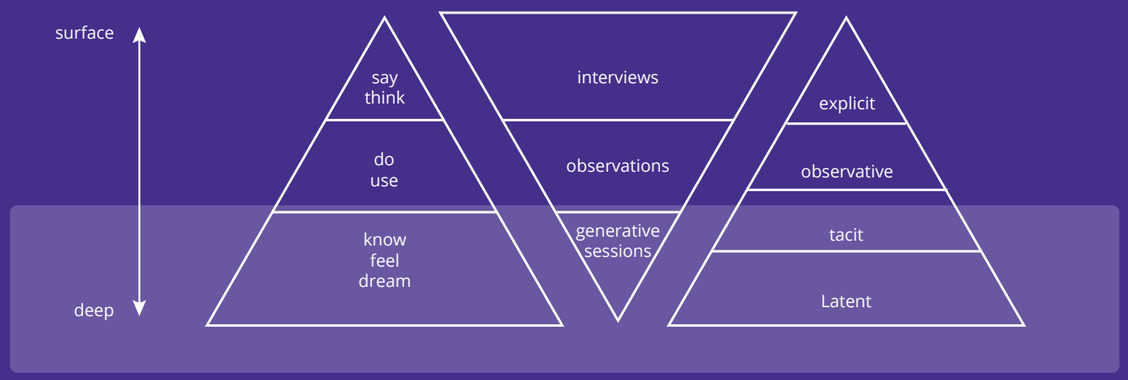


Figure 12|*Do, Say and Make model (Sanders,2012)*

3.1.1 Interview goals

Interviews

From the preliminary interviews and desk research, search areas were created to get a more in-depth understanding of the current situation. The topics during the in-depth interviews were:

- Decision makers and stakeholder's interaction
- Care providers' interaction moments with CVRM patients
- Care providers' needs and wishes
- Stakeholders' experience with (digital) innovations at GPs
- Current use and implementations of eHealth

These insights were used to gather information about what values are needed to create a product that is relevant for the stakeholders.

Stakeholder mapping

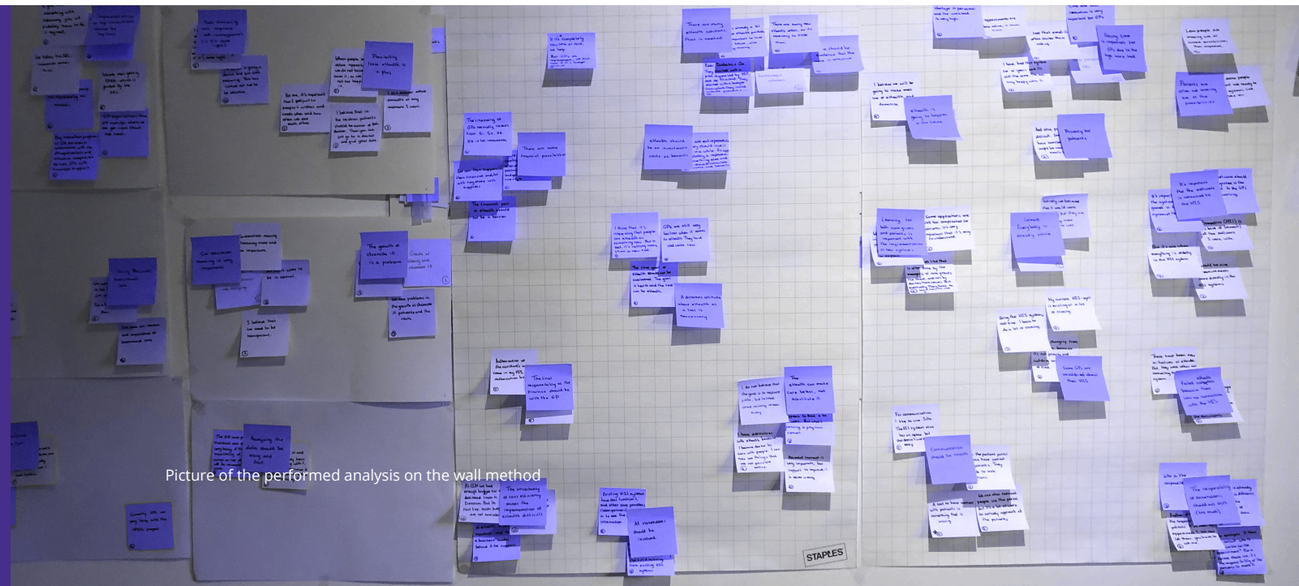
The goal of the stakeholder mapping toolkits was to get more understanding of the stakeholders within primary care and their importance in decision making. The participants were asked to write and/or draw the stakeholders and decision makers on the place in the map where they believed the stakeholders belonged.

Timeline

To extract more information about the interaction of care providers with CVRM patients, a timeline was created. The goal was to create an understanding of the current pathway. The participants were asked to write and/or draw the process as how they experienced it. During the first interviews with GPs and a practice assistant, the timeline was used to enable participants to sketch their current way of working. Consequently, they were asked to highlight important moments on this timeline. This was done to extract their values during the care of CVRM patients. The input was used to sketch interactions and highlight important moments during the CVRM care process.

Scenario testing

Scenario testing was used to trigger more participant creativity and to test different ways of monitoring. The scenarios all had a different level of GP involvement. The participants were asked to give their opinion about what they would like, what they would not like, and what they would like to add to the scenarios. The input of these sessions was used to extract important values that the product should have to position itself.



Picture of the performed analysis on the wall method

3.1.2 Interviewees

Purposeful sampling was used to select interviewees that are especially knowledgeable about or experienced with the topic of interest (Cresswell, 2011). The in-depth interviews focused on getting more insight into the current way of CVRM care, the use of eHealth and finding out what values are important, while the preliminary interviews were more focused on establishing the context of this project. An overview of the involved stakeholders throughout the project is given in table 3.

3.1.3 Analysis on the Wall

To analyse the data, the Analysis on the Wall method has been performed. With this method, information and inspiration can be gathered simultaneously (Sanders & Stappers, 2012). To analyse the gathered data, the most interesting quotes have been selected from the interview. Then, they were written on post-its to be able to move them around and cluster them. In addition to the interview quotes, some literature outcomes have been added.

From these separate quotes and insights, clusters were created. The clusters provided an attempt at creating a deeper understanding of what the interviewees meant, figure 13 gives a representation of the process. A more elaborate description of the Analysis on the Wall can be found in appendix F. The insights of Analysis of the Wall have been synthesized in this chapter.

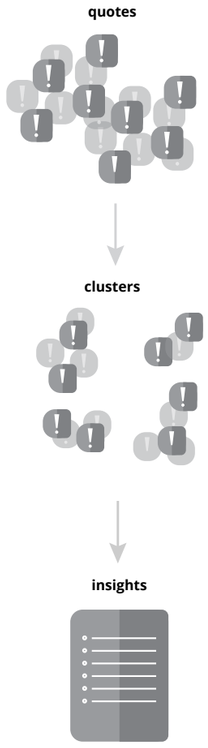


Figure 13 |*Analysis on the Wall process*

	Preliminary interviews	In depth interviews	Scenario testing	Value creation	Ideation	Validation
general practitioners	2	1	1	1		
practice assistants	1					1
care organisations	1	2	1			
healh insurances employees	2	1				1
patients						2
Heart for Health	2	3		1		
Context experts	2				1	
Design experts					3	

Table 3 |*Involved participants throughout the whole project*

3.2 Stakeholder analysis

Outcomes of the discover phase and research have been synthesized. This chapter describes the insights that were gained about important decision makers, different attitudes towards eHealth and the financing of eHealth.

The overview in figure 14 shows a **Descriptive Value Map** of the most important decision makers in the general practitioners' market. The Descriptive Value Map visualises the current sets of relationships between the stakeholders in the context (Kumar, 2013). The map includes the most important value flows of money, information and services. The structure and values shown in the figure are based on interviews and the mapping toolkits.

Besides patients and GPs, the value map lists many other stakeholders. For this thesis, an extra layer of levels has been added to the Descriptive Value Map, dividing the stakeholders into three segments: general practice level, regional and national. Within these levels, there is a collaboration between almost all stakeholders. Stakeholders such as health insurances and the government are also national, but are considered as an overarching stakeholder of all levels. Stakeholders such as hospitals are not included in the map, due to the limited scope of the project.

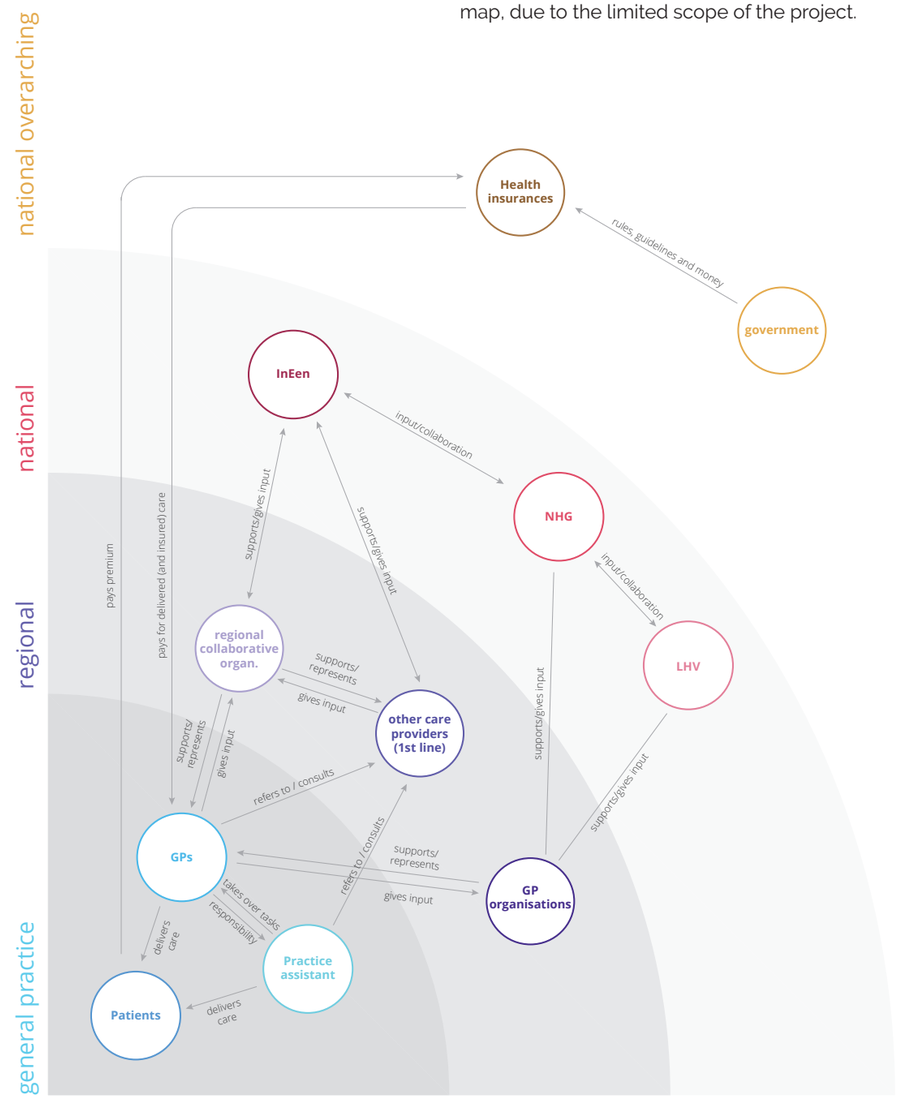


Figure 14 |*A Descriptive Value Map, visualising the most important money, information and service flows between stakeholders (Kumar, 2013)*

3.2.1 Attitudes towards eHealth

Patients and eHealth

When implementing eHealth in primary care, it is crucial to know if patients will be able to and interested in using the product. According to Wouters et al. (2019), chronically ill patients are often reluctant to use eHealth. Only 33% is enthusiastic about the use of eHealth and 40% is reserved about it. This patient group can be split up into different attitudes. Those attitudes may affect the use and implementation of eHealth products. The potential attitudes are as follows, in correspondence to the description by Medicinfo (2018);

- The healthy proactive doubter. This group is healthy, but they have doubts about their health. They would like to work online as much as possible and expect a 24/7-service. They are found to be the most interested in remote healthcare.
- The frequent waiters. This group is quite healthy but like to wait before visiting the doctor. They follow the trend in remote healthcare to a certain extent.
- The healthy waiters. This group is healthy and does not take action very fast. When they do take action, they have a preference for a physical consults.
- The care proactive health needing. This group has a bad health and visit the care provider fast and very often. This group has been found to have the lowest interest in remote healthcare.

When looking at the attitudes described by MedicInfo, Heart for Health should not focus on the care proactive health needing. These patients are in bad health but, as a cause of their bad health, have a strong preference for physical care. DHoTS is designed to serve patients with (a high risk of) heart diseases at GPs. This means that the patients do not necessarily have a very bad health, but they are at high risk of suffering from more serious diseases (again). Within this group, there is an interest in remote healthcare, but also in physical contact (figure 15). Therefore, the eHealth program should be developed in such a way, that there is blended care.

General practitioners and eHealth

Currently, GPs are often hesitant about the implementation of eHealth. At first, GPs expected to lower the workload by using eHealth. But in practice, care providers have often experienced that IT solutions often do not match their way of working. From preliminary interviews, it appeared that GPs believe that making use of the HIS system is not time efficient, but it supports good registration of patient data. eHealth at practices should be reliable, intuitive and user friendly (Wouter et al., 2019) in order to be implemented seamlessly. An overview of the research outcomes is illustrated in a **customer profile** visual of the GP, which can be found in figure 17.

The GP's biggest concerns are financing, the use of the eHealth products by patients and the division of responsibilities. GPs sometimes experience a low use of eHealth by patients. A cause might be that patients are not familiar with products or the fact that for some patients, it is difficult to understand how and why they should use it. It is therefore important to design the product in such a way, that all interested patients will be able to work with it.

Another concern is the division of responsibilities. When patient data come in, the patient might expect the GP to be answering as fast as possible and look into all the data. Heart for Health should therefore provide a clear division of responsibilities in order to prevent diverging expectations.

The GP's attitudes on eHealth can be divided into three main areas. To show these different groups, **personas** are used (figure 16). Those personas are 'extremes', they are representations of intended users (van Boeijen, Daalhuizen, Zijlstra and van der Schoor, 2012). Naturally, most GPs will be positioned somewhere in the middle. The personas can help to see on which areas Heart for Health should focus. The created personas are based on my experience with GPs and interviews, and they are not a direct representation of the people who were interviewed for this thesis.

It has been found that the contrast between GPs is very large. Therefore, Heart for Health should start to focus on GPs with a positive attitude towards innovations. The adoption of the GPs with a negative attitude will take long before they will be willing to use and believing in the added value of a product.

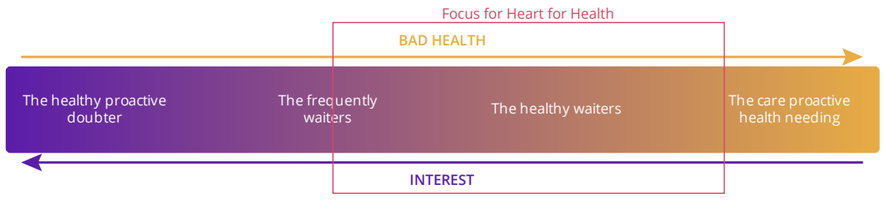


Figure 15 | *Patients' attitudes towards remote healthcare, highlighting the focus for Heart for Health*

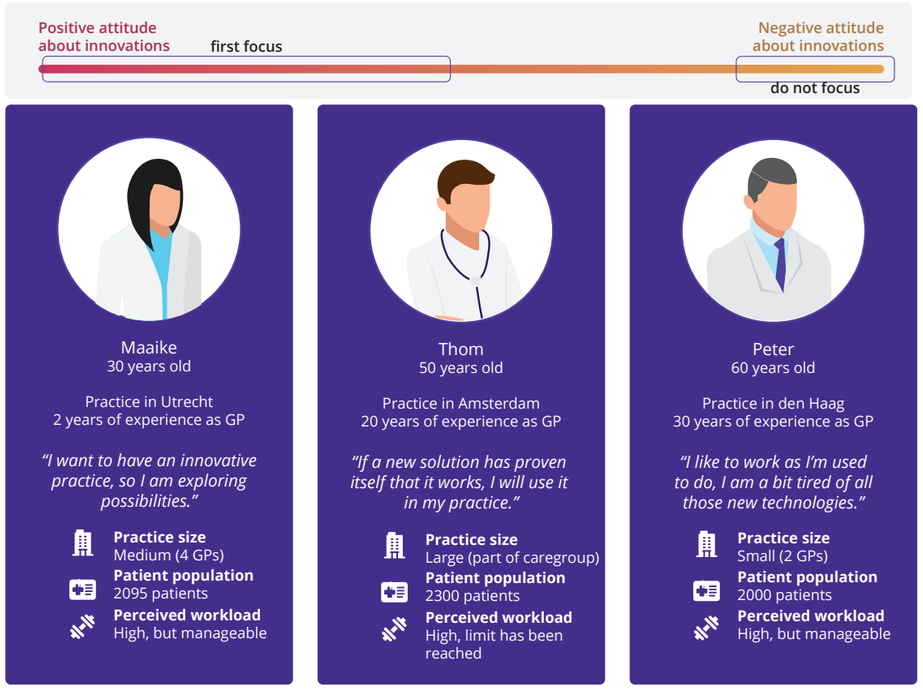


Figure 16 | *General practitioner personas, used to explore different attitudes towards eHealth*

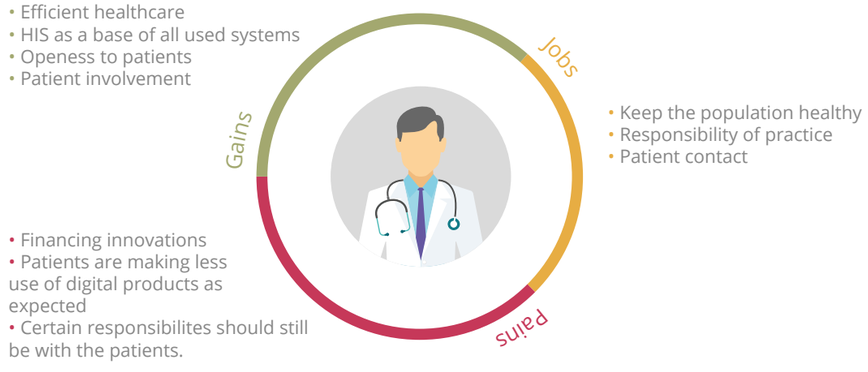


Figure 17 | *Customer profile of the GP*

Care organisations and eHealth

Care organisations look into the wants and needs of their members (among which GPs). They regard eHealth as a possible tool to improve healthcare. Care organisations can regionally organise eHealth implementations when their members are interested. They can make appointments with suppliers and health insurances. Figure 18 shows a summary of the outcomes of the interviews with primary care - and GP-organisations

The practice assistant and eHealth

The practice assistant is actively involved with their patients' health. Within their job, it is crucial for them to be able to deliver personalised care. With CVRM, practice assistants focus on people's lifestyle and on monitoring the patients. As stated before, the practice assistant is not a (final) decision maker. However, their values can influence the GP's opinion, since they are the experts concerning monitoring ketenzorg.

For practice assistants, it is important that patients are able to work with the product and that they understand it. In this way, it might help patients to do more self-management (self-care). New products should not give practice assistants extra work since they already have a high workload. Figure 19 shows a summary of the outcomes of the interview with a practice assistant.

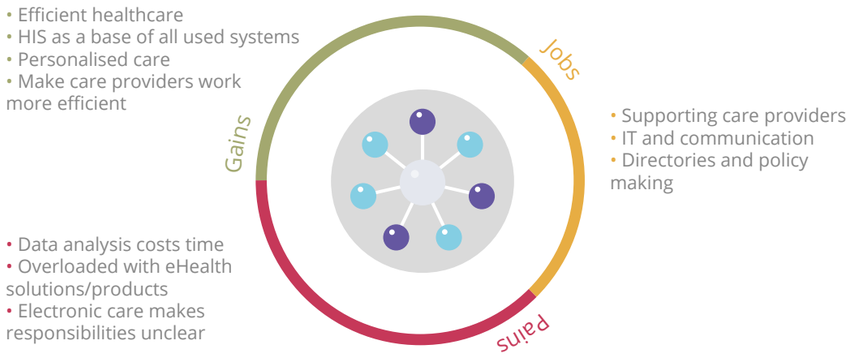


Figure 18 | *Customer profile of the GP organisation*

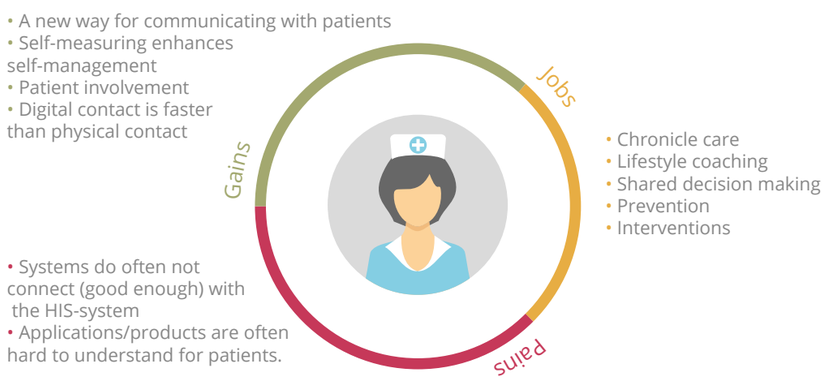


Figure 19 | *Customer profile of the practice assistant*

Healthcare insurance companies and eHealth

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For practice assistants, it is important that patients are able to work with the product and that they understand it. In this way, it might help patients to do more self-management (self-care). New products should not give practice assistants extra work since they already have a high workload. Figure 20 shows a summary of the outcomes of the interview with a practice assistant.

The government and eHealth

As mentioned, the government stimulates the healthcare sector to adopt more eHealth (Rijksoverheid, 2019). They believe that eHealth can improve public health and can keep healthcare affordable.

In 2014, the Minister and State Secretary of VWS formulated three objectives for improving the application of eHealth. The first objective is *"access to medical data"* for patients. According to Wouters et al. (2019), the supply side of online insight has been growing since 2014, but the use by patients is still low. The second objective concerns *"self-measuring and telemonitoring."* The number of people that self-measure has increased greatly: in 2019, four out of ten chronically ill patients measured their own health data. Besides this, there has been an expansion of the digital registration of health data. The third objective is about *'"screen care and home automation,"* to allow people to live independently and at home for a longer time.

Despite these objectives, the availability of budgets for reimbursement of eHealth in the basic package is still minimal.

Figure 20 | *Customer profile of the health insurance company*

3.2.2 Financing eHealth

Besides the attitude towards eHealth, financing has been found to be a big obstacle for the implementation of eHealth.

Figure 21 presents the distribution of money available for health care in 2017 (Kuijper, 2018). It demonstrates that just a small amount of the total budget goes to general practitioners. This occasionally makes it hard for them to cope with the growing demand for primary care and to implement new technologies. There is ongoing discussion about which stakeholder should be paying for what.

From interviews, it appeared that GPs are currently not interested in investing in telemonitoring. Therefore, it is necessary to either find an interesting business model for GPs or a way to make use of the health insurance's budgets.

In figure 22, a brief explanation elaborates on the money flow between stakeholders within financing. The money visualisation is based on the 'proportions' that are paid, they are not a correct representation of how the money is divided.

The patient's incentive for investing extra money besides the insurance fee is low. This has been confirmed in both interviews and literature (Heijmans, Waverijn & van Houtum, 2014). They merely pay a monthly fee to receive necessary care.

The insurance company pays an arranged amount of money to the care providers. According to an article of Het Financiele Dagblad written by Dijkman (2019), healthcare insurances are often insufficiently compensated for chronically ill patients. Since healthcare is mostly paid by the government and because insured members are able to switch every year, a lack of interest in investment is created for improving chronic healthcare (this statement has been validated by an employee of an insurance company). This lack of investment contributes to the tensions between stakeholders about who pays for what. Besides, if they would invest in eHealth at GPs the product will be used for all patients of the GP. This means that if not all insurance companies invest, one insurance pays (and therefore their clients) for the care of other patients causing a lack of interest in investments.

For the GP, investing in a product that digitally replaces consults, costs money. GPs get paid for their consults and physical actions. If they would substitute these consultations for eHealth solutions, it will take away part of their income. Besides, the group of CVRM patients that have an out of control blood pressure and would therefore benefit the most from monitoring at home, is quite small on a practice level (around 10 patients per year). Therefore, GPs would rather invest in a product that will be in the interest of a larger part of their practice population.

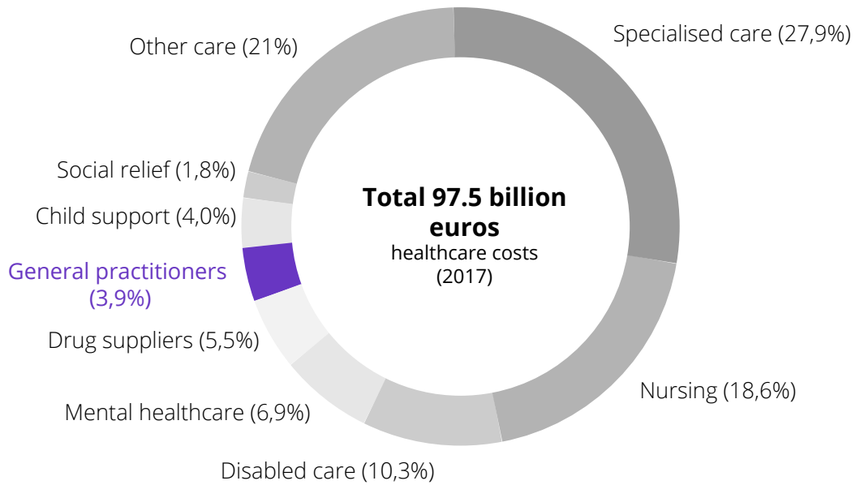


Figure 21 | *The distribution of money available for health care in the year 2017 (Kuijper, 2018)*

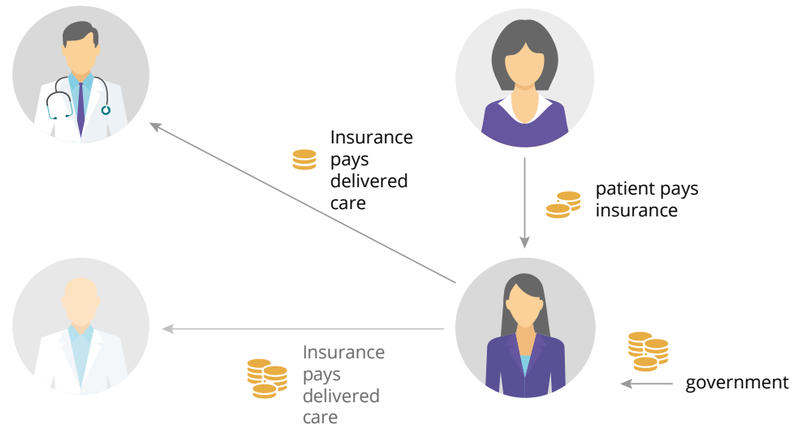


Figure 22 | *Visualisation of the money flow within healthcare*

The hospital is included in this visual because lowering risks has influence on their number of patients. If the population is healthy, lower costs are made within secondary healthcare (e.g. hospitals). But the work of keeping the population healthy is often done within primary care. This makes it difficult for insurances to decide on how to finance those eHealth solutions for primary care, because the cost saving effect occurs in secondary care. Hospitals are paid by insurances. If risk is managed more efficiently, less patients will go to the hospitals, and money could be invested at GPs. This is not an attractive solution to hospitals and therefore they will not be willing to invest in better risk management at GPs.

All those considerations cause friction in the healthcare market. The goal of all stakeholders is to maintain a healthy population. But in practice, stakeholders do often think and handle in their own (organisation's) interests. This makes it rather difficult to find a suitable business model. Also, in the healthcare world, many innovations are financed from temporary funding. After the pilot phase, innovators often struggle to find a sustainable business model. If Heart for Health wants to enter the market, a viable business model is crucial. More research about budgets and implementation structures can be found in appendix G.

3.2.3 Decision makers

From research it has been found that practice assistants and patients are the most important users of products for chronic care, however it is expected that they will not be the decision makers in primary care (figure 23). Resulting from the conducted interviews and research, it appears that the most important decision maker within primary care is the general practitioner. When implementing a product on a regional scale, the care organisation should be included since they connect GPs. Besides, for financing, the health insurance might be an interesting decision maker, whether they are going to invest or not.

General practitioner

The general practitioner is expected to be the most important decision maker. In the end, the GP will decide if the product will be used in their practice. The GP can be regarded as both a decision maker and a user of the product.

Patients

The patient is not expected to have a large influence on the decision-making process. That said, GPs do take the experience of patient care into account when deciding if a product is going to work for them. It is important that products add value from a patient perspective as well, making the patient a relevant user to include in the product.

Practice assistant
Like the patient, the practice assistant is likely to be an important user of the product. Practice assistants take over tasks from GPs with chronic ketenzorg diseases. Practice assistants are not likely to be very involved with decision making, but their opinion and knowledge can have an influence on the GP's decision.

Care organisations
The care organisations are representing their members. The opinion of the care organisations is based on the opinion of GPs. When a product is regionally implemented, care organisations can help to facilitate agreements with suppliers and with other care providers. Care organisations can therefore be considered as enablers.

Health insurances
Depending on the scale of implementation, health insurance companies might be investors in the product. Health insurances are not main decision makers, yet they might be the enablers in introducing new products.

Figure 23 | *Visualisation of the most important stakeholders when implementing eHealth in primary care*

3.3 Service pathway

A service pathway has been created to explore the CVRM care process. According to the European Pathway Association, "the objective of a Pathway is to enhance the quality of care by improving patient outcomes, promoting patient safety, increasing patient satisfaction, and optimizing the use of resources." The goal of this pathway is to give a representation of the current service that is provided to the patient. Later, this pathway is used to plot the findings of the research. Here, interview insights will be plotted in the pathway to show concerns and preferences of stakeholders. Creating an overview of improvement of patient outcomes, safety, satisfaction and the optimisation of the resources used.

3.3.1 Current pathway

Since Heart for Health will focus on CVRM, a service pathway is created concerning this topic. It has been constructed based on the visual timeline toolkit, literature and interviews. The pathway of figure 25 is a global representation of how CVRM is treated within Ketenzorg. The different stakeholders included are patients, doctor and practice assistant (in practice) and external stakeholders which are ketenpartners (such as the lab, specialists, other care providers, pharmacy).

HIS-systems
Within the pathway of CVRM, the HIS-system is an important element. Since the 1990s, the use of HIS-systems has become more conventional. Right now, all GPs in the Netherlands make use of HIS-systems. In figure 24, an overview shows the different systems that GPs work with. The overview is a representation of a possible combination of GP systems, and is not necessarily representative for all GPs in the Netherlands.

The practice assistant has their own segment within in the HIS system. During the consults, the practice assistant needs to document according the guidelines. Whenever the practice assistant makes an adjustment in medicines, a request for approval is sent to the GP. This ensures that the final responsibility remains with the GP. The practice assistant is free to send patients to other care providers via Zorgdomein. Besides, the practice assistant makes use of the KIS system, patient portal and Zorgmail. Contact between the GP and practice assistant can occur either verbally or through the HIS system.

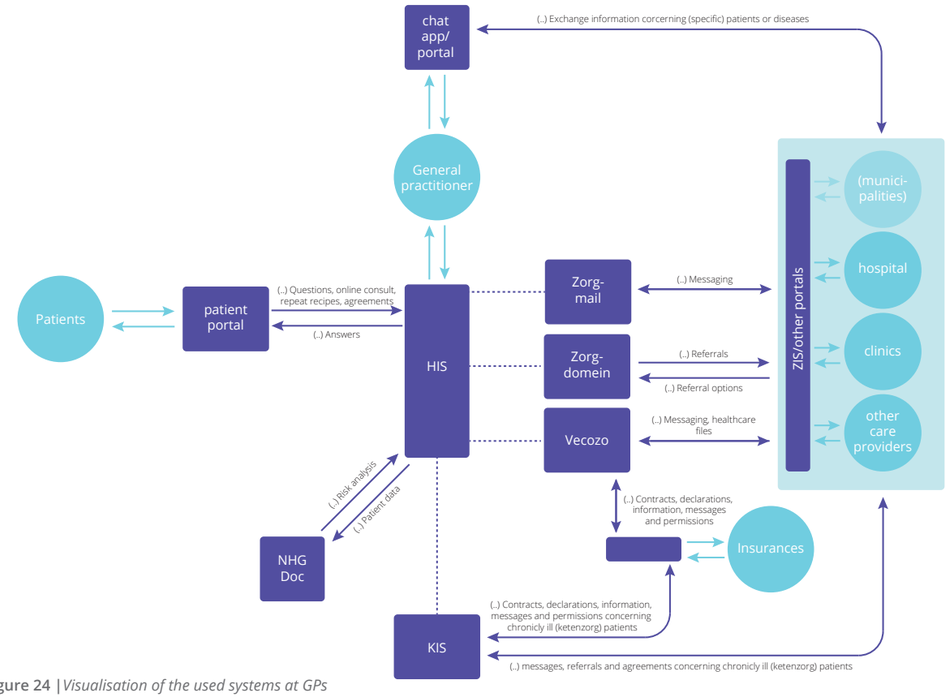


Figure 24 | *Visualisation of the used systems at GPs*

Patient path
In the patient path, the different locations of interactions are visualised. Within the map, the circles around the dots represent the moments of measurement. As can be seen, there are currently a couple of measurement moments. In the first phase, measurements are done quite regularly: once every two weeks. But after the first consults, the patient is only measured during their consults, which is every three to twelve months. The GP and practice assistant can analyse the measurements and determine what their action should be according the protocol.

Actions at practice
As is visualised in figure 25, the HIS-system is the basis of all actions of the GP. When a practice uses a KIS-system, communication of the practice assistant runs via the KIS-system. The KIS-system automatically communicates the registered information to the HIS-system. When there is not a KIS-system, the practice assistance uses her portal in the HIS-system.

External actions
The external actions segment in the figure is a representation of the actions executed by the ketenzorg partners. For CVRM, the most common ketenzorg partners are the laboratory, pharmacist, dietician, physiotherapist and lifestyle coach – all ketenpartners to which the patient can be referred depending on their personalised plan and goals.

Timeline
The timeline in this service pathway describes the process of the first interaction with the patient until the start of the standard check-up moments phase. This includes the disease identification phase. Heart for Health focuses on the disease monitoring, meaning that they will focus on the process after the diagnosis .

Legenda
General practice
Practice assistant
General practice
Practice assistant
Practice assistant
Touchpoints
Measure moment

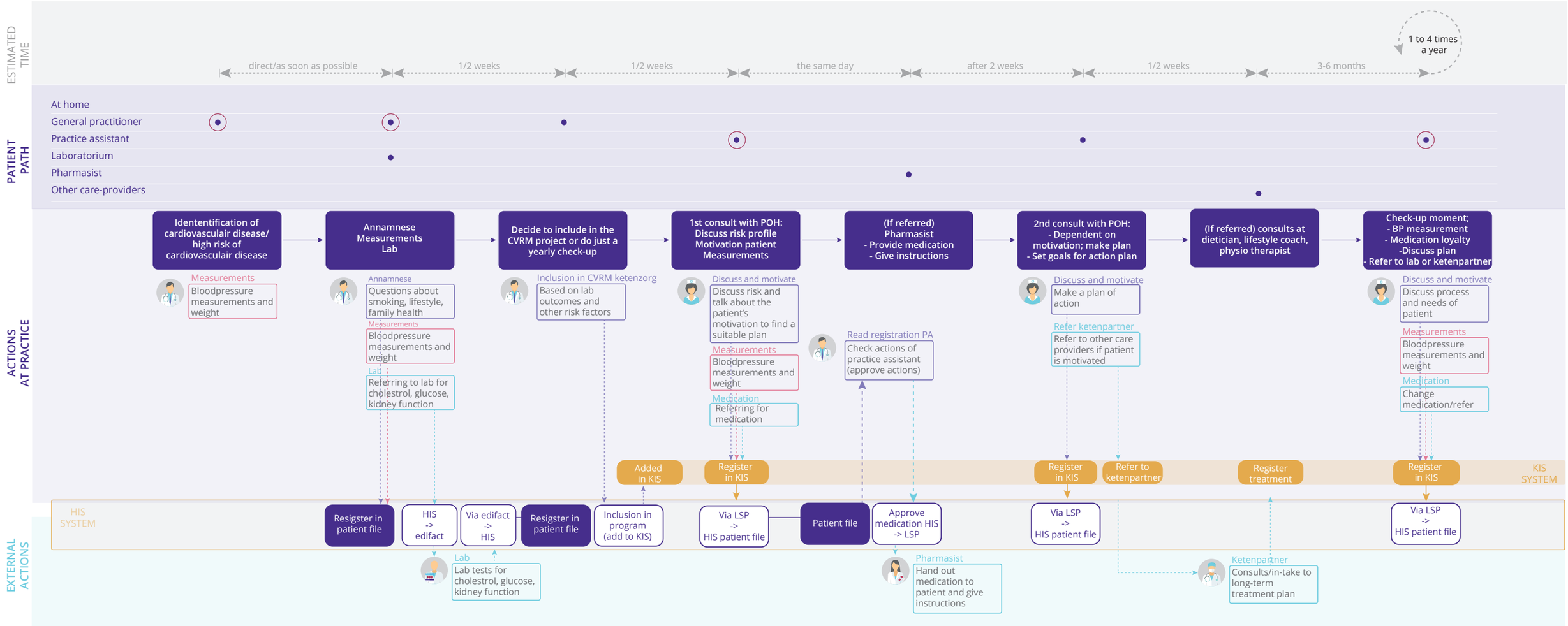


Figure 25 | *Current service pathway of the CVRM process*

3.3.2 Services delivered by the care providers

The service pathway describes the services that care providers deliver to their patients. The provided service is different for every disease. Within CVRM, a number of important services have been found: lifestyle coaching, anticipation and patient-centred approach. To be able to make the service as efficient as possible, care providers make use of different systems to support their processes.

Importance of lifestyle coaching by the healthcare provider

Lifestyle is in many cases (partly) the cause of high blood pressure. Those patients often have a low prosperity, resulting in cheap and unhealthy food habits. On top of that, the CVRM group includes many smokers who struggle to quit. Therefore, lifestyle improvement is a very important but also very difficult task for GPs and practice assistants when treating CVRM patients. Lifestyle is one of the main topics during different consultations.

Anticipating on patient's health literacy

From interviews, it has appeared that CVRM patients often have low health literacy. Especially during consultations with the practice assistant, effort is put into the explanation of the approach and the advice that is given.

Patient centred care

The care providers focus on delivering patient centred care. As can be found in the pathway, they set goals and make action plans together with the patient based on their motivation. It has been found that this is important to motivate CVRM patients, because all patients require a different approach. Some patients will benefit from a very strict schedule, while others get demotivated by a strict approach and require small steps towards a better health outcome.

Smooth connection between different systems

As can be seen in the figure, the current systems are either communicating with the HIS-system, or they are accessible from within the HIS-system. When developing a new product, a smooth data transition between systems should be realised.

The only exception to the current software ecosystem (figure 24) is Siilo. During the interviews, Siilo appeared to be a relatively new application used by many health care providers (in the figure presented as a chat/app portal). Siilo is a safe messenger app (for phones) where care providers can coordinate or discuss medical concerns. Within the ketenzorg process, Siilo is not frequently used because those processes are familiar to the care providers and therefore not many discussions arise.

3.3.3 Concerns and advantages according to stakeholders

Figure 26 is a representation of the section of healthcare that Heart for Health wants to play a role in with DHoTS. In the figure, it has been assumed that Heart for Health is able to make a connection with the HIS-system of the GP. This assumption is based on the fact that GPs and practice assistants are not interested in new separate systems. If Heart for Health is not able to make the connection, the market will be very small or non-existent, and therefore it will not be interesting to enter the market.

Concerns

Once doctors start using eHealth solutions for monitoring in their practice, patients are able to measure at home. Those measurements produce data, which are partly analysed and communicated to the system of Heart for Health. Care providers have indicated that the collection of more data is not very appealing to them, since they are not sure what they will have to do with it. A concern of GPs and practice assistant is that there will be a data overload, meaning that data will keep coming in and that they will not have time to process them. Besides, they expect that it will not decrease the amount of patient consults, since the consultations involve more than just the measurement of blood pressure.

Furthermore, care providers have experienced that the use of eHealth solutions often causes a decrease in patient centered care and understandability of the provided care, which should be avoided.

Moreover, interviewees expressed their concerns about responsibilities. When data keep coming in, patients might expect that the caregivers will keep track of their health. When a risk turns into a more serious situation, patients might take a less pro-active role and wait for the doctor to make a move. Furthermore, patients might hold the caregivers responsible if something goes wrong with their health.

Advantages

An advantage of the application is that there will be a more accurate measurement. Blood pressure is a varying measurement and can be influenced by a variety of factors such as stress and unhealthy eating habits. When patients measure at home, they experience less stress and there will be more diverse checkpoints. This might result in the patient having to visit the practice less often. Besides measurements, patients will be able to adjust the anamneses (questions about smoking, weight, lifestyle, etc). This, in combination with the measurements, will give a better overview of the patient's process. When care providers have better insight in their patients' health, medication will be more carefully adjusted to their illness and a more suitable plan can be made.

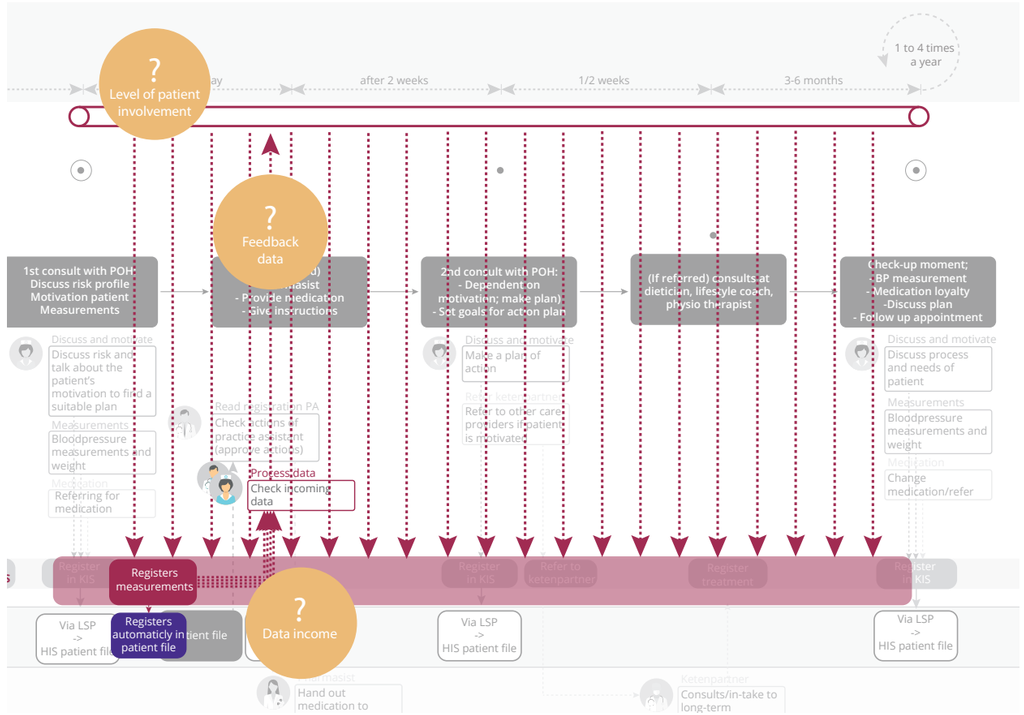


Figure 26 | *Focus within the pathway of Heart for Health including the concerns of stakeholders*

3. DEFINE

The performed research has been analysed and the outcomes have been synthesised. From the stakeholder analysis, it has been found that the stakeholders all have their own attitude towards eHealth. Stakeholders can all see the value of eHealth, but if the product is carefully designed. However, they also see many different obstacles.

When designing a product that enables continuous monitoring, it is important to consider that the product should not create continuous work for the care provider. The division of responsibilities, the data income and the feedback should be thoroughly examined to prevent miscommunication and mistakes in the CVRM process. Besides, the current interactions between care providers, patients and the software ecosystem should not be deteriorated. The services that have been found to be most important are lifestyle coaching, anticipation on patient health literacy and patient centred care. Besides, a smooth connection to the HIS-system is required for a seamless implementation. The introduction of a new product should enhance the delivered service.

Besides the design of the product, finding the right financing model is crucial. Currently, there is an ongoing discussion about who should pay for what. Therefore, Heart for Health should look critically into the feasibility of the product.

4

PRODUCT VISION

This chapter explores the past and future context of DHoTS. It concludes the discover and define phase with a product vision.

4.1 Creating a product vision

Heart for Health's vision for the future is described in the first chapter. An additional product design vision has been created to consider the intended value of the product before designing. The product vision statement describes the product goal in the long term, considering learnings from the past as well as future context. Simonse accurately describes the difference between a future vision and a design vision: "A future vision explores the future, whereas a design vision is created after design research on certain problems in the present."

The process described in the **ViP method** has been used as inspiration (Hekkert & van Dijk, 2011). The ViP method consists of deconstructing and designing a product (figure 27). First, the 'old' product is deconstructed in terms of what the current product/ service contains. This has been done in the first chapter 1 where DHoTS is described. Then, the current experience of DHoTS has been explored together with an employee of Heart for Health, followed by an analysis of the current market factors that where found during this research. The last step before the development of a vision statement is the exploration of the future context. The first exploration of the future context has been done in chapter 2, where the performed trend analysis is described.

4.1.1 Exploring the past

To explore the current experience of DHoTS, the value creators of the current capabilities of DHoTS are discussed. When designing a product, value is very important. **Product value** is the benefit that the customer gets against the perceived costs. For determining the value in healthcare, **the quadruple aim** is a frequently used framework to optimise healthcare performance (Bodenheimer, 2014)., shown in figure 28 It describes the importance of the aims; patient experience, population health, cost reduction and care team well-being. This model has been used as a guideline for value mapping.

Figure 27 | *The ViP method created by Hekkert and van Dijk (2011)*

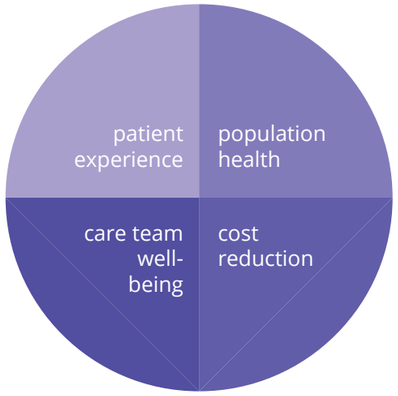


Figure 28 | *Quadruple aim, according to Bodenheimer (2014)*

Patient experience

DHoTS has a patient app, allowing patients more insight into their measurements. The product enhances experience since they feel more empowered and get more (visual) input into their health data. The follow-up action is decided by the doctor and communicated to the patient. The expectation is that patients thereby feel like their doctor is more involved in their health progress.

Population health

DHoTS enables blood pressure monitoring, providing a more valid average outcome. This average can support the GP in determining the appropriate follow-up steps. Likewise, a more valid outcome by monitoring the software gives decision support by delivering the corresponding protocol, which improves the health outcome following the NHG-standards.

Care team well-being

The care team well-being is mainly influenced by the pressure experienced by the GPs and the practice assistant. By providing support for the care providers, the expectation is that it will contribute in lowering the workload.

Cost reduction

If healthcare becomes more efficient, this will create a cost reduction for GPs as well, being able to spend their time on other patients. Within CVRM, better monitoring results in the prevention of more serious illnesses in the future, considering that improved measurement result in more optimal medication adjustments and lifestyle advices.

Experience DHoTS

DHoTS is offering decision support based on protocols. The actual added value is still questioned by stakeholders. From research, it has appeared that for some, this value is a 'nice to have', but it is not creating sufficient value to reach a bigger audience just yet. In figure 29, DHoTS has been plotted in the quadruple aim. The quadruple aim has been explored together with an employee of Heart for Health, to get not only insights from external interviews but also internal expertise. The participating employee has gained expertise by collaborating with current users of DHoTS.

From experience, it has been concluded that patients using DHoTS struggle with worries when they have a bad measurement. This is making the patient experience less. Besides, the current users are contacting their general practice more often for reassurance by their care providers.

The current pilot of DHoTS has not proven to lower pressure. From the value mapping session, it appeared that DHoTS is not able to save time for care providers. Actually, the opposite currently occurs: users of DHoTS experience a higher workload, caused by the use the product. Due to this higher workload it is difficult to develop the product further since care providers are already under pressure and do not have time to contribute in enhancing the product. Besides, the pilot phase has not delivered any proof of efficiency yet, which is a very important for implementation in healthcare.

All those aspects affect each other in the quadruple aim. Due to the increase of workload, it is not likely that there will be an actual cost reduction caused by using DHoTS. Also, better health by monitoring will only be achieved if the product is actually used, which will be unlikely if the users are not satisfied.

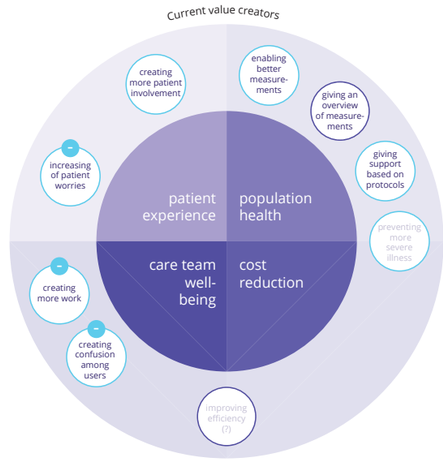


Figure 29 | *Value exploration of DHoTS*

4.1.2 DHoTS' context

Heart for Health developed DHoTS because they saw many problems within healthcare. They considered the growing amount of chronically ill patients, something they had also experienced within their other products for cardiology. Heart for Health wanted to develop a product that was able to support general practitioners with the growing amount of chronically ill patients.

Heart for Health developed DHoTS for a pilot study. This pilot was rolled out for three years. However, they still strived to create a business model after those pilot years. Like many other eHealth suppliers, they have faced many hurdles and therefore they will stop the development in 2020. It is currently a struggle for many new eHealth suppliers to find a suitable business model within the current system in the Netherlands.

Another problem encountered by Heart for Health is the collaboration with different HIS-systems and the exchange of information to serve the GPs as well as possible.

The current product statement of DhoTS, derived from an internal document, is:
"A digital CVRM-care-service, allowing patients to monitor from a distance. GPs receive an automated treatment advice based on NHG-protocols."

This statement proposes a focus on giving standardised advice based on measurements and other medical data, in order to give an advice based on NHG-protocols.

From this quadruple aim analysis, it has turned out that the idea for what DHoTS should provide, is not yet in line with what it actually delivers.

Value mapping session

4.1.3 Exploring the future

Now we know the current values, we want to find out the future opportunities. For the development of a new product it is very important to explore the future context. What has been learned from the trend research in chapter 2 is that healthcare is changing rapidly due to growing pressure and limited resources. Different stakeholders are looking for new ways of organising healthcare, creating a growing need for eHealth. This has been something that Heart for Health has tried to play a role in within primary care.

However, it has been found that protocoled care might not be the most desired by healthcare providers. For CVRM patients, healthcare providers try to focus mainly on patient centered (personalised care and enabling) self-care. Besides, care providers try to take time for creating more understanding of the disease, because this has been found to be most effective within this patient group.

4.1.4 The differences between the Heart for Health and the users

Knowing the current values and future trends, the user input needs to be taken into account as well. For the design of a new product, a more customer centered approach should be adopted. Heart for Health's focus was mainly to look into the developments in healthcare and what their approach would be. Resulting features that were not in line with the desires of their envisioned stakeholders.

Heart for Health's current product vision is not aligned with the desires of its users. To create a product that is desired, **value alignment** of Heart for Health and GPs (and practice assistants) is necessary. Figure 30 describes the actions of Heart for Health compared to the desires of GPs. The visual includes suggestions on how the product should cover those desires.

The focus of Heart for Health is currently on protocoled care. From interviews it was found that protocols are indeed important to care providers, but they emphasised that every patient is different. Therefore, care providers should not only follow protocols, but also incorporate the needs and behaviours of individual patients, thereby making personalised care more important than protocoled care.

All care providers agreed that efficiency should be enhanced. But where Heart for Health is focusing on distant care, the healthcare providers do want to continue patient consults. For them, distant care is only a solution if it is not at the expense of the quality of the delivered care. Blended care is a solution to this conflict, but this should be done very well because blended care could again conflict with efficiency.

Similarly, all care providers agreed with Heart for Health that patient involvement should be stimulated. In addition, care providers mentioned that coaching and guidance is essential because many patients have a low health literacy. This will also contribute in reassuring patients. Only if proper guidance is given, patients will be able to be involved in their self-care.

The last conflict of interest is the interest for a healthy population. Heart for Health's focus is situated on a national health level. On this national level, there are many CVRM patients with a high risk of more severe diseases. But, on a practice level, this concerns only 10 to maximum of 20 patients per practice per year. GPs are responsible for health on a practice level, meaning that those 10-20 patients per year do not provide a big incentive for investment. GPs would rather invest in something that is available for all or at least a considerable share of their patients. A plaster on this problem would be to find a stakeholder with an interest in investing into a national healthy population.

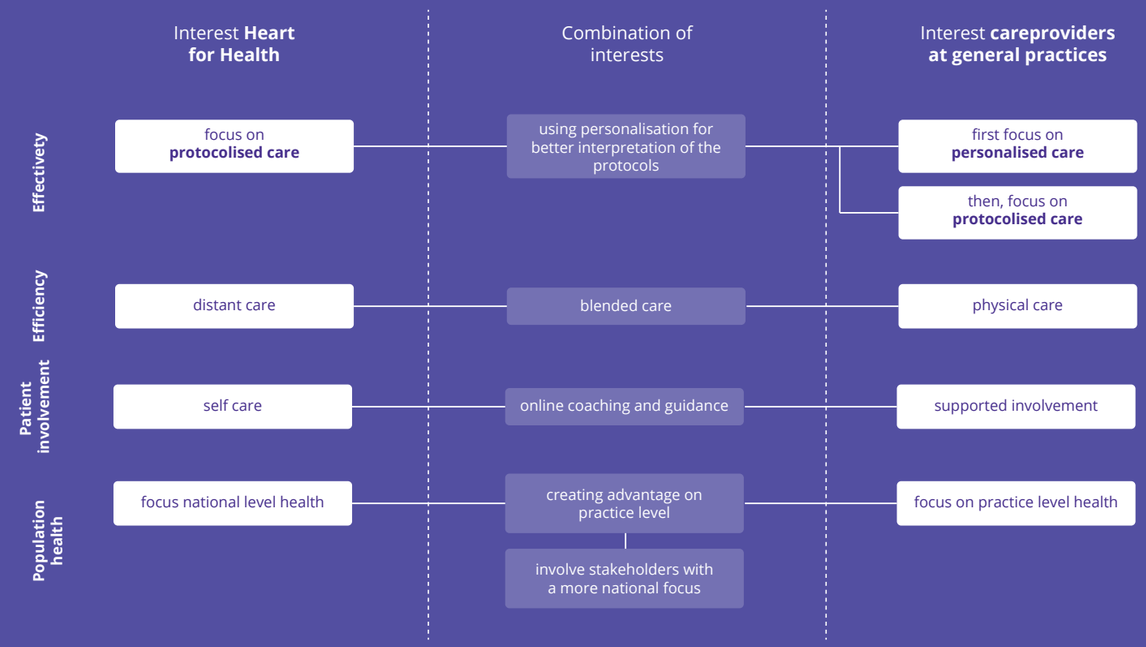


Figure 30 | *Conflict of interests of Heart for Health and careproviders*

4.2 Product vision statement

A product vision has been created based the analysis of current values, future opportunities and user insights accompanied with interview insight. This product vision has been a personal interpretation and therefore is a personal believe of what the product should offer to the users.

The creation of the product vision has been performed through an analysis of key interactions and experiences encountered throughout the research. Previous insights and conclusions are translated into workable design guidelines. Those design guidelines demonstate important interests that should be considered when further developing the product.

- Contribute to lowering the pressure on GPs (trend analysis)
- Enhancing self-care (trend analysis)
- Enhancing/enabling shared decision making (trend analysis, customer profiles)
- Enhancing patient-centered care (trend analysis, pathway)
- Modularity to adjust to the changes in healthcare (context research)
- According to the GDPR (trend analysis)
- To not position itself as a KIS-system (competitors)
- When implementing at GPs, the decision makers will not be the direct users (stakeholders)
- A good connection should be made to the HIS (pathway)
- Match the current way of working (analysis on the wall, value creation)
- A suitable business model should be found (stakeholders, customer profiles)
- Proof of effectivity (customer profiles)
- An alarm overload should be avoided (pathway)
- There should be a clear division of responsibilities, where not all responsibilities are in the hands of the care provider (pathway)
- The current number of CVRM patients that will benefit from monitoring at GPs is small and it should not cause extra work (scenario testing)
- The product should fit to the low health literacy, being explanatory and easy to understand (pathway)
- Enhance accurate measurements (pathway, scenario testing)
- Lifestyle improvements (value creation, pathway)
- Protocol should not be considered as the main interest (value creation)

During the project a personal vision was developed including my own values, beliefs, morals and view for the design of a product at general practitioners, which has been translated into the product vision statement. The product vision statement emphasises on what have been found to be most important during the research process.

The product vision statement for this project is as follows:

"The product enables patients and general practitioners to make use of remote healthcare in such a way that it makes health care more efficient, without losing quality in terms of personalisation and quality of care".

This statement adds to the current future vision of Heart for Health, it makes the road more specific, with more focus on the values that are important to care providers.

Validation of product vision statement

According to Hekkert and van Dijk (2011), a good product vision statement should be context-based, it should describe an end-goal, be realistic, motivational and it should neither be too generic nor too specific.

The statement describes an end-goal which is the use of remote healthcare for more efficiency. This goal is clear yet still open for interpretation and therefore not too specific. From trends and developments, it has been found that remote healthcare (eHealth) is a realistic contributor for the efficiency of healthcare.

The statement is motivational since it includes features that were found to be important for stakeholders. As a designer, I want to create a product that is desired by stakeholders. Besides, I believe that personalisation and quality of care are currently only a side activity for Heart for Health, while they focus on standardisation and automatisation. With this product statement, more attention is paid on the interactions that I have found to be important.

4. PRODUCT VISION

Combining the product vision statement and the future vision of Hearth for Health
To create an actionable future vision statement, a combined future vision of both Heart for Health and the product vision has been created. The future vision of Heart for Health is the following: *"A future where remote healthcare prevents unnecessary CVRM patient consults at general practices."* Combined with the aforementioned product vision statement, these have merged into the following future vision (figure 31):

"A future where remote healthcare prevents unnecessary CVRM patient consults at general practices, by enabling patients and general practitioners to make use of remote healthcare in such a way that it makes healthcare more efficient, without losing quality in terms of personalisation and quality of care."

Figure 31 | *Visualisation of the created future vision*

5

DHOTS 2.0

This chapter explores the possibilities for further development of DHoTS, aiming to create a product that is desirable, feasible and viable.

5.1 Value creation

Heart for Health desires to develop DHoTS further into a product that is implementable at general practitioners. Therefore, this chapter explores the possibility of developing DHoTS further into an implementable product at practices. This product is called DHoTS 2.0.

In the previous chapter there has been found that the current created value of DHoTS is insufficient, a considerable value increase should be accomplished with DHoTS 2.0. DHoTS is not taking away tasks but only adding additional pressure to the GPs workload (Chapter 4). Heart for Health wants to prevent patients from unnecessarily going to the GP. This means that not only measurements but the entire consult should be replaced. This is very challenging, since the consults consist of more than just monitoring. It also involves personalised care and empowering with understandable information. If Heart for Health wants to proceed with the product, it should be able to take over the full task of the GP or practice assistant during a consult. This paragraph explains the needed value from a **consumer perspective** coming from interviews and a **value creation session** with an employee of Heart for Health, which are plotted in figure 32.

Patient experience

By using DHoTS, patients has many unanswered questions. To increase the effect of eHealth, DHoTS 2.0 should include information for patients in an accessible manner. This information should not only explain how people should measure and what the data mean, but also give feedback on personal health aspects such as lifestyle.

In addition to questions, patients often struggle with worries. They want to be assured by the care provider that everything is alright. Therefore, trust is necessary between the patient and the doctor but also between the patient and the product. Measure moments should be well defined to ensure people that they are doing it right, and that not all extremes are an accurate reflection of their current health.

Population health

Quality of care relates to the safety and effectiveness of the delivered care. By way of monitoring blood pressure, more suitable medication can be prescribed, which in turn could prevent unnecessary medication intake. Besides, when patients receive more carefully fitted healthcare, hospital visits might be prevented.

Every patient is different. To help their patients in an appropriate way, GPs want to deliver patient-centered care. Patients' treatment is not only influenced by measurement data, but also by factors such as stress, lifestyle and well-being. If Heart for Health wants to reduce practice consults, DHoTS 2.0 should in some wat be able to provide insight into the aforementioned factors and give lifestyle coaching, which is one of the current services provided by practice assistants.

Cost reduction

At a practice level, efficiency resulting in less unnecessary consults could make it possible for GPs to spend more time on the patients that actually need consults. In the current system, GPs are paid per consult or action. However, with a sharp growth in patient numers, any avoided consults are easily filled with other patients.

At a national level, better monitoring is likely to result in a decrease in hospital visits. Not only is the risk maintained more accurately, but also, by providing 24/7 guidance, the product might be able to prevent people who experience anxieties from going to the emergency support. Saving on these expensive hospital visits contributes to keeping healthcare affordable.

Care team well-being

Care team well-being is related to the pressure on the workforce. When healthcare becomes more efficient, the pressure on the care team lowers. In order to achieve this, the product should actually replace actions or make actions easier. Besides, the product should be easy to use and should be integrated in the GP's systems. DHoTS currently only includes basic patient information and measurements. To be comprehensive, all relevant patient data should be included in one system. According to care providers, at the very least, the patient's full medical history and medication should be included.

At this moment in time, GPs experience difficulty in collaborating with other care providers such as specialists. In too many occurrences, the measurements and lab results are not shared between providers, resulting in double measurements and tests. A vital next step for Heart for Health is to make a system which is accessible to all care providers involved.

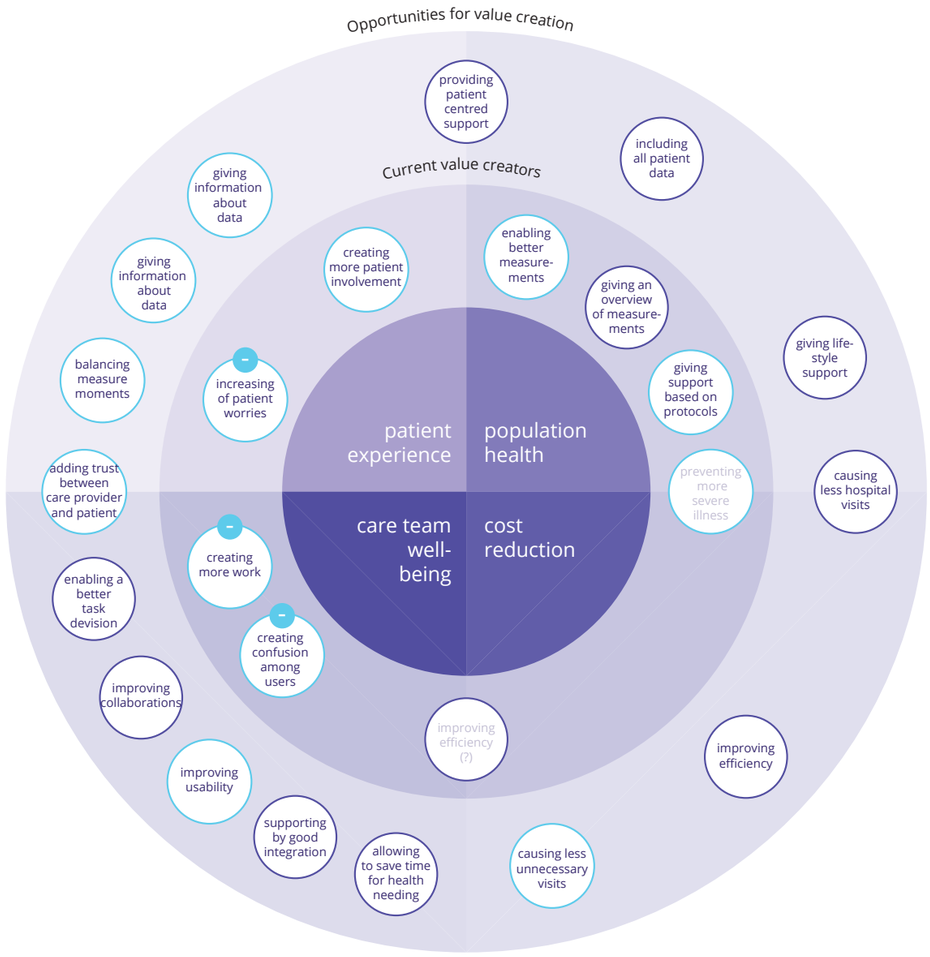


Figure 32 | *Value exploration for DHoTS 2.0 including current and opportunities for value creation*

5.2 Product scope DHoTS 2.0

From the previous value creators and the pathway exploration, a **product scope** visual has been created (figure 33). As has been found from the pathway, a new product should not deteriorate the service that has been delivered by the care providers. Besides corresponding to the described value creators, the product should be in line with the future vision formulated earlier in this thesis: *"A future where remote healthcare prevents unnecessary CVRM patient consults at general practices, by enabling patients and general practitioners to make use of remote healthcare in such a way that it makes healthcare more efficient, without losing quality in terms of personalisation and quality of care".*

Therefore, a product that replaces general practitioner consults for the monitoring of CVRM **at general practitions** should at least include the following value creators;

- **A patient-centered approach,** meaning that the device delivers personalised care. This is currently one of the main services that is delivered by the care providers within the practice. If a product would take over the consultations, this should not be at the expense of the quality that is delivered.
- **Understandable information** for patients with a low health literacy. Patients often experience problems with understanding their health, creating more actions for the care provider. The new product should not raise more questions or cause faulty interpretations by patients.
- **Improving the health of patients**. The product should contribute in lowering the probability of the patient of getting a more severe disease. For stakeholders, it is necessary that there is proof of effectiveness when using the product.
- The product should be **ready for a seamless implementation**. Care providers do not have time for a long implementation trajectory or to go through different test and development phases without improving the efficiency. Besides, it was found that care providers do not want to adjust too much to be able to use new devices. The device should fit to their way of working.
- The product should contribute to **lowering the workload**. If the product does not lower the workload, the product will not be of added value for caregivers, resulting in a preference for a face-to-face consultation.

DHoTS 2.0 should have a primary focus on personalisation and delivering quality, which has been found as an essential element for the creation of a good product. Within the scope of this project, the product has to add value on the following four levels: user, practice and national & regional. The practice level is vital, since that is where the most important decision makers are: active (GPs) and the users (practice assistants). Considering that the incentive for investing in CVRM patients is low on a practice level, the national level is included to define the added value for other stakeholders that might be relevant for the business model.

This product scope explains the features that DHoTS 2.0 should deliver to be desired by GPs. The idea of measuring at home and sending data to GPs does not suffice to make the idea relevant. If Heart for Health wants to create a more desired product, more features have to be included.

Figure 33 | *Product scope for DHoTS 2.0, describing the features for user-, practice-, national- and regional level*

5.3 Evaluation of DHoTS 2.0

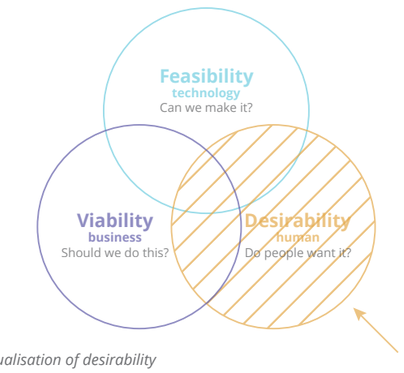
Before starting the development process, an estimation should be made on three levels to decide whether the product is worth developing. Therefore, the feasibility, desirability and viability of DHoTS 2.0 have been researched. Desirability answers the question: do people want it? Feasibility answers: can we make it? And viability: should we do this?

5.3.1 Desirability

Interviews and generative sessions have resulted in insights into what stakeholders (GPs) want. Despite the clear necessity for a new way of caring, GPs are likely not willing to make use of a product that is not adding sufficient value. The current user group is using DHoTS so that it can be developed. However, they have clarified that it is too time and effort consuming. There is still no generated proof of effectiveness. GPs are struggling with the high workload, making them unwilling to spend extra time on more pilots. Therefore, the user group remains very small and will not grow as long as the product is not comprehensive.

Heart for Health wants to create a product that replaces visits at the general practice. To reach this, it takes more than distant measurements and decision support. The whole consult of GPs or practice assistants consists more than measurements and decision making alone. If Heart for Health wants to reach a bigger audience, the product should be expanded into a more comprehensive solution. Therefore, the product scope of DHoTS 2.0 is designed as a product that is desired by stakeholders.

In order to make the product desired, it should incorporate all elements that normal visits contain. As long as Heart for Health is not able to create a product that is able to replace a complete consult, they will not make the delivered care more efficient, rendering the added value for GPs and practice assistants too low.



Visualisation of desirability

5.3.2 Feasibility

"Strategic design is co-creative in nature: a strategic designer does not make strategic choices all alone – he or she needs a multidisciplinary team to co-create strategic decisions, including specialists in the domains that would impact the feasibility and viability and other relevant stakeholders from inside the organization." – G. Calabretta, G., Gemser & I. Karpen (2016)

To determine the feasibility of the product, internal interviews and a small survey were sent to two team members working on DHoTS. The survey contained questions about the capabilities of Heart for Health. Besides asking team members, I have done my own analysis as well. The questions were used to create a strategy wheel. A strategy wheel is a visual representation of the company's competences (Buijs & Valkenburg, 2015). A more elaborate description about the strategy wheel can be found in appendix H.

Strengths and weaknesses

From the strategy wheel in figure 34, it can be found that Heart for Health has a lot of knowledge of the healthcare context. Heart for Health knows the problems in healthcare, but at the same time, this knowledge held them back from doing user research. They originate from secondary care, which involves different stakeholders than primary care. If they want to focus on primary care, they should invest in more user (GP/practice assistant) research.

Their technical skills are sufficient to create new eHealth related products. Heart for Health has a wealth of IT knowledge and people are eager to work hard for their cause. However, their financial resources, product portfolio, research & development and strategic capabilities are lagging behind slightly.

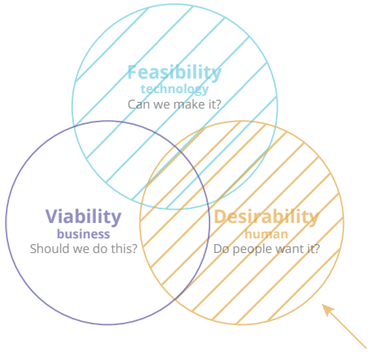
Comparing with the competition

As stated in chapter 2, Philips is likely to be the biggest competitor. Philips has vast financial resources, nevertheless Philips has many other departments and does not invest all their resources into one product. Also, while the product portfolio of Philips is big, their related products might sometimes have a negative association with their customers. This might result in an advantage for Hearth for Health since Heart for Health is an unknown company.

Figure 34 | *Strategy wheel, created in collaboration with employees of Heart for Health*

The research & development and user knowledge of Philips is expected to be very high. From their website it seems like they invest a lot in those areas. Philips might lose eye on their competition once in a while because they are currently one of the biggest competitors in healthcare. They score lower on the knowledge of context. Philips knows healthcare but Heart for Health 'comes from healthcare', which might be an advantage for Heart for Health, since they can more easily relate to their customers.

Since Heart for Health is a smaller company, decisions and developments can most of the time be executed quicker than in large companies such as Philips. Making the company more flexible towards users. This can become a large advantage for Hearth for Health since they adjust their products easier.



Visualisation of desirability and feasibility

Is Heart for Health able to make it?

Creating DHoTS 2.0 will be a challenge for Heart for Health. Substantial investments will have to be made, and the competition provided by Philips and other competitors is considerable. Heart for Health is an enthusiastic company with a progressive vision. However, they tend to forget to analyse their customer first. The product that is desired by GPs is not the product that is currently offered.

Nevertheless, it can be expected that if Heart for Health invests more, improves their research capabilities, and takes a more step-by-step approach, they will be able to make DHoTS 2.0. Also very important, is that Heart for Health already has a network of GPs, which they can reach out to for testing new products.

In an internal interview, one interviewee stated:
"We do have potential for eHealth, we can do a lot. But we have to bring value to GPs. With cardiologists we have a lot of experience, however with other diseases we have less knowledge."

The results from this research suggest that Heart for Health is expected to be able to make the product. Nevertheless, with their current expertise, they are not likely to be the most suitable company to focus on primary care.

5.3.3 Viability

Viability refers to whether the solution is expected to be profitable. It is necessary to examine the viability before starting development. In design processes, viability is often taken for granted when the attractiveness (desirability) is making sense (Calabretta, Gemser & Karpen, 2016). For DHoTS 2.0, viability is very important since Heart for Health is currently struggling to make an operable product.

Profit

As stated before, it is expected that the incentive for GPs to invest in a product for CVRM is not high enough. This is because the user group in practice, existing of uncontrolled hypertension patients, is low on a practice level (10-20 patients per practice per year). Therefore, it is necessary to look into other stakeholders that could benefit from the introduction of such a product.

National level

On a national level, high blood pressure is a relevant problem. According to Volksgezondheid en Zorg, 31% of the Dutch population aged between 30 and 70 has a high blood pressure, increasing their risk of more severe diseases. Therefore, it can be expected that on this national level, there will be an interest in investing in a product to monitor blood pressure.

Health insurances

Health insurances benefit from healthier people. If their insured customers are healthy, they are expected to face less (and lower) hospital costs. However, since customers are able to switch between health insurance companies every year, an investment in such solutions is a big risk and therefore unattractive for health insurances. Also, health insurances see it as an investment that should be done by GPs. If health insurance companies were to pay for the device, the GP would likely use it for all their patients – also those that are not insured at the insurance company paying for it.

Only if the implementation would be executed on a large scale, and if the majority of insurance companies would contribute, health insurances could be interested in investing in DHoTS 2.0. From past experience, unfortunately, it has been learned that such simultaneous implementations are rare.

Government/NZa

If the government would decide that the product should be included in the basic package, the product will become available for all patients at risk. To reach this, the product should be proven to be cost and quality effective. Since blood pressure only poses a risk for more severe diseases, research will take a long time to prove that more severe diseases are avoided through the use of such a solution.

Costs

All sorts of subsidies are available. At the moment, DHoTS is a subsidised and invested pilot. In the healthcare industry, many start-ups use these sorts of funding during the first years of their products, but struggle to find a sustainable business model once the subsidies end. DHoTS is currently experiencing the same.

The funding should be used to work towards a sustainable business model.

Investments

Investments have already been made and a viable business model is hard to achieve. Working towards a proven product will cost more time and also many more investments. In the short term, Heart for Health will have to invest (a lot of) money and there will be a lot of uncertainty on whether the product will achieve a sustainable business model in the future. Figure 35 shows a representation of the expected (estimated) investments.

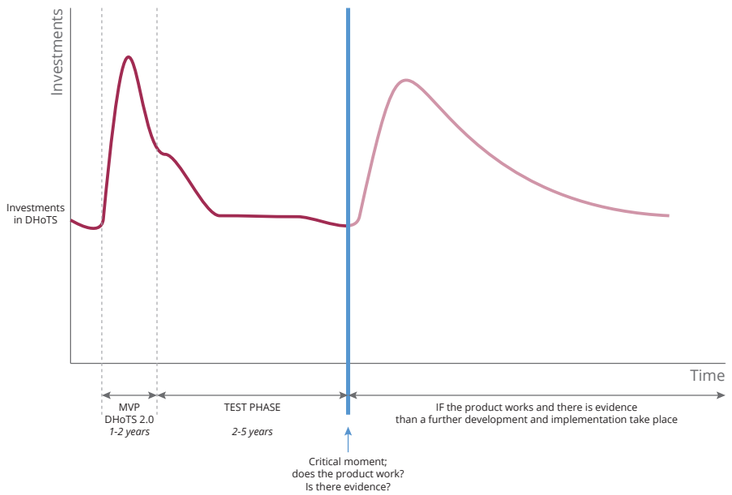


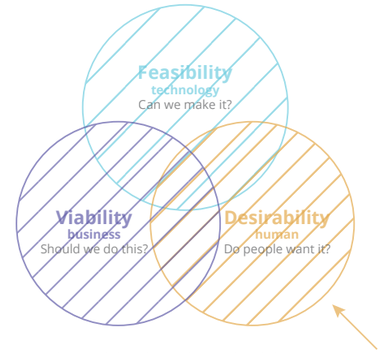
Figure 35 | *Expected investment and phases of implementation*

Risks

DHoTS 2.0 comes with many risks. DHoTS currently already faces problems in finding a suitable business model and this will not likely change with the implementation of DHoTS 2.0. Investments have to be made without any certainties in the future. The test phase, and therefore the expected return on investment, will take a long time. After the test phase, the product might not have proven any efficiency which will make it even harder to find a business model. Besides, when the efficiency has proven itself, it might still not add enough value for stakeholders.

This makes an investment in DHoTS 2.0 a big risk for a company that has not been established in any market yet. Moreover, the problems of financing eHealth within healthcare go beyond the problems of the financing for DHoTS, providing another obstacle for the establishment of a successful business model.

Therefore, it is important that the important features are build in the test phase, so that there can be kept track of how the product performs. So that at certain moments in time, there can be decided to maintain, adjust or stop.



Visualisation of desirability, feasibility and viability

5. DHoTS 2.0

Initially, Heart for Health desired to research how DHoTS could be developed in such a way that the product becomes profitable. This led to the product scope of DHoTS 2.0 as described in figure 33. DHoTS 2.0 describes a product that both delivers added value for general practices and works towards the envisioned future of Heart for Health.

However, Heart for Health is struggling to develop of a comprehensive product, that offers what stakeholders desire. The requirements for a CVRM monitoring product at general practices have been formulated as follows;

- Enabling a patient-centered approach
- Providing understandable information for patients with a low health literacy
- Improving the health of patients
- The product should be ready for seamless implementation
- The product should contribute in lowering the workload

Many problems within the development of DHoTS are arising. Heart for Health wants to create a product that is efficient, but due to the limits in data availability, they are not able to create a comprehensive product that is implementable at general practitioners. Besides, DHoTS is under a lot of pressure since the pilot users are not satisfied. It has been found that general practitioners actually want all or nothing.

The capabilities of Heart for Health should be broadened and more data is necessary to build a desired product. Looking at Heart for Health's situation right now, it is expected that they will not be able to develop their current DHoTS into the proposed DHoTS 2.0. Gathering new and sufficient data is complex since GPs are often not willing and able to invest time in an underdeveloped product.

Heart for Health has to find a new way to proceed from what they are offering now, to what they desire to offer. There are two options for the short term:

Option 1: Continue with current approach

The first option is to continue what Heart for Health is currently doing. Heart for Health is trying to add value to DHoTS but this progress of adding value is progressing at a slow pace. From interviews, it appears that the initial focus of DHoTS has been wrong and was not what GPs needed. During the course of this research, Heart for Health has also decided to stop the development of DHoTS for the near future, meaning that its development will even be slower or non-existent.

Option 2: Finding a new way to work towards the envisioned future (explore opportunities)

The second option is to find a different way for Heart for Health to have impact at GPs within the envisioned future. The current target group of GPs is difficult to satisfy because of their complex needs and wishes. Finding a different target group to start with could result in better outcomes and a faster development of the product. The implementation of DHoTS 2.0 could then follow. This option will be further elaborated on in the next chapter.

6

DEVELOPMENT

This chapter describes the exploration of new opportunities for Heart for Health. An ideation session has provided input for new ideas for the company. Then, the most promising idea have been selected and further developed into an idea that was evaluated.

6.1 Next steps for Heart for Health

This chapter describes the ideation and creation of the proposed solution to develop from where Heart for Health is now (DHoTS), to the envisioned future where remote healthcare prevents unnecessary CVRM patient consults at general practitioners, without losing track of the created product vision statement.

Heart for Health developed DHoTS to reach a future where remote healthcare prevents unnecessary CVRM patient consults at general practices. Due to the complexity of the context and stakeholders, the development of such products has been found to be challenging. A process overview of previous research has been shown in figure 38, on the next page.

From research it has been found that the current approach of trying to first implement a product at general practitioners was challenging within the capabilities of Heart for Health and the ongoing market trends and developments. The wishes of the GPs were too complex to develop all at once and they were not interested in a product that only delivers a part of the solution. An abstract visual representation of what GPs want and what Heart for Health is offering is shown in figure 36. The requirements for a product for CVRM monitoring at general practices were formulated as;

- Enabling patient-centered approach
- Providing understandable information for patients with a low health literacy
- Improving the health of patients
- The product should be ready for seamless implementation
- The product should contribute in lowering the workload

From the performed research, the requirements have became clear. But, creating a feasible product that contains all those elements is complicated.

Accordingly, an approach was necessary to explore how Heart for Health can still reach the envisioned future without having to create a product that delivers all those requirements. The exploration was done to find a new entrance in the CVRM-market, to serve as an step towards the implementation of DHoTS 2.0.

Therefore, an **ideation session** has been done to explore new opportunities for Heart for Health to persue their vision without having to cover all the complex requirements at once. The goal of this ideation was to find a first possible step and find opportunities for developing an alternative product that increases the probability of a successful implementation.

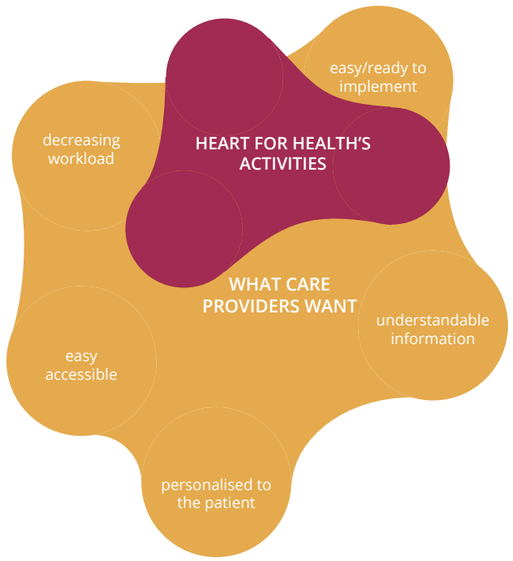


Figure 36 | *Product requirements and activities of Heart for Health*

6.1.1 Ideation

To further explore the possibility of working towards Heart for Health's vision for the general practitioner sector, a ideation session with students has been organised. During this ideation session, four participants were asked to generate as much ideas as possible on different steps or approaches that could be valuable for Heart for Health.. The generative sessions started with an introduction presentation of the topic. Then, four predetermined **How-To**s were shared. After performing the How-To method, the participants **discussed** the outcomes. Together they developed four promising ideas further in groups of two.

Participants

For the creative session, four students were asked to participate. The participants were selected on creativity and/or medical experience.

Participant 1 Medical education
Participant 2 Medisgn education
Participant 3 Industrial design education
Participant 4 Creative entrepreneur

How-to method

The How-To method is regularly used in Industrial Design. Predetermined How-Tos were used due to limited time. The How-Tos focused on current problems that where found during this project. The participants were asked to think of one how-to themselves, resulting into some extra input. The selected How-Tos were:

- How to make healthcare more efficient?
- How to improve quality of care?
- How to do something completely different?
- How to make someone pay for healthcare?
- How to lower the workload in healthcare?

The How-Tos were all written down on separate papers. Then, every participant (including myself) got a paper in front of them. Every participant was given two minutes to write down as many ideas as possible and to elaborate on other's participants' ideas. The How-Tos can be found in appendix I.

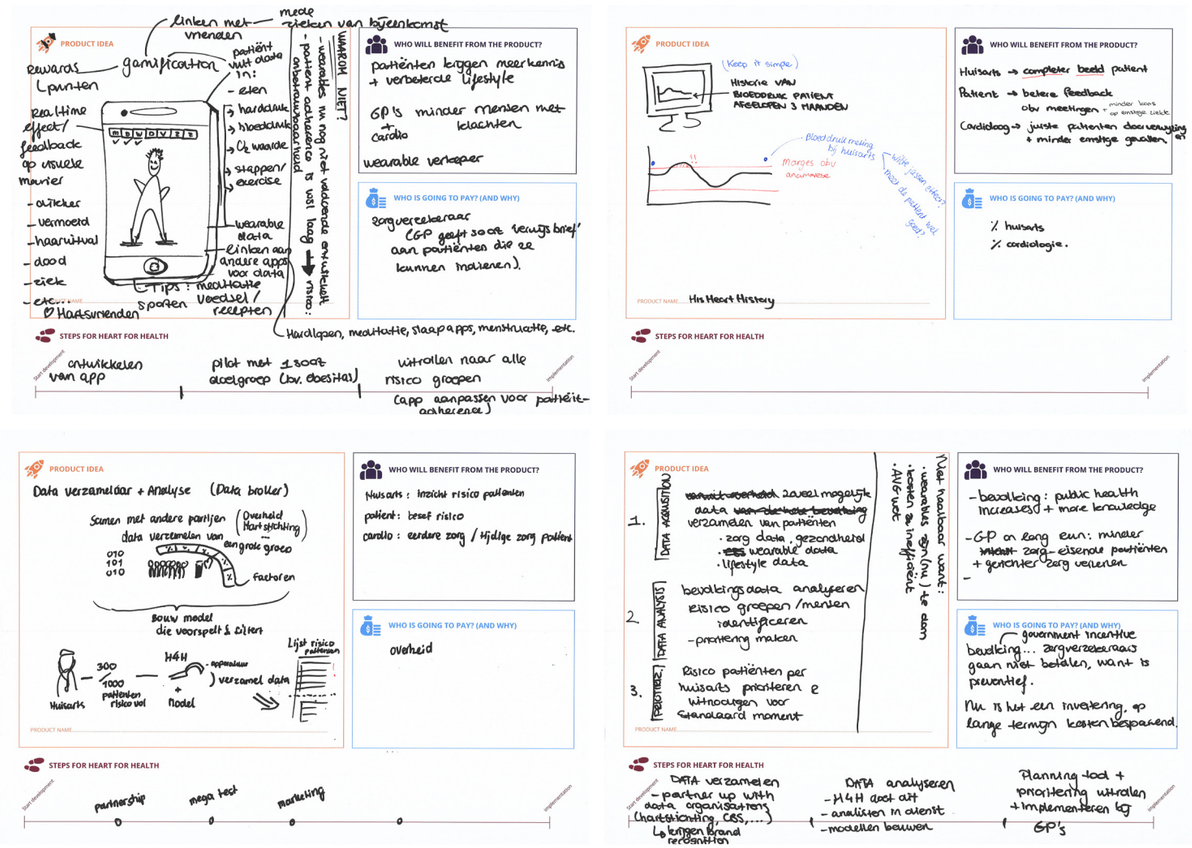


Figure 37 | *Idea maps created by the participants of the ideation session*

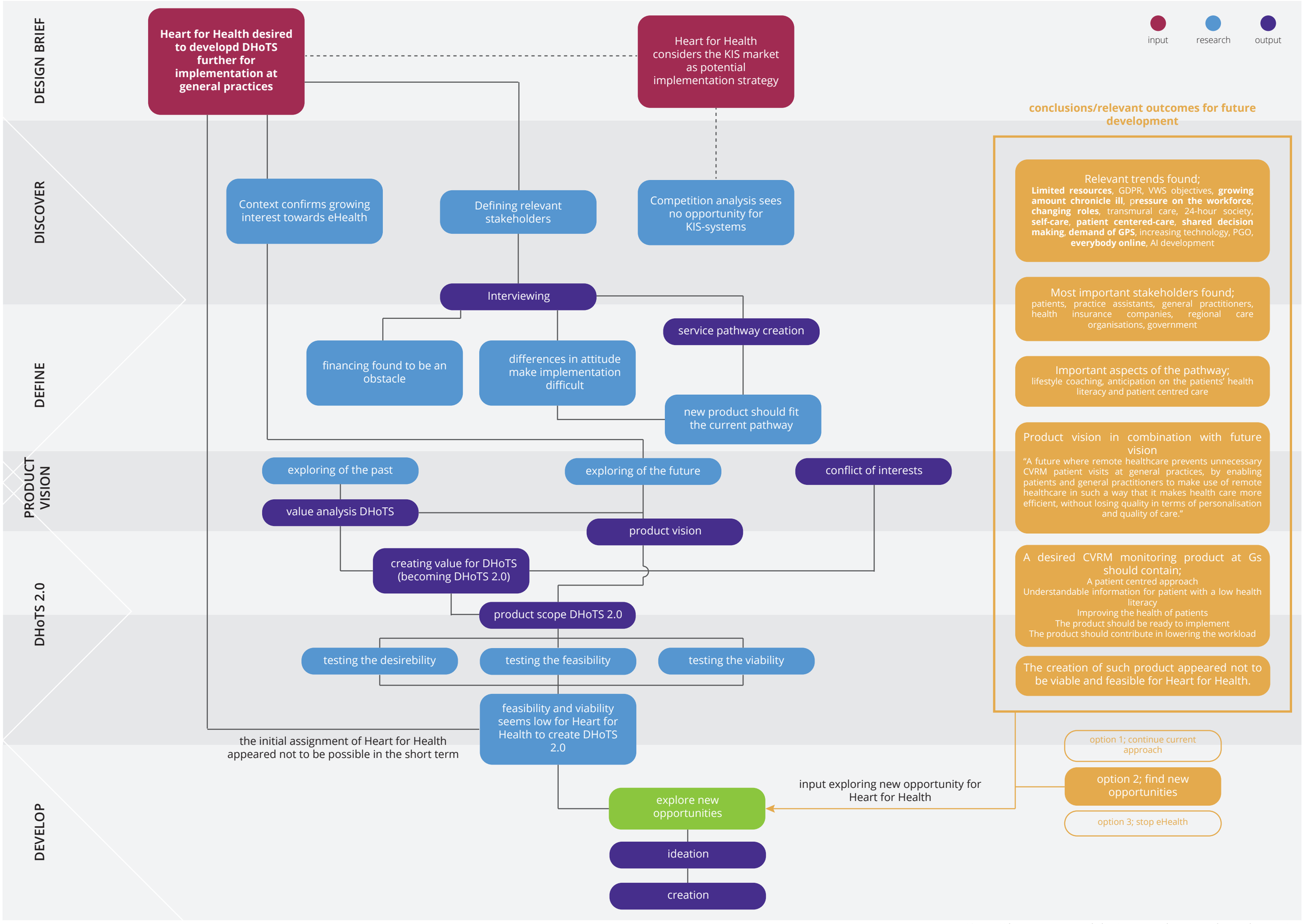


Figure 38 | *Process overview including important take-aways and research connections*

Outcomes

Performing the How-To method resulted into a total of 120 partial solution directions. The directions were discussed and first ideas were shared (figure 37). The participants were then asked to form groups of two. The first group consisted of participant 1 and participant 3 and the second group consisted of participant 2 and participant 4. The group each developed two concept ideas.

Idea 1 – Creating an avatar

Idea 1 is a patient app, empowering patients in their own health process. The participants chose to make use of an avatar, which is a reflection of the patient's health. The app can give advice on the topics of food, medication and data. In addition, patients can find friends to motivate each other to improve their lifestyles.

This app could provide patients with more knowledge of their health and therefore prevent them from getting sicker. The insurance should pay for this application, since later costs on their part are potentially avoided.

Idea 2 – Creating an overview

The participants found that simplicity is key when developing a product for GPs. Therefore, a simple overview screen where doctors can see the measured data and the outliers in their HIS might be a solution that they like.

The participants said that this might be a 'nice-to-have' for GPs, but it will not generate enough value to be truly interesting. Participants did mention that, what might be valuable, is that there is not a continuous data stream. Patients can share their data when they are at the GP, making the data a lot more manageable.

Idea 3 & 4– Using large scale

Idea 3 and 4 both describe a governmental initiative to gather large scale data in collaboration with other health related organisations such as the Hartstichting. With this idea, a national overview of patients that have a high risk for high blood pressure can be created. These data can be used to keep the entire population healthy.

The participants argued that this idea will not be cost effective. Besides, it will not lower any pressure on GPs (on the contrary: it is expected that it will only make the pressure higher) and many people will not be willing to share their data.

Including insights from the ideation session, it has appeared that patients might be an interesting first user of the product of Heart for Health. Patients have less strict demands for CVRM products as compared to GPs. With patients as first users, Heart for Health will have to cover a smaller amount of the same demands. The development of this product can therefore still be a first step towards the development of DHoTS 2.0, while less desires have to be covered at the start of the implementation (figure 39).

From the ideation session, **the idea of a patient app has been selected as most promising and realistic** by the participants**.** According to trends, patients are becoming more involved in their own health. This has created an opportunity for Heart for Health to facilitate this involvement. Creating a service delivered outside the consultations.

When an app is developed for patient use (separate from GPs), the app does not affect the workload of careproviders at general practices. A patient app can focus on personalisation, giving understandable information and accessibility. Without creating the necessity of decreasing the workload and the readiness for direct implementation. The application is no longer trying to substitute consultations, but it will be an extension of the delivered service.

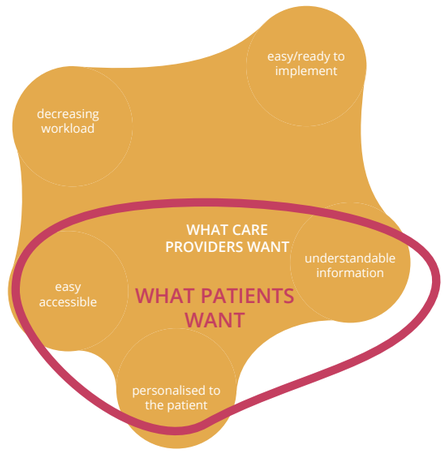


Figure 39 |*Product requirements and requirements for designing for patients*

"There is only one winning strategy. It is to carefully define the target market and direct a superior offering to that target market."
- Philip Kotler

6.2 Development of a patient app

Focusing on a new target audience enhances the opportunities for Heart for Health. With Heart for Health's existing knowledge, there might be opportunity in reaching a new market with their product. Experiences from this new market could later be used to improve their capabilities for primary care.

Learnings from mijnClic

When Heart for Health was still part of CCN, they developed mijnClic, which was an information and advice platform bought from a cardiologist. The website gave standardised lifestyle advice based on information gathered with an intake form. This intake form resulted into two scores: a heart risk score and a lifestyle score. CCN tried to translate this data into an app, but there were some struggles and eventually CCN decided to sell the platform.

CCN learned that it can be very difficult to build an app that is stimulating and appropriate to users. According to an internal interview about mijnClic, CCN tried to give standardised advice to patients. The advice was very far-reaching and it did not motivate users into following the advice. On Mondays, patients would get an advice, for example: "remember to eat less salt", with corresponding information about the advice. Besides a lack of motivation, another problem that was found is that the information provided was often too difficult to understand for the majority of the CVRM population.

What was missing from mijnClic was personalisation and understandable health information. Resulting from both literature (U.S Department of Health and Human Services, 2012; CDC, 2008) and the performed research, these aspects have shown to be really important when trying to change a person's lifestyle. When creating a new patient app, focus should be on a personalised approach, fitting to the individual patient's needs.

6.2.1 Value specification

The patient

CVRM is associated with lifestyle habits such as smoking, lack of activity and unhealthy diets. Besides, high blood pressure can affect people with obesity, type 2 diabetes, kidney disease, obstructive sleep apnoea, lupus and other diseases. Empowering those patients with healthcare knowledge can help chronically ill patients to manage their disease (Howard and Ceci, 2012). The app will be designed for patients who want to change their lifestyles for blood pressure improvement, since this group can have the biggest impact from self-management. The motivation of patient is essential because they will be the ones improving their own health. Making the patient more aware of their health status and supporting them in their progress can also lead to a lower workload for GPs. To get more familiar with the patients, a **persona** has been created (figure 40).

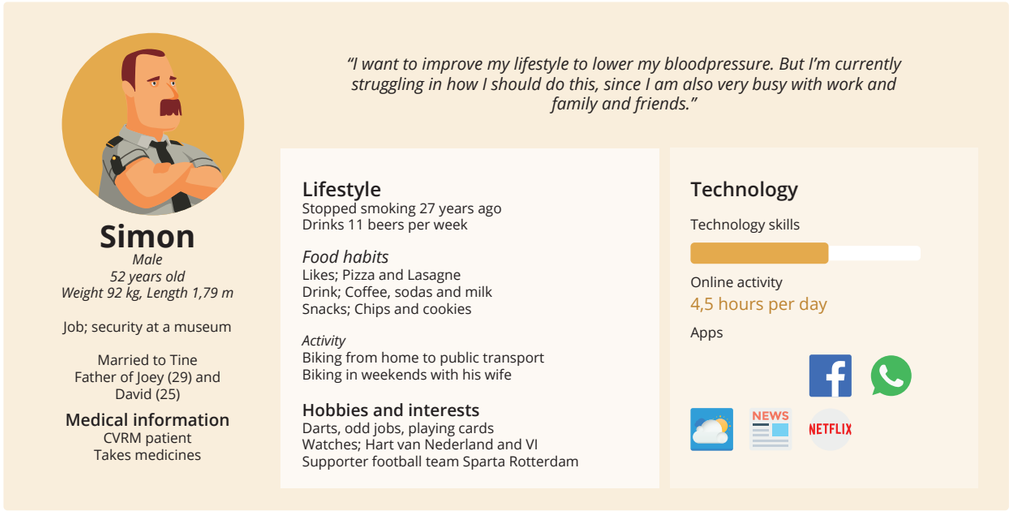


Figure 40 | *Persona of a CVRM patient*

Value proposition

A **value proposition** is created to describe the value that Heart for Health should deliver to patients. To develop a value proposition, two methods have been used. First, the commonly used method of **Value Proposition canvas** (Osterwalder, 2015) has been selected. With this method, a customer profile is created and important components are represented. Then, the value proposition is adjusted in such a way that it fits the pains, gains and jobs of the customer. For the patient app, there is one important stakeholder: the patient. The full canvas has been visualised in appendix J, the value proposition has been visualised in figure 41.

To create a more complete value proposition, the **method of Value Hypothesis** has been used. With this method, different opportunities and possibilities are explored. According to Kumar (2013), the Value Hypothesis method has five parts: user, needs, offerings, benefits and competition. First, the value hypothesis has been executed manually in order to explore possibilities. Next, the most important and relevant elements were selected to ultimately create a value proposition. The relevant outcomes of the method have been described below, and the full exploration can be found in appendix J.

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User: CVRM patients who want to improve their lifestyles for better health outcomes
Needs: empowerment, support and information
Offerings: an app including coaching and overviews
Benefits: personalised, accessible and understandable for people without a healthcare background

From both the value proposition canvas method and the value hypothesis method, the value proposition has been created. This value proposition is a statement of what the product should deliver to stakeholders.

The value proposition:
"For CVRM patients who want to improve their lifestyles for better health outcomes, Heart for Health offers an app that empowers patients to make lifestyle changes by offering personalised information and support which is understandable and accessible for people with a low health literacy."

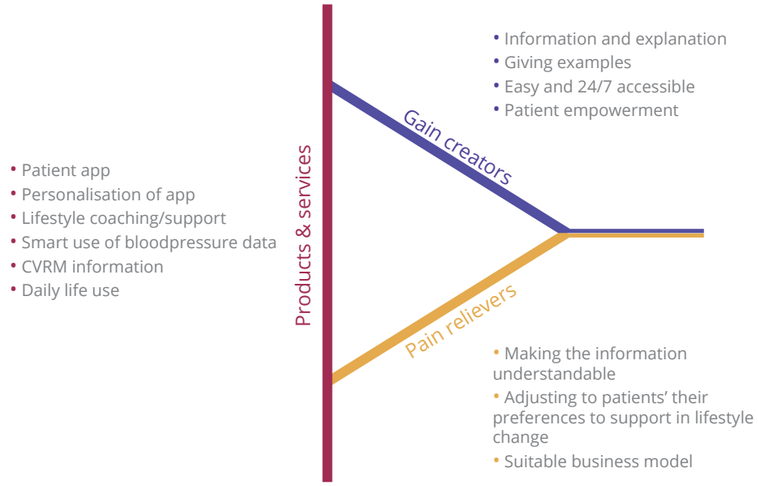


Figure 41 | *Value proposition created by using the value proposition canvas of A. Osterwalder (2015)*

6.2.2 Design

The name for the application is HartsVriend. HartsVriend is the Dutch expression used to describe your best friend. 'Hart' literally means heart and 'vriend' means friend. The app is a friend for your heart, hence HartsVriend.

Design exploration

For the design of a patient app, **individual and collaborative brainstorming** have been performed. The ideas and directions that were found to be most promising have been selected to use during the aforementioned phases. Figure 42 gives an overview of different realistic opportunities for the application that were explored, divided into different aspects.

Personalisation

Personalisation has been found to be an important aspect in the pathway of CVRM. As mentioned before, it is important that the actions are realistic for the patients concerned. A current problem with lifestyle is that it can be hard to estimate what is affordable for patients in terms of their diet and physical activity. Food and activity related advice should be tailored to such factors. A simple questionnaire can help the application to get insight into any necessary information. These questionnaires can for example give insight into the weekly amount of money spent on food and activity, giving the app guidelines into what possibilities are within the budget of the patient. On top of that, people are very different in what they are willing to change. Slow lifestyle change is often preferred, and to motivate patients, it is crucial that the application adjusts to the preferred speed of the individual patient.

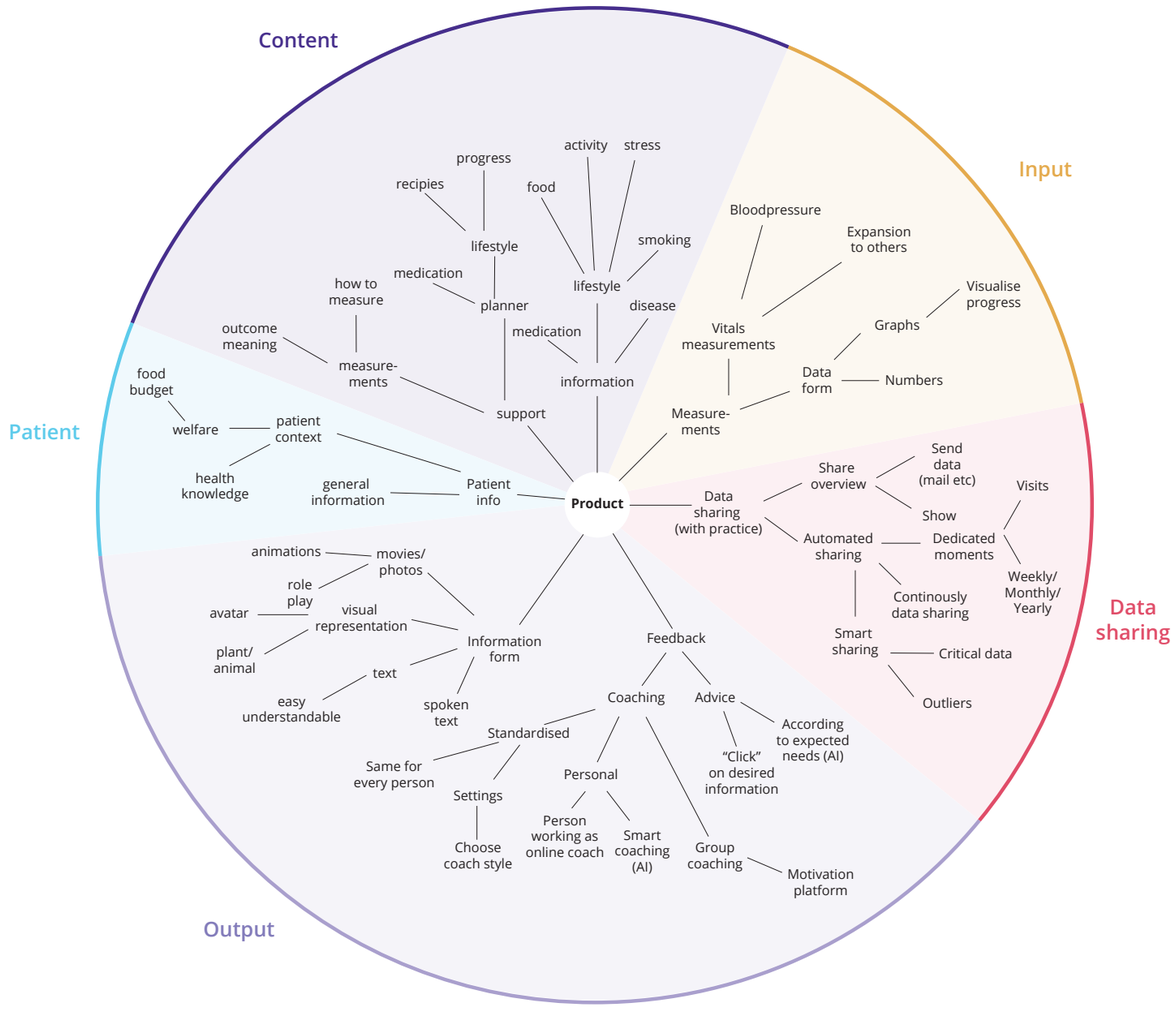


Figure 42 | *Ideas/opportunities generated for a patient app*

Easy understandable and accessible information

Accessible and understandable information can contribute to lifestyle change. CVRM patients often have low health literacy, making it difficult to explain the consequences of their actions to them. Information should therefore be brought to them in small amounts in a way that is easy to understand. Stichting Pharos is a national expertise centre, experienced in making medical knowledge understandable for everybody. When developing a patient app, it is recommended to partner up with an organisation such as Pharos. In addition to text, explanatory movies can help demonstrate how certain actions should be executed, for example how people should measure their own blood pressure.

Improving patient's health

The goal of the care providers and the incentive for patients is to improve the patients' health. The application supports the patient with their lifestyle, which has been found to be one of the most decisive factors for high blood pressure with CVRM patients. From previous interviews, it was also found that self-care can improve health outcomes. Therefore, the access to understandable information and personal approach are expected to result in a better patient health outcome.

Data sharing with GPs

From the performed research, it was found that GPs do not want more (uncontrolled) data income but that they are interested in a more complete overview. Therefore, the app will not send unneccesary information to the practices.

6.2.3 Other applications

There are currently many health application providers available. The explored applications are more eleborately described in appendix K. Three categories have been found that might be relevant as competition:

First, there are fitness-, diet- and weight losing apps. Fitness apps help people to become more physical active and to maintain a better diet. Those applications often have a focus on losing weight or becoming fit. Examples of fitness apps are my fitness apps are MyFitnessPal, Fooducate and Weight Watchers. Most of those applications support their users, but do not have a very personalised character. The applications help motivated users to become more conscious of their activities and the effect. An example of an application that does have a personal feature is Weight Watchers, Weight Watchers connects coaches and other users to the users to give a more personal support.

Second, there are healthcare applications. Within healthcare apps there are PGOs such as Quli, and healpt. Those applications give users more insight into their medical dossier. The applications also enable patients to have online contact with care providers. Besides PGOs, there are applications that enable users to receive more health advice at home. An example is Quin, an app that connects a Quin-GP with patients to give personalised advice about symptoms. Furthermore, there are apps like Thuisarts, this application gives users reliable information and can give indications if it's necessary to visit the doctor.

The last interesting competitor group that was found are tracker apps. Applications like FitBit or QardioCore give users insight into their vitals. It gives graphs and some standardized feedback on the outcomes of the measurements.

From this analysis there can be found that there are many different apps available. Despite this large range of different applications, no applications have been found with a focus on monitoring of CVRM patients. HartsVriend is designed to be a combination of the three different categories described above with a focus on what fits to CVRM patients. Fitness-, diet- and weight losing apps supports people to lose weight, which is something many CVRM patient would benefit from, but this support is not given from a medical point of view. Besides, the applications are often made for people that are already very motivated. The describes healthcare apps support people with their overall health. It enables them to do faster diagnostics and connects them with care providers, but these applications do not focus on monitoring the patients and support in their process. The last applications that were mentioned are tracker apps, those applications are built to connect to tracker devices and to give clear overviews. But, it appeared that patients are often not able to do something with this data on their own. From this analysis it has been found that there are many apps that provide partial solutions for CVRM patient, but none of them provides the complete package where CVRM patients would benefit from. Creating an opportunity for Heart for Health to perceid with the HartsVriend app (figure 43).

Figure 43 | *Ideas/opportunities generated for a patient app*

6.3 Evaluation of the idea

The creation of an app that answers to this value proposition is also within the following product vision statement that has been formulated earlier in this research: "I want to enable patients and general practitioners to make use of remote healthcare in such a way that it makes health care more efficient, without losing quality in terms of personalisation and quality of care." However, instead of focusing on GPs as primary decision makers, the patient will be the central determinant. In addition, the choice to develop a patient app mitigates the demand for a product that is fully finished, as well as avoiding an increase in workload. Yet it still includes personalisation, understandable information provision and the potential increase of health. To further validate the idea, its desirability, feasibility and viability are evaluated.

6.3.1 Desirability

The idea of the HartsVriend app and the proposed features came from extensive healthcare research. Due to the ongoing situation caused by COVID-19, it was not possible to physically meet patients and care providers. Therefore, the idea has been **validated through phone calls**.

One practice assistant and two patients participated. Both patients have CVRM and stated that it was (partly) due to their lifestyle.

From these interviews, it was found that the different stakeholder confirmed different aspects of the idea and simultaneously gave input for the further development of the product. Resulting from the interviews, the desirability has been validated.

Validation by a care provider

The app has been validated by a practice assistant. The practice assistant supports the idea of a patient app that empowers patients: "It sounds good, we want to enhance self-care, otherwise people will keep depending on us."

The patient-centered approach is found to be very valuable. Every patient is different and they all have to be treated differently to get the right support. Some patients are very motivated, which could result in fast progress. Others struggle to make lifestyle adjustments, and for them, a slower approach eventually results in a better outcome. Besides, some patients benefit more from information while others respond better to lifestyle advice. The motivation level of patients has to be probed before giving them any advice or information.

According to the practice assistant, developers of solutions often forget that information (and thereby education) is very important for people with a high blood pressure. Not all patients are able to find the right information, and they often turn to unreliable sources for information, such as unverified messages on Facebook. The Hartstichting can provide a wealth of information that can be of great value to incorporate in a CVRM app.

The practice assistant mentioned the importance of good measurement advice. The decision tool of de Hartstichting helps patients to find a blood pressure measure advice that suits them. The practice assistant also pointed to the importance of asking questions about measurements. The app should include feedback moments for unusual measure outcomes. Questions could include: how are you feeling right now?

Another addition mentioned by the practice assistant is the option of creating a multilingual app. Due to differences in genetic and lifestyle factors, high blood pressure is more common in Surinamese, Hindu and Turkish patients (TPO, 2010). Therefore, it is recommendedable to create an app that is easily understandable for those groups, by offering it to them in their own language.

Validation by patient 1

Patient 1 visits the practice four times a year for CVRM. Since he was diagnosed with a high blood pressure, he has adjusted his salt intake. The participant stated that he had quite an active life and that did not see the point of more physical activity. The participant called himself a stubborn patient.

This particular patient was not very interested in an application to track his disease. However, he did mention that it was often difficult for him to make lifestyle adjustments. The patient appointed that he wanted to change his lifestyle as long as his quality of life would not suffer from the adjustments. For him, a personal approach was key to success. For example, he said that he would rather quit smoking than stop eating steak once in a while. If people (or apps) would want to motivate him, they should anticipate on his preferences.

Validation by patient 2

Patient 2 also visits the practice four times a year for both CVRM and diabetes in one consult. This patient saw a value in a patient app. For him, awareness is a very important aspect to be included in an application. The patient explained that he often struggles with lifestyle changes, also due to his inactive job. He did adjust his salt intake, but he is also looking for ways to lose weight. He has tried different ways of becoming more active but he mentioned that discipline was missing.

The patient has a blood pressure measurement device at home, which he uses on a regular basis. He uses the outcomes to reflect how he is currently doing. When his measurement is very high, he starts trying to lose weight. Unfortunately, he experiences that when the measurement is within the limits again, his motivation disappears. Besides, the patient mentioned that he was not very digitally savvy. He had tried to use an activity tracker, but all the different features were too much for him, making it very time intensive for him to use. From this, it has been found that an application should be comprehensive, but that it should include too many buttons, options and settings.

An application could help the patient if it anticipates on his needs. He mentioned an instance when people told him not to drink any more coffee, but this was not something he was willing to give up. The personalisation is therefore crucial to be able to create an impact for the patient.

The patient also mentioned that contact with others motivated him. Every time the practice assistant had told him to adjust his lifestyle, he felt a renewed sense of motivation. The main issue was that usually, this motivation would rapidly fade. One other example he gave was more serious, namely that an acquaintance of his that had passed away from a heart attack. This event motivated him to take his health more serious. Those examples validate the idea of a community, where people can motivate and inspire each other.

6.3.2 Feasibility

Entering the patient market is something that Heart for Health has not accomplished yet. The complexity of the product is stripped down in different phases, making this product easier to develop and to learn during the different phases. How this product is stripped down will be explained in the next chapter.

Multiple validation moments are necessary to see if the actual added value has been achieved. These moments allow Heart for Health to reflect on what did add value and what did not, to prevent focussing on the wrong things.

Capabilities Heart for Health
Heart for Health has cardiologic expertise which makes them a suitable player in creating action plans and in giving information. Besides, Heart for Health has experience with the devepment of IT solutions. The expertise of those IT solutions can serve as a base for the creation of new products.In order to develop a successful product, Heart for Health should expand their expertise and they will likely have to find new employees before creating the app. Expertise in health & lifestyle, data and app development will be essential.

Since the organisation was founded by two cardiologists, former patients could be easily contacted to be the first users of the product and to give feedback.

6.3.2 Viability

As stated before, the incentive for patients to invest in their health is low, and health insurances are only willing to invest in products that are proven to be effective. Therefore, the first phases of HartsVriend will have to be covered by innovation budgets and investments. Every phase has its own validation moment which should be completed before continuing to the next.

Business model

The **business model canvas** developed by Alexander Osterwalder (2010) has been used to create a business model. The full canvas can be found in appendix L. HartsVriend has to become a proven to be an efficient app, making it in the interest of healthcare insurances to implement it for CVRM patients.

Key activities
The highest costs for the development of HartsVriend will come from the employee costs of the app- and lifestyle module development and data management. Besides, good marketing is necessary to get the most out of health insurance collaborations.

Channels
Heart for Health will not spend money on high investment channels. The app will be available via app stores and the product website. Once the beneficial effect of the app is proven, it is expected that it will be easy to spread information flyers at practices, to reach a large number of potential users.

Revenue
A national approach could be achieved via the NZa (National Health authorities), who are responsible for compiling the basic package. An example of a form of care that was recently included, is the Lifestyle Intervention budget. This budget is available for people with obesity or overweight with a minimum BMI of 25 and a high risk of cardiovascular diseases, or people with a BMI of at least 30. Within this programme, support is given in terms of a healthy diet and activity. To make use of this support, the patient has to be referred by their general practitioner.

The current addition of the Combined Lifestyle Intervention could be an entrance for Heart for Health with a first focus on overweighed CVRM patients. However, this budget does not yet include eHealth. The expectation is that over time, more and more eHealth solutions will be included. Currently, many organisations (health insurances, practices, government) are struggling with how they should tackle eHealth. It can be expected that in the near future, more initiatives can be included.

These recent developments could result in a scenario in which physical support is substituted for eHealth support within the Combined Lifestyle Intervention budget. Additionally, other budgets might be made available over time. The goals that have been set by VWS are an indication of the growing support for eHealth solutions as an indispensable part of the Dutch healthcare landscape.

Health insurance companies
After inclusion in the basic package, the pricing structure could include an annual contribution by healthcare insurance companies. Price agreements have to be made with every health insurance separately. This can be an attractive model for health insurances because they all have their own agreements concerning their insured consumers, and consumers switch on a yearly base. Besides, the amount of CVRM patients is bigger in low welfare areas, meaning that some insurance companies will have a significant higher number of users. This business model is more attractive to health insurances than the business model for DHoTS 2.0, since insurances can provide it specifically to their insured patients, instead of to practices where other people than their own insured patients can make use of it.

Validation of the business model

The proposed business models have been discussed with an employee of a healthcare insurance company. The insurance employee validated the uncertainty of financing of eHealth. Within insurances, there are many discussions about how they can tackle the rise of eHealth. She confirmed that health insurances and the government do want reimburse eHealth, but they are struggling in finding a way to fit it into the current way of how healthcare is organised in the Netherlands. The employee did expect that in the future, a more appropriate reimbursement model will be found to cover the development costs for eHealth solutions that have proven to be effective.

6. DEVELOP

To explore new steps for Heart for Health, an ideation session has been performed. From this ideation session, it appeared that shifting the focus to patients is a promising new direction. It was found that patients ask for a smaller part of the requirements. Namely;
- A patient-centered approach
- Understandable information for patient with a low health literacy
- Improving the health of patients

From earlier research and a shifted focus towards patients, a value proposition was created for a patient app: "For CVRM patients who want to improve their lifestyles for better health outcomes, Heart for Health offers an app that empowers patients to make lifestyle changes by offering personalised information and support which is understandable and accessible for people without health literacy."

This value proposition was the base of the proposed application, named HartsVriend. The application focusses on better health outcomes by empowering patients with understandable information. Besdies, the application will have a focus on delivering care that fits to the user and will in the first phases not include the careproviders.

This app, serves as the foundation of the envisioned future. With the app, Heart for Health can start to further develop their capabilities, with a step-by-step approach towards a more complicated product. In the future, HartsVriend app and DHoTS 2.0 platform can together form the product that is desired by all stakeholders.

The desirability of HartsVriend has been validated by both patients and a care provider. A potential obstacle is finding a suitable business model. Nevertheless, the expectation is that this obstacle will decrease over time, as the acceptance of eHealth and its financing possibilities increase.

7

DELIVER

This phase demonstrates the outcomes of this thesis. A roadmap is created to clarify the different innovations necessary to work towards the created vision. In this phase, the horizons are elaborately discussed.

Then, the roadmap is evaluated based on previous research.

7.1 Roadmap design

According to Simonse (2017) a roadmap is a visual portrait of design innovation elements plotted on a timeline. For this project, the roadmap is used to visualise the steps that Heart for Health can use to work towards the future that they envision: "A future where remote healthcare prevents unnecessary CVRM patient consults at general practices, by enabling patients and general practitioners to make use of remote healthcare in such a way that it makes health care more efficient, without losing quality in terms of personalisation and quality of care."

This chapter elaborates on the HartsVriend app and how the development is a step by step approach towards the envisioned future.

The designed app supports patients in improving their lifestyles. To create an app *"that empowers patients to make a lifestyle change by offering personalised information and support which is understandable and accessible for people with a low health literacy"*, the app development process will be divided into three main phases: pre-pilot, pilot and implementation of HartsVriend. These phases are all divided in different horizons within the **roadmap** for Heart for Health. HartsVriend is expected to provide direct value for patients: better health, personalised support and understandable information.

After the implementation of the patient app, the DHoTS 2.0 platform will be introduced. During this stage, the experience of HartVriend will be used to make the development of DHoTS 2.0 viable and feasible. DHoTS 2.0 will focus on an easy implementation at practices and lowering the workload.

7.1.1 Time pacing

Time pacing is a difficult factor for the slow pacing healthcare industry. As can be seen from the timeline shown in figure 44, Heart for Health desires to take one to three years between their new products. This is quite fast, considering that in healthcare, evidence is often vital to create a sustainable product. The first horizon is fully focused on proving the concept and relying on innovation budgets, which are usually three year investments. Therefore, the first horizon is set at three years. The second horizon is crucial for developing a smart system. The transition towards a fully intelligent system is expected to take a long time, therefore this horizon is set to five years. The last horizon is the implementation of DHoTS 2.0. Healthcare implementations at GPs often progress very slowly, therefore the last horizon has been set at seven years for implementing the product at GPs. Initially, for DHoTS, Heart for Health aimed to have 1.600 participating practices (based on an internal strategy update). Therefore, this will also be the goal for DHoTS 2.0. Looking at the differences between GPs (described in the personas in chapter 3), it is expected that a considerable number of GPs will take a long time to reach.

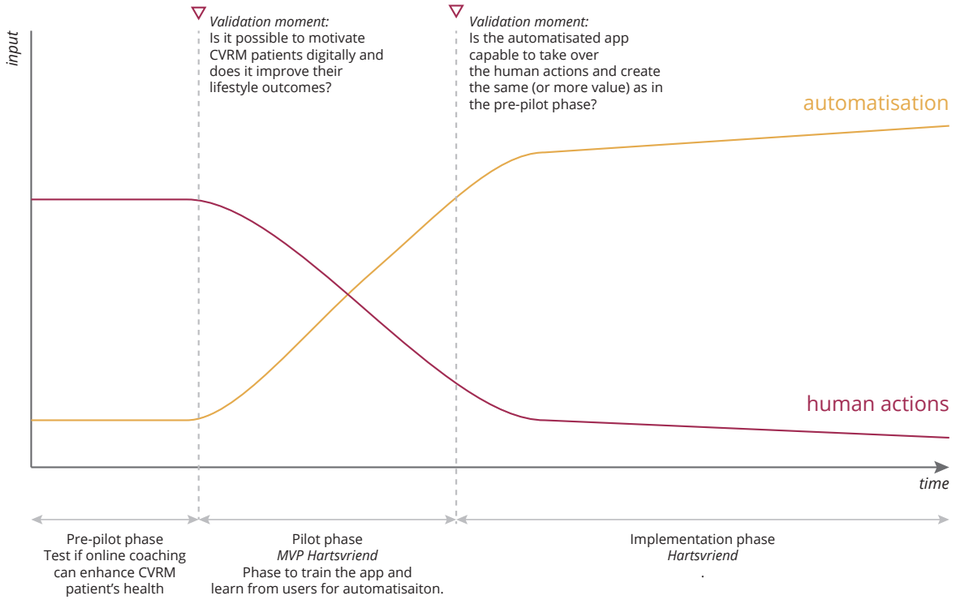


Figure 44 | *Automatisation process of HartsVriend*

7.1.2 Horizon 1: Creating evidence and first automatisation

Horizon 1 consists of the pre-pilot and pilot phase. The objective of the first horizon is to roll out a first version of HartsVriend to test the desires of users and gather input. Since the idea of HartsVriend includes complex features, a step-by-step approach is recommended to gather data. Horizon 1 consists of two main interests; testing the product (working towards proof) and gaining first data intelligence. The first phase has a main focus on testing the product and creating evidence, the second phase has a main focus on gathering data and focusses on first automatisation.

Looking at the formulated requirements for a CVRM monitoring product, the first horizon mainly focuses on delivering patient-centered (personalised) care and health improvements. Besides, the product already starts with incorporating understandable information.

The role of Heart for Health

Heart for Health takes the role as additional care 'supporter'. They will provide an extra service stream to the patient and provide information and advice besides the practice care providers. During this phase they will also take the responsibility for monitoring patients outside consultations.

The role of general practitioners

During this horizon, general practitioners will not be included. Their role stays unchanged from the usual pathway.

Business model

Horizon 1 is primarily focused on developing the idea. In healthcare, it is necessary to first have evidence of effectiveness before arriving at a sustainable business model. Therefore, the focus will have to continue to be on innovation budgets and subsidies. Heart for Health should find such investors at the start of the development. Those budgets will have to cover the first three years, without expecting a return of investments in this stage.

Value streams

During the first horizon the values that were already existent remain the same, see figure 45. Heart for Health's money stream will be from investors. Heart for Health gives health support to the CVRM patients and they will receive patient data and feedback for optimalisation of the product. The pressure on the GPs is expected to be the same. Heart for Health will only serve for additional health support for patients.

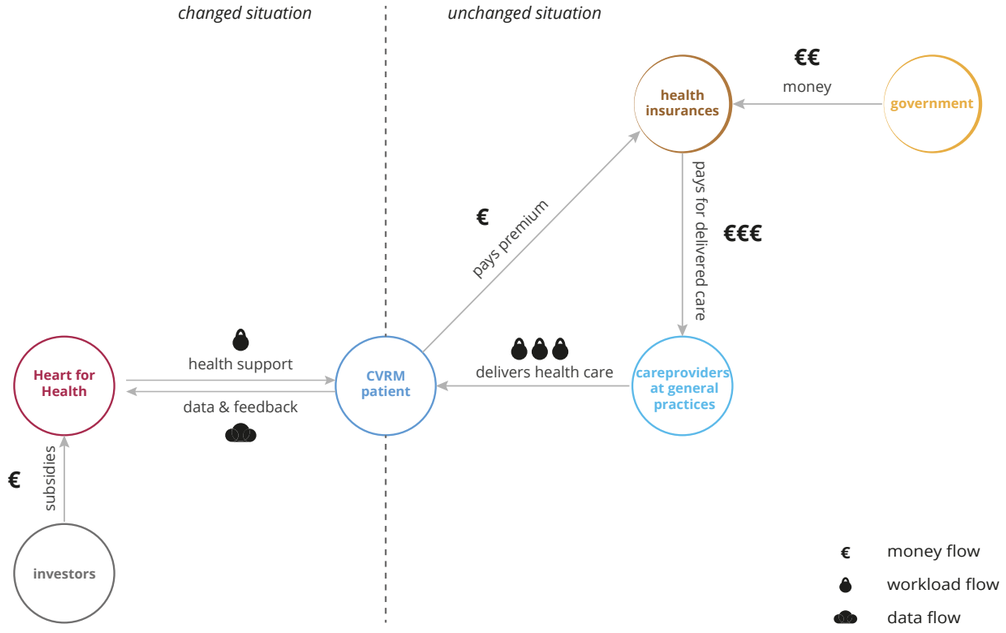


Figure 45 | *Value streams Horizon 1*

Pre-pilot phase

Although it has been proven that lifestyle changes influence blood pressure, little evidence is available about whether digital coaching can contribute to improving blood pressure management. Executing a pre-pilot is advised to gather evidence. During this phase, the app will not offer complicated automated functions. Actions from certified lifestyle experts such as lifestyle coaches of practice assistants are necessary to learn what works and what does not in an online coaching context. Additionally, the app should strive for the best possible health outcomes focusing on lifestyle (see figure 46).

Application

The pre-pilot phase will include a patient application. In this application, patients can see the advice that has been provided and see to-do's. Besides, an overview can be opened where they can see their progress in terms of weight and blood pressure.

Services

The application enables patients to fill in their blood pressure measurements, age, weight and length, all of which is crucial information to create an appropriate plan of action. These data will be interpreted by lifestyle experts who will propose a plan. Then, together with the patient, the plan will be adjusted until it suits the patient's needs and wishes.

To reflect on the action plan, an overview of both the blood pressure measurements and weight can be used as progress insight for the patient. Besides, the application includes feedback modules so that patients can give their opinion on the provided advice and information. The application contains the following services;

- Personalised support by human actions
- Improving patients' health

Personalisation

Personalisation has been found to be a key element in lifestyle coaching. Therefore, it should be included in the very first stage of the product development. During this phase, personalisation will be applied by human actions. Lifestyle experts will handle the cases, creating opportunities to co-decide on the approach and action plans.

To be able to provide personalised actions, the first patient group should be very small. It is recommended that Heart for Health makes use of patients that already know their organisation, for example former patients of CCN. This enables Heart for Health to explore the possibilities of the application before rolling out a fully developed product.

Data intelligence

For this pre-pilot phase, the Wizard of Oz prototyping approach can be used. This method helps to avoid working with incorrect assumptions (Dow, 2005), such as the assumption that digital coaching can contribute to improving health care outcomes. The Wizard of Oz method describes a product where the user interacts with an interface, without knowing that the responses are given by a human instead of a computer. In this way, Heart for Health can first validate the idea and at the same time learn from insights that they encounter during this phase without the necessity of an extensive data base. To gain more insights into the users, multiple feedback modules should be added for users to reflect on the actions of the application.

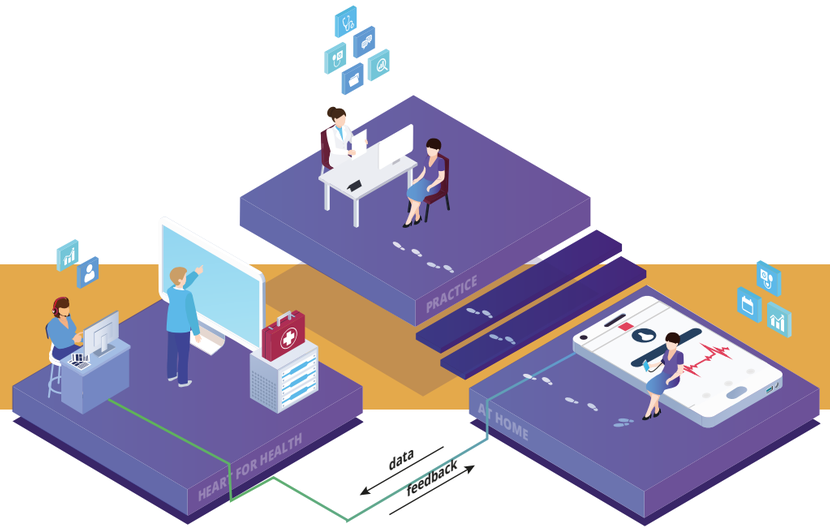


Figure 46 | *Visualisation of the pre-pilot phase*

Pilot phase

The pilot phase is used to get productive feedback on the app and will be launched during the second part of the first Horizon, after the pre-pilot. During this phase, human actions will slowly be automatised (see figure 47). During further development of the app, the lifestyle expert's actions can be replaced by automatisation as much as possible.

To narrow down the features, obese CVRM patients are selected as a target group, considering that they are the group that will benefit the most from lifestyle support. To reach those patients, support in diet and activity is crucial. Other lifestyle features can be excluded in the begin phase.

Application

The application will be further developed and include an information search engine, where patients can search for information topics. This is the first step of empowering patients with information.

Services

The pilot phase is an automatisation version of the pre-pilot phase. Besides the possibility of personalised lifestyle actions and focus on improvement of health, information is added in this horizon. The application contains the following services;

- Personalised support through coaching selection
- Availability of understandable information
- Improving patients' health

Personalisation

Personal guidance is retrieved by developing different coaching settings, created from learnings gathered during the pre-pilot phase. Patients can decide for themselves which coaching setting works for them and change the settings if they feel that it does not suit them. This makes the app scalable without any loss of personalisation.

Information

In the pilot phase it is recommended to develop an information database for patients. Within this database, easy to understand information should be available. Besides, references to good websites should be included to empower patients with legitimate information. At the beginning of the pilot phase, the information should be provided via an easy to use search engine. Over time, the application will add accompanying advice to the action plans.

Data intelligence

Data intelligence is the main focus of Heart for Health during this phase. Heart for Health will start with simple data use in terms of pre-set coaching styles. During the use of the app, users will be asked for their feedback on the coaching styles. From this information, Heart for Health can start to develop a smart data system and use data in a predictive matter. This means that the data will be developed in such a way that the application is able to predict suitable actions according to the data that have been filled in by the user.

Collaborations

For the pilot phase, it is recommended to collaborate with different partners. Pharos has experience with making information understandable, which has been found to be very important. Besides, the Hartstichting already possesses an extensive database of both information and patient data, making them an attractive partner to further develop the product.

Figure 47 | *Visualisation of the pilot phase*

7.1.3 Horizon 2: Automatisation of personalised lifestyle change empowerment for all CVRM patients

The main objective of Horizon 2 is creating the connection between Horizon 1 and Horizon 3. For Horizon 2, the main focus is to fully automate the app (see figure 50 on the next page). During this phase, the app will be developed in such a way that the largest part of the CVRM patients will be able to use it. This will be realised by offering the application in different languages and including information and support on remaining lifestyle aspects such as medication intake.

In Horizon 2, the value proposition for the app for patients will be fulfilled: *"For CVRM patients who want to improve their lifestyles for better health outcomes, Heart for Health offers an app that empowers patients to make lifestyle changes by offering personalised information and support which is understandable and accessible for people with a low health literacy."*

Looking at the formulated requirements for a CVRM monitoring product, the second horizon focuses primarily on delivering automatised personalised care, providing understandable information and empowering patients to make health improvements. Within the second Horizon, the foundation of Horizon 3 will be laid for the implementation of DHoTS 2.0.

The role of Heart for Health

Heart for Health will be able to take over a part of the informative and motivating task of the care provider. Their role will remain to be an addition to the role of the general practitioner.

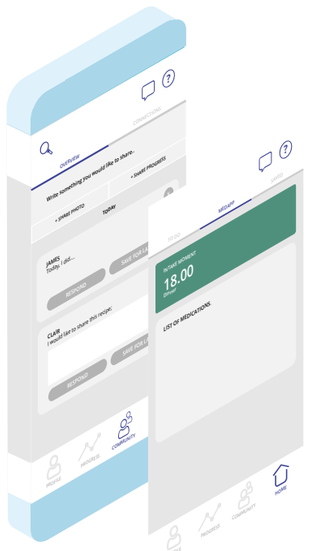


Figure 48 | *Proposal for design HartsVriend*

The role of general practitioners

As in Horizon 1, this Horizon will also not include general practitioners. Their role stays unchanged from the usual pathway. but the workload might be lowered slightly due to the informative and motivating role of Heart for Health. Only at the end of Horizon 2, Heart for health will have to start including GP for the first development of the connection between the HartsVriend app and the DHoTS 2.0 platform.

Business model

As discussed earlier, the expectation is that the insurance companies will be most likely to invest in a product for CVRM patients. The HartsVriend app is implemented after the prove phase. When it is proven that the app prevents more severe diseases, health insurance companies will be likely to be interested in investing in the product, since it can then likely contribute to lower investments in the long term. For Horizon 2 and 3, Heart for Health will have to collaborate with health insurance companies to work towards a sustainable business model.

Value streams

During this phase, the first effect on the value streams will become present (see figure 49). The subsidy investments will be stopped and health insurances will start paying for the HartsVriend. The money stream per CVRM patient to the general practice can be lowered and Heart for Health will be able to take over the information and motivation task of the care providers. Which means that the workload of the GP can be partly lowered. The data stream will remain the same and the care providers will not receive any data income.

HartsVriend

HartsVriend is a more advanced and smarter application compared to the products in Horizon 1. The app will be introduced after the pilot phase. The development of this application will only be realised when there is proof that online (automated) guidance can contribute to a lower number of severe incidents involving CVRM patients. HartsVriend is developed for all CVRM patients who want to improve their lifestyle.

Application

HartsVriend will include the same features as the pilot phase, yet further developed. Besides, notifications will be added to stimulate patients to read new and relevant information or to follow up on to-do's. Within these to-do's, input for e.g. medication intake could be included. Furthermore, the application contains a community platform. This platform enables patients to share their process, tips and tricks concerning CVRM. It has been found that groups or communities can motivate patients. The main goal of the platform is enabling the patients to motivate each other and communicate. An indication of how the application could look like is given in figure 48.

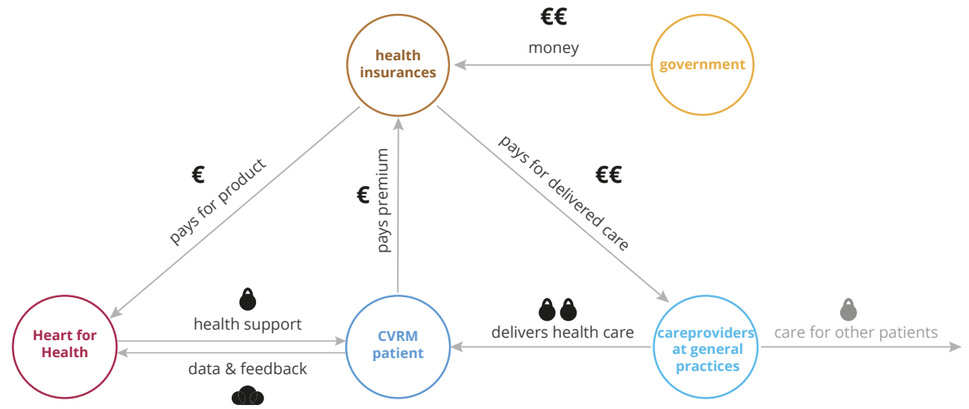


Figure 49 | *Value streams Horizon 2*

Services

HartsVriend is an automated application enabling patients to improve their lifestyle by empowering them with understandable information and personalised lifestyle advices. Besides diet and activity advice, the app will include smoking and medication advice. The application contains the following services;

- Automatised personalised support
- Empowering with understandable information
- Improving patients' health

Personalisation

Personalisation will be reached by making use of intelligent data. A questionnaire will be created to retrieve relevant patient information. Then, the intelligent system will create a suitable action plan for the patients. Patients can still give feedback on the advice if they feel that it is not suitable for them.

Information

In the pilot phase, the first information became available for patients. In the HartWacht app, the information database will be extended including smoking and medication. Besides, suitable information will be sent to patients. This empowers patients with new knowledge without having to search for it themselves.

Data intelligence

From the feedback of patients given in Horizon 1, the application will be able to give better health advices. In the second Horizon, the application will be able to give intelligent advice to CVRM patients without them having to select a coaching style. Patients will be asked to fill in a questionnaire at the start of the creation of an activity plan, which will be the foundation of the given health advice. Besides, patients will be able to approve or disapprove of different actions, which will then automatically be updated into an action that fits the patient.

Collaborations

For medication intake, a collaboration with MedApp will be very valuable. According to Brown & Brussel, 50% of patients does not take their medication as prescribed. Support in medication adherence can contribute to better health outcomes. MedApp is established to enhance medication adherence. According to their website, they currently have 225.000 users. MedApp is not only focused on alarms and reminders, but they also have a module that includes medication information and inventory management. The app has a direct connection with every pharmacy in the Netherlands, enabling patients to easily order their medication.

To establish the foundation for Horizon 3, some collaborations are recommended. For DHoTS 2.0, a connection to HIS-systems is required to make sure that DHoTS 2.0 will be ready to implement in the third Horizon. Besides a good connection, it is recommended to establish collaborations with regional primary care organisations. These organisations can facilitate large scale implementation amongst general practitioners.

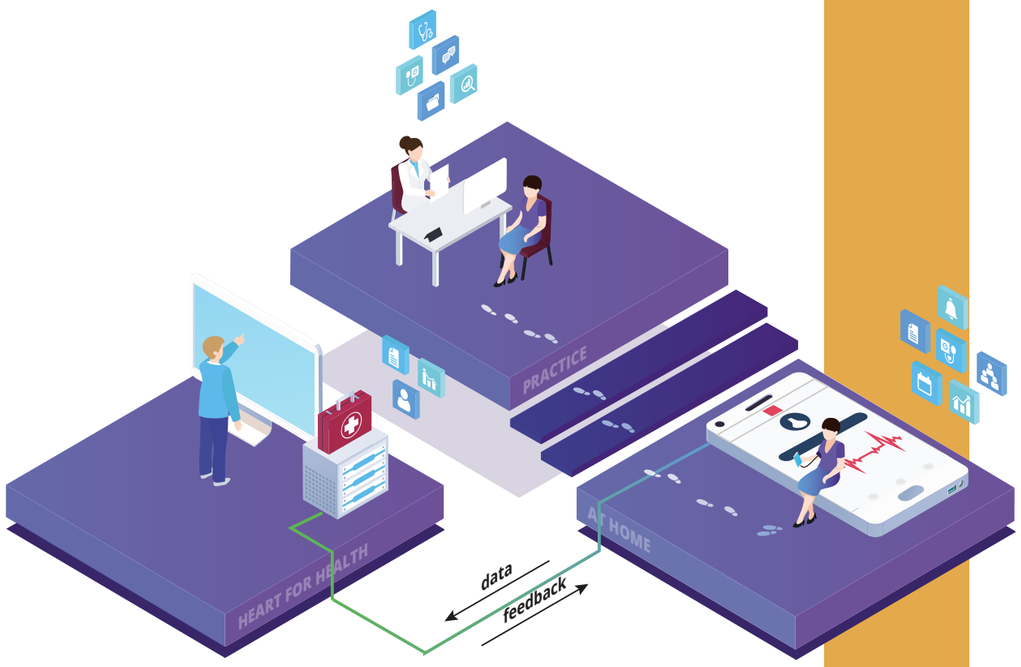


Figure 50 | *Visualisation of the HartsVriend phase*

7.1.3 Horizon 3: Supporting general practitioners with a comprehensive product to substitute unnecessary patient consults.

Horizon 3 focuses on the general practitioner. In this phase, the DHoTS platform 2.0 will be introduced (see figure 52). The main objective is that, in the end, the product will be able to replace patient consults. Heart for Health can make use of their current expertise with DHoTS on how they could implement the product at GPs. The application will be developed in such a way that it is capable of making personalised decisions, which resolves the conflict of delivering protocoled care. Besides, the app will only send data that is actually valuable to the GPs. DHoTS 2.0 has to be well-integrated with the HIS system.

During this Horizon, the main objective implementing DHoTS 2.0 at general practitioners. This will be done by offering a comprehensive product that is ready for a seamless implementation. The final goal of DHoTS 2.0 is lowering the workload at GPs.

The role of Heart for Health

Heart for Health will become a facilitator of the consultations between care providers and CVRM patients. Heart for Health will give insight into the monitoring data to care providers. Besides, Heart for Health will take over a larger part of the tasks of the general practitioners by informing, supporting and enabling remote healthcare.

The role of general practitioners

In this Horizon the role of the care providers will change significant. Consultations will be substituted by remote healthcare and during the remaining consultations a focus will be on discussing the generated monitoring data together with the patient. Besides, health care providers will be responding to filtered alarms of the system. All with all they will need to spend less time per CVRM patient, enabling them to spend more time on others.

Business model

As stated before, it is difficult for Heart for Health to find a suitable business model for the implementation of eHealth at general practitioners. By starting the implementation at patients, first connections with health insurances can be achieved. Furthermore, the largest part of the product will be proven in this phase, creating an opportunity to get included in the basic package. Another expectation is that eHealth will be more commonly included in the basic package which will make it more likely to establish the proposed business model.

Value streams

In the third Horizon, the money flow from health insurances will be divided over both the practices and Heart for Health (see figure 51). The total amount of costs per CVRM patients is lowered and the money can be used for other patients and necessary care. Also, the workload of care providers will be significantly lowered per CVRM patient. This time can be used by care providers to support other patients. In this value stream map, both the workload and money stream to the general practice is lowered. This does not mean that the total money income of the practice is lowered but their time will become more efficiently used. Besides money and workload streams, the data stream will change as well. In this Horizon, the care providers will be involved, but this involvement will be managed well to withhold a data overload.

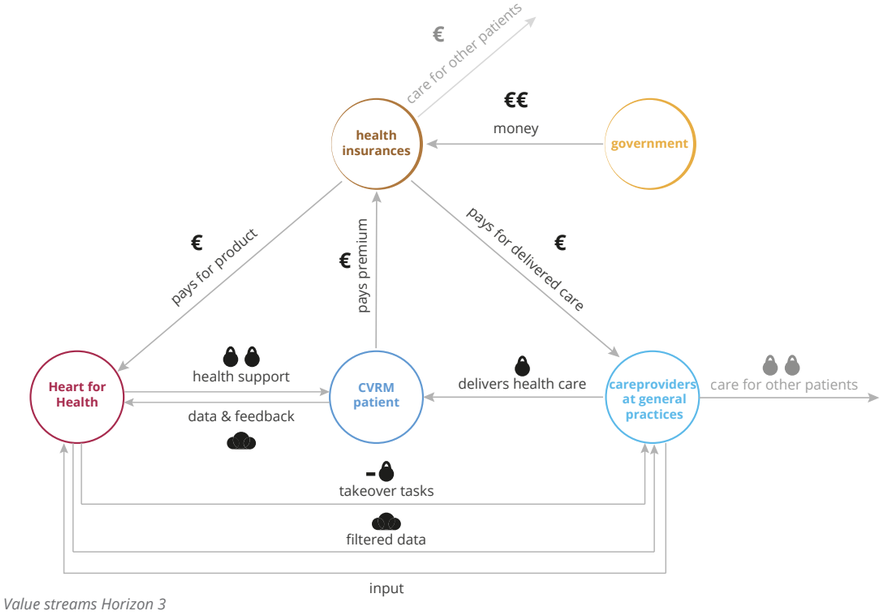


Figure 51 | *Value streams Horizon 3*

HartsVriend & DHoTS 2.0

Application and platform

The product of Horizon 3 consists of two interfaces: one application for the patient and a plug-in for the GPs. The application is a further developed version of the previous applications. What will be added is a feature that gives insight into the input of the GP and includes to-do's that are provided by the GP.

The plug-in will send information directly to the HIS of the GP. In this phase, Heart for Health is expected to have an extensive database and an ability to filter relevant data. Only when an intervention is necessary, the GP will be alarmed. At that moment, the patient receives a notification to get in contact with the GP for a check-up. Besides, the application enables the GP to adjust the given advice whenever they find that to be necessary.

Services

The product contains the same service as the previous phases: automatised personalised support, empowering with understandable information, improving patients' health. What will be added is the connection with the HIS-system and the filtered data. Finally, the application will be used as a service that replaces unnecessary consults.

Data Intelligence

In the previous phases, the data will be analysed which enables Heart for Health to implement DHoTS 2.0 as an intelligent product. The intelligent data can enable them to filter relevant measurements and simultaneously add conclusions to the measurements.

Connecting

To make the product easy to use for general practitioners, the connection to the HIS-systems is fundamental. To reach this, Heart for Health should aim to collaborate with HIS suppliers. Once the connection is established, caregivers can give input in the care process of the patients. Besides, a minimised number of updates will be sent to the GP when the application finds something potentially interesting.

Lowering the workload

With the intelligent use of data, it's expected that the product will be able to substitute unnecessary consults. The HartsVriend application will be able to give personalised care and information, taking over a part of the current consultations. Besides, the data will be interpreted by the product which also reduces the tasks of the general practitioner. Altogether, it is expected that this combination will lower the workload. This topic will be further discussed on page 94.

7.1.4 Roadmap

The roadmap created for this thesis is a tactical roadmap, which is shown in figure 53 on the next page. It provides a strategic plan for the future and exposes innovation steps that contribute to working towards the envisioned future (Simonse, 2017). These steps are devided in different Horizons which are eleborately discussed before. The roadmap is created to function as an internal document for Heart for Health.

Figure 52 | *Visualisation of the DHoTS 2.0 phase and the HartsVriend*

HORIZON 1
3 years
Creating evidence and first automatisation.

HORIZON 2
5 years
Automatisation of personalised lifestyle change empowerment for all CVRM patients.

HORIZON 3
7 years
Supporting general care providers with a comprehensive product to substitute unnecessary patient visits.

Milestones |
- Proof of online value for better health outcomes
- Proof of automatization
- Full automatisation
- First practice use
- 1600 GPs

pre-pilot | **pilot** | **HartsVriend** | **DHoTS 2.0**

BUSINESS MODEL

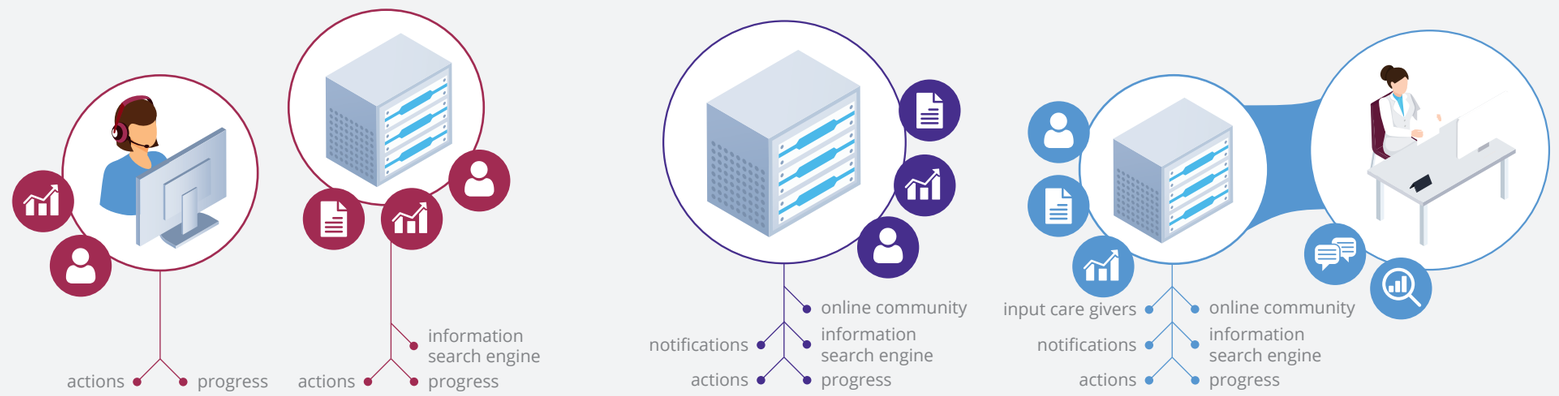
Users |
- selected CVRM patients
- overweight CVRM patients
- CVRM patients
- CVRM patients & care provders

Payer |
- subsidies and investors
- first health insurances
- included in basic package

MARKET TRENDS

- Personalised care |
- Pressure on workforce |
- Changing roles |
- Shared decision making |
- Online acitivity |
- 24-hours society |
- Lowering costs |

PRODUCT SERVICE



Value creators |
- personalised care human actions
- coach selection
- automatised personalisations
- progress overview
- feedback on progress
- information available
- selected information
- group motivation
- caregiver input
- substitute visits
- filtered data

TECHNOLOGY

- Feedback |
- Collecting data |
- Predictive data use |
- Prescriptive data use |

RESOURCES

Internal expertise |
- health & lifestyle coaching
- data team
- GP expertise
- app development team
- marketing team
- translators

Collaborations |
- Pharos
- MedApp
- regional GP organisations
- Hartstichting
- health insurances
- HIS suppliers
- BPM device providers

Figure 53 | *The designed roadmap*

2035

"A future where remote healthcare prevents unnecessary CVRM patient consults at general practices, by enabling patients and general practitioners to make use of remote healthcare in such a way that it makes health care more efficient, without losing quality in terms of personalisation and quality of care."

7.2 Evaluation of the roadmap

During this thesis, both the idea of DHoTS 2.0 and HartsVriend have been **evaluated** with stakeholders. Obstacles were found due to the extensive features necessary for DHoTS 2.0. The different Horizons all contribute to including the features (figure 53). The requirements of a product for CVRM monitoring at GPs were formulated as:

- Enabling patient-centered approach
- Providing understandable information for patient with a low health literacy
- Improving the health of patients
- The product should be ready for seamless implementation
- The product should contribute to lowering the workload

The first two Horizons focus on the personalisation, empowering with understandable information and improvement of health outcomes. In the third stage the main focus is on making the product easy to implement at GPs. Therefore, connections to the HIS will be established. Besides, data filtering will be done to select the relevant health information and outcomes for GPs.

Evaluating the roadmap on the pathway

A question that is still present is; how does the product actually contribute in lowering the workload? To evaluate this, **the effect of the product is visualised in the previous designed pathway**.

HartsVriend and DHoTS 2.0 concern the monitoring part of the pathway. In the previous pathway, these moments have been visualised as a repeating measure moment that occurs one to four times per year. To explore the effect of HartsVriend and DHoTS, the four times per year has been visualised in figure 54. For comparison, the new (monitoring) pathway has been visualised in figure 55.

The new pathway substitutes a part of the check-up moments and replaces it with at home actions. Those actions can take over blood pressure measurements, medication adherence check-ups and the creation and adjustment of plans. These moments do not occur at a three-month interval. Patients (and caregivers) can decide for themselves when and how often it is necessary to interact with the HartsVriend device.

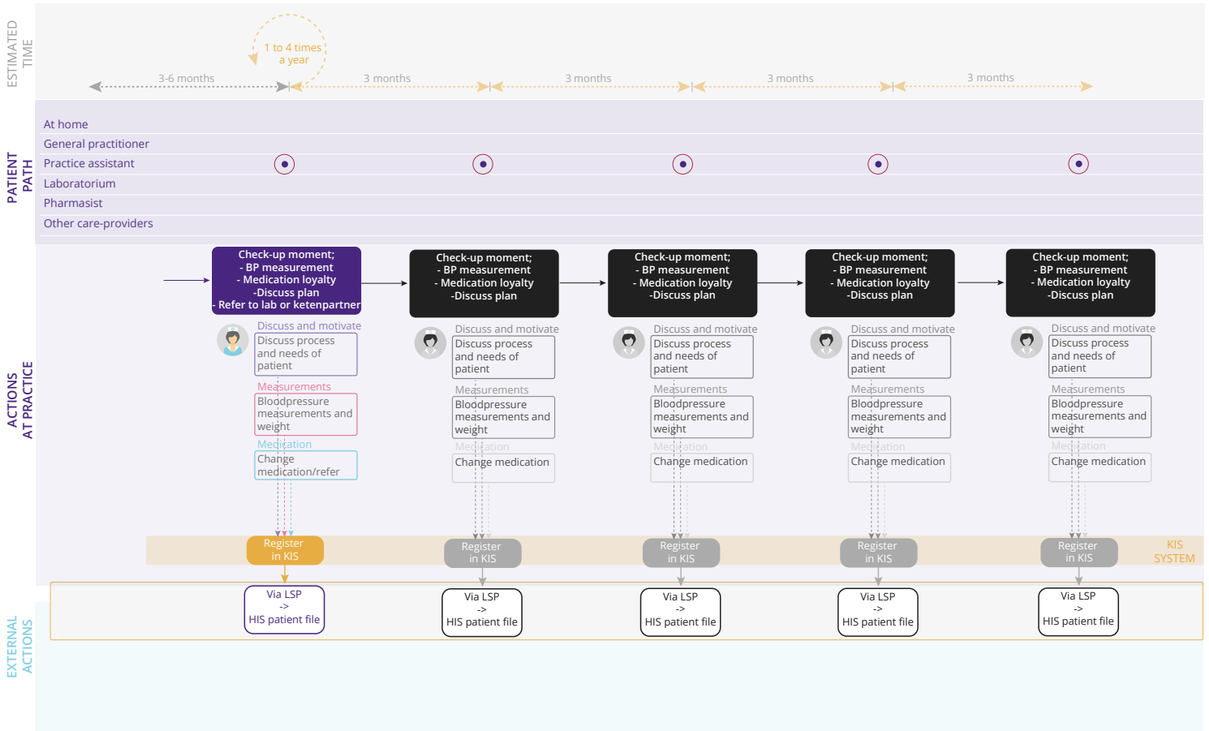


Figure 54 | *Zoom-in of the monitoring phase in the pathway*

Only when the HartWacht application finds unusual measurements or data, an alarm is sent to the caregiver. The caregiver can make adjustments in the settings via DHoTS 2.0, which will be automatically sent to the patient. If the caregivers think that it is necessary to make an extra appointment, a message can be sent to the patient. It becomes the patient's responsibility to make an appointment.

It has been found that blended care is often desired by both caregivers and patients. Therefore, it is recommended to continue to make appointments once every one to two years. During this consult, the focus will be shifted to evaluation of the application and adjusting settings together. Besides, potential referring to the lab or other care providers can be done.

Looking at the changed pathway, it can be confirmed that if the DHoTS 2.0 and HartsVriend are developed well, it will contribute in lowering the workload. This lowering is achieved by the replacement of unnecessary consults. Only necessary or preferred consults will be made. Besides, the responsibility of making appointments remains with the patient. Furthermore, caregivers will only receive a message whenever crucial data are available. Other data can become available when the caregiver actively opens it during consultations or online check-up moments. Within this data connection, trust from the caregiver is crucial. If the caregiver can trust the product, it will no longer be necessary to double check. The horizons collaboratively work towards a proof of effectivity and intelligence, and therefore create trust.

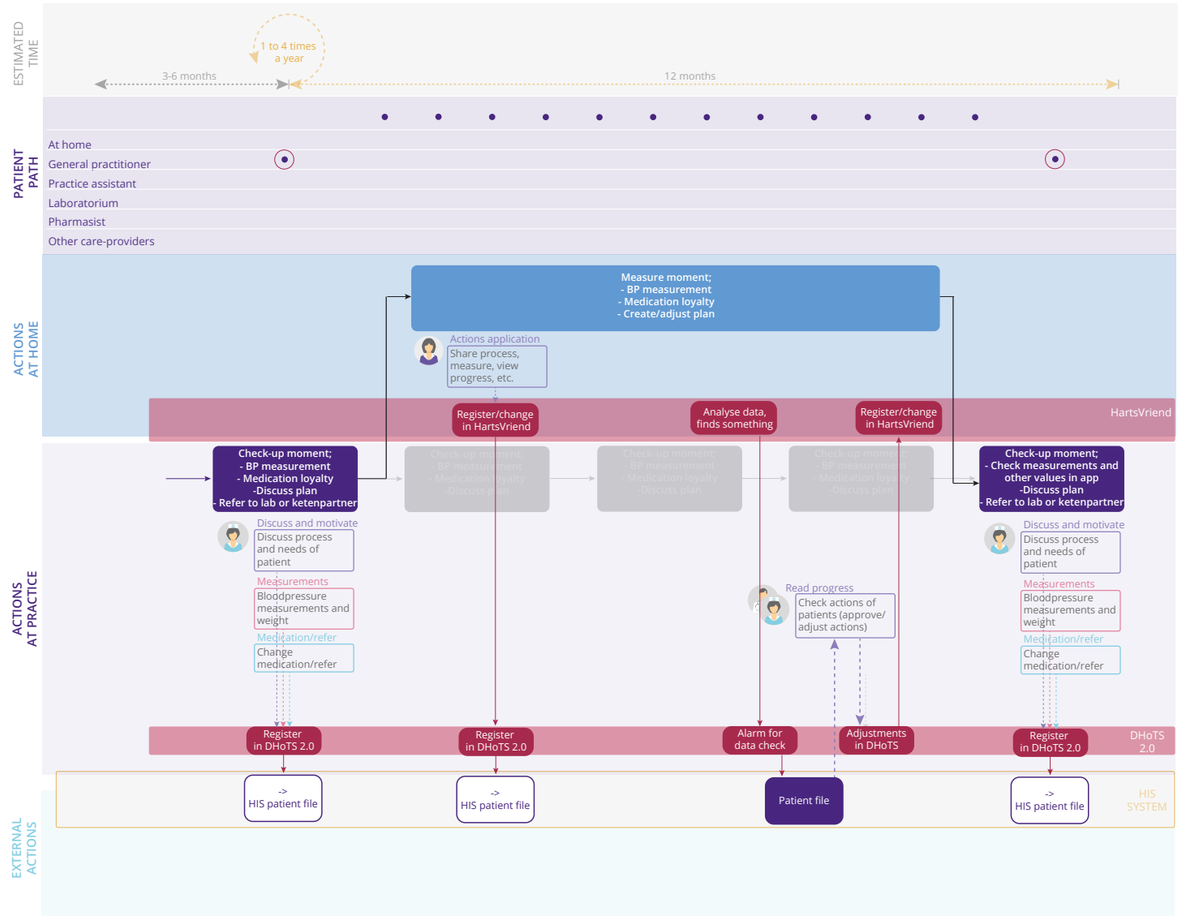


Figure 55 | *Changes in the monitoring phase caused by the implementation of HartsVriend and DHoTS 2.0*

DISCUSSION

8.1 CONCLUSION

Throughout this project, the initial research question has been answered: ***"How can Heart for Health implement its software at general practitioners?"***

Literature research showed a growth in the interest in eHealth. Social trends such as the pressure on the workforce, the shift towards a 24-hour society and the rise of patient-centered- and self-care imply a growing interest in healthcare. Also, the ever-rising costs of healthcare and the growth of chronically ill patients asks for a new way of delivering care. There are currently first movers that want to change healthcare, but the number of care providers that are ready for change still appears to be small. Within primary healthcare, the amount of CVRM patients is growing most quickly. Along with the fact that Heart for Health started with cardiology, this has made it an interesting focus for the company.

Heart for Health wants to enter a rapidly emerging market, making it necessary to take a good look into the stakeholders that they want to target. From interviews, one of the biggest problem in implementing eHealth for primary care appeared to be financing of eHealth. All stakeholders have a low incentive for financing eHealth for at general practices. Besides, proof is often a determinating factor for inclusion in the basic package. This still appears to be difficult since pilot phases are often too short. Besides, current available budgets (composed by the NZa for the government), do not allow for the reimbursement of eHealth. These problems in financing are not only a problem for Heart for Health but for all developers of eHealth products.

Heart for Health's current pilot at general practitioners is called DHoTS. After extensive stakeholder research, the product has been further developed and tested for its desirability, feasibility and viability.

From interviews it occurred that the added value that DHoTS is expected to deliver is not in line with the desires of GPs. GPs want to deliver personalised healthcare, since they have experienced that especially CVRM patients are difficult to treat if their context is excluded. Besides, DHoTS is not yet time efficient. This makes the incentive of trying the product very low since care providers already experience a growing pressure on their practices.

A vision has been created to consider the intended value that a new product should ideally have before looking into the design of a new product for Heart for Health. The product vision is combined together with the vision of Heart for Health to give direction to this thesis. The vision that was created is;

"A future where remote healthcare prevents unnecessary CVRM patient visits at general practices, by enabling patients and general practitioners to make use of remote healthcare in such a way that it makes healthcare more efficient, without losing quality in terms of personalisation and quality of care."

Besides, some requirements were formulated as essential for the development of a monitoring device for CVRM patients at general practices:

- **Enabling a patient-centered approach**
- **Providing understandable information for patients with a low health literacy**
- **Improving the health of patients**
- **The product should be ready for a seamless implementation**
- **The product should contribute to lowering the workload**

Using these insight, a product scope of DHoTS 2.0 has been designed. DHoTS 2.0 is a comprehensive product, expected to serve the values of GPs and is therefore expected to be desirable.

The feasibility study has shown that Heart for Health is expected to be able to create DHoTS 2.0 when they do substantial investments in its product development. However, looking at viability, the probability of finding a sustainable business model on the short term is low. This high investment compared to the low probability of a sustainable business model makes it a great risk to develop DHoTS.

Therefore, the current approach seems not to be appropriate to enter the general practitioner market. Therefore, ideation and creation of next steps for Heart for Health have been performed to explore possibilities to enter the general practitioner market. This was done without losing track of the final vision of Heart for Health.

From this performed ideation and creation session, a patient app turned out to be most promising. Patients cover a smaller part of the formulated requirements, namely; using a personalized approach, providing understandable information and improving health. A patient app can help to generate the necessary data for the implementation at general practitioners.

Since financing healthcare is very reliant on evidence-based information, the development of the app has been divided in different validation moments and products. The development includes a pre-pilot phase to test if lifestyle change can be obtained through online coaching, as well as a pilot phase to test if Heart for Health can create an automated personalised application and the final HartsVriend app. These different validation moments prevent Heart for Health from developing a final product that does not meet the desirability standards of its target group. During the pilot phases, continuous feedback and data streams will contribute to the evolvement of the product.

The patient market is relatively new to Heart for Health. In the past, they have tried to create a patient app, but the personalisation aspect was missing. This new product will be a challenge, but the step-by-step approach helps to develop new skills and to generate more stakeholder insights. With the HartsVriend app, finding a business model is still uncertain. However, with a focus on patients instead of on practices, the product might be easier to sell to insurances because the reimbursement will be calculated per patient instead of per practice. Also, looking at current developments in the healthcare sector, new ways of financing eHealth are expected to arise.

A roadmap has been created to conclude the research question: *"How can Heart for Health implement its software at general practitioners?"*

To implement Heart for Health's software at general practitioners, it is recommended that they take a step-by- step approach, starting with the patient as their first target customer. Heart for Health can collect data and develop a personalised application. This data can then later be used at general practitioners to deliver a comprehensive, desirable product. The development of the full service will take 15 years, ending in 2035, in a future where remote healthcare prevents unnecessary CVRM patient visits at general practices.

8.2 Contribution to practice

The aim of this master thesis was to contribute to the field of Strategic Product Design, design for healthcare and Heart for Health. During this thesis, a focus has been on answering to the desirability, feasibility and viability of design choices.

Overall, this thesis is intended as an inspiration for Heart for Health to look at their products from a different perspective. With this thesis, new ways to tackle design problems have been used that could be applied by Heart for Health more often.

A critical approach

The analysis of DHoTS has been done to show a more critical position towards the current products of Heart for Health. This point of view has been formed by involvement of many different stakeholders. Their input is most valuable for design and I believe that this involvement could improve the product of Heart for Health in the future.

I hope to have inspired Heart for Health to do more co-creation sessions with their intended stakeholders to map out the values that their product should ideally contain. Besides, I hope to have inspired them to listen more carefully to the desires of their users to create a desirable product.

Furthermore, I hope to have exited them to take a closer look into the context. Heart for Health has the capabilities to develop good products, but a more critical look into the context around can help them to emphasize on their capabilities within this context. Instead of looking for what fits to the current developments, a fit should be tried to be found between the context and the company. Connecting the capabilities of Heart for Health to the desires of the stakeholders and context will ultimately result into the best strategic fit. Which will contribute in the creation of a desirable, feasible and viable product.

Thereby, I hope to have inspired designers to take a critical approach towards products or services. From my experience at Heart for Health I have learned that there are many good ideas and intentions, but the actual added value to users and context should not be forgotten. In my opinion, there is often an urge to push an idea into a possible fit. I believe that all designers should first allow themselves to reflect on the product and find the intended and actual value, before creating a strategy.

Future vision and roadmapping

The future vision and roadmap were created to map out possible steps for Heart for Health to take for the future. With this future vision and roadmap, I hope to have motivated them to take a more step-by-step approach towards their envisioned future. This approach does not only fit to Heart for Health but to the whole healthcare sector. For all new eHealth suppliers, it has been found difficult to create a sustainable business. By taking a more step-by-step approach and by incorporating validation moments, it will become easier to reflect on the product. At those moments, companies can decide to either adjust, maintain or stop. This will contribute in lowering the risk of the development of healthcare products.

8.3 Recommendations & conditions for successful implementation

This chapter describes recommendations for Heart for Health, to help them when they choose to proceed with the proposed road towards their envisioned future. Besides, conditions for successful implementation of the roadmap are discussed. Furthermore, some honest thoughts are shared towards Heart for Health's current position in developing their software for the general practitioner market.

Conditions for successful implementation

For the design of the created roadmap, some assumptions had to be made. The first assumption that was made is that Heart for Health will be able to get a new subsidised investment for a pilot of three years. To reach this, Heart for Health will have to lobby for new investments. A potential source of investments is the innovation (S3-) budgets of a health insurance company. Another possibility is to reach out to research and development programs that focus on prototyping and testing healthcare products for technical improvements. The roadmap can be used as a base for approaching investors. Due to time limitation, it was not possible to dive deeper into this topic during this thesis.

The second assumption was that the reimbursement of eHealth will change over time. Throughout this project there has been strived to find a suitable business model. But practice teaches that the development of a suitable business model for eHealth is without any certainties. What is set is that the only way to work towards a suitable business model in healthcare is to provide evidence of the effectiveness. By interviewing stakeholders, the expectation is that the future will bring new opportunities for eHealth.

The last relevant assumption is that Heart for Health is able to make a patient app. Internal interviews indicated that there is a lot of technical expertise. But, additional expertise will be needed for the development of patient focussed products. It is recommended to first analyse the internal capabilities more closely and critical before starting the development of new products.

Future scenarios that might change the options of DHoTS

The described options in chapter 5 are based on the research outcomes and the current attractiveness of the market. The fact that DHoTS seems unsuitable for the current market and stakeholders, does not imply that it will not be a promising solution in the future. Three future scenarios that could change the attitude of users towards the implementation of DHoTS are described below.

Scenario 1

The desires of care providers might change over time. Learning from trends, the amount of chronically ill will continue to grow. Even though general practitioners already experience a high workload, it seems to still be manageable. In times of scarcity, it might be necessary to make trade-offs between the delivered quality and efficiency, creating an opportunity for Heart for Health for a fast (and unfinished) implementation of DHoTS 2.0. An example is the current corona virus. Care providers were initially reluctant towards the use of eHealth. That attitude is currently changing, and ways of using eHealth are being discussed.

Scenario 2

The desires of patients are likely to change over time. During this research, it seemed as if patients were fine with visiting the practice a few times per year. The next generation of CVRM-patient might be less keen on visiting the general practitioner and are likely to be even more focused on online contact and a 24-hour approach. This generation might even be willing to invest some money to substitute the visits for online contact, changing the chances of creating a business model for Heart for Health.

Scenario 3

From the analysis it was found that Heart for Health seems unlikely to be succeeding in adding the necessary value due to financial limitations and accessible data. Heart for Health could sell DHoTS to a bigger company (such as Philips), who does possess those capabilities. If Philips is able to add the necessary value and to create DHoTS 2.0, it can be implemented at general practitioners.

About the development of products

Focus on the customer

This project has been executed from a strategic design approach, including the stakeholders' perspective throughout every stage of the process. When researching DHoTS, it was found that the current values of DHoTS were not aligned with the desires of envisioned target customer (general practitioners). A recommendation to Heart for Health would be to include multiple stakeholders in their design process. With the development of DHoTS, the opinion of several GPs was included. However, more in-depth research into latent and tacit needs was

missing. It is recommended to make more use of co-creation sessions and in-depth interviews in the future to discover the true needs of customers.

A recommendation to minimise the risks is to talk about the desires of health insurance companies and the government. If those stakeholders are closely involved in the design process, by e.g. co-creation sessions, they might be more interested in a collaboration. A

Work towards validation goals

In healthcare, many innovations cope with difficulties in proving their concept. It is recommended for Heart for Health to set goals before developing products. In the proposed road, multiple validation moments are included. Those steps build up towards a more complicated and thereby more expensive solution. When goals are set before developing, moments for validation can help to prove if the product will be desirable, viable and feasible before investing large amounts of money.

Exploring opportunities abroad

Distant healthcare is still relatively new for the Netherlands. Despite the high pressure on general practitioners, the incentive for eHealth still appears to be small. During this research, a scope has been set on development for the Netherlands. Therefore, there was no research done internationally. Nevertheless, it is expected that incentives for distant healthcare might be higher in countries with a more scattered population. Literature confirms that eHealth has been successful in countries such as Norway, caused by the distances between patients and care providers (Hartvigsen et al., 2007).

Besides countries with a more scattered population, it might be valuable to take a closer look into countries with different healthcare systems. In the Netherlands, the incentive for investing by patients is low due to the fact that they pay monthly premiums. In countries like the United States of America, the incentive for investing in monitoring might be higher because less people have health insurances. Ultimately, for those users, the total costs of their health will be temperate because more severe illnesses can be prevented.

Exploring potential opportunities for Heart for Health in those countries is recommended.

About Heart for Health's current position

Heart for Health is still in its early phase as a company. They do not have a known brand name in healthcare yet. Heart for Health is positioning itself in a very sensitive market. Over the past months, they have decided to mainly focus on the development of EPDs but there is still a desire to include eHealth into their portfolio. I would recommend Heart for Health is to allow themselves to reflect on their strategy and products more often. From a strategic perspective, I believe that deciding to quit the development of a product is sometimes the best decision a company can make. Especially in smaller companies, I believe that focus is key for success. When first market positions are achieved, an extension of the focus can be done

From the performed research, a recommendation would be to first establish themselves in the EPD market. Healthcare is a very slow market, meaning that the establishment is expected to take a long period of time. Besides, high investments are needed to develop DHoTS into a product that is desired. Since there is no current revenue stream, it is wise to first establish themselves in one market before entering another.

Once Heart for Health has established themselves within their core business, opportunities might arise again to invest in eHealth at GPs.

"The essence of strategy is choosing what not to do."

- Michael Porter

8.4 Limitations & implications for further research

Limitations of research

Despite the extensive research that has been done during this project, several limitations need to be discussed. The obtained interview insight has been generated from a limited number of stakeholders. Those stakeholders were generally from the same region, which might not be representable for the entire Netherlands.

Also, due to the broad scope of the project during the first stage of the project, the competitor analysis has been performed on a broad skill. When focusing on a patient app, it is recommended to map out all the possible competitors specifically for patient health apps.

The data have been interpreted by the researcher, which caused a necessity for subjectivity in some stages of the process. The data have been validated during different stages by stakeholders, in an attempt to minimise subjectivity. Besides, toolkits were used to gain insights from experts without influencing their outcomes.

Limitations of design

The HartWacht has been designed in a relatively short amount of time, therefore only a first guideline for what the product should contain is given.

Due to limited time and accessibility to participants, only two patients have been involved during the research to validate HartWacht. The selection of patients was only based on their diagnosed CVRM. Their motivation to improve their health was not included. Additionally, current developments (COVID-19) made it necessary to test the ideas from a distance (via the phone). Before developing HartWacht, further research is recommended, including co-creation sessions to gain tacit and latent patient insights.

8.5 Personal reflection

This thesis has been the most complex and simultaneously most enriching project I have worked on throughout my studies. I have genuinely enjoyed and at the same time damned the difficulty of this project.

This project has encouraged me to develop myself as a strategic designer. Throughout my masters, I have struggled to find the essence of strategy and what my position was within it. By being thrown in the deep, I have learned to adjust and take a strategic perspective in unfamiliar situations.

Besides design methods, I have tried to practice my writing skills. With Industrial Design, we often focus on visual communication above writing. Writing a thesis was something that I had little experience with. For me, it was difficult to make the story coherent and understandable. Even though I have struggled with writing, I have found it to be a good experience and a new skill.

My experience at Heart for Health

Heart for Health has given me the opportunity to explore my capabilities as a Strategic Design student. I have been motivated by employees of Heart for Health, which I am really grateful for. I have also felt resistance, which I had to learn to deal with. This learning has been most valuable to me since it has been a new experience. It was something that I felt that I could deal with and enriched me as a strategic designer.

Furthermore, the experience has cultured me as to what it is like to work in a small and evolving company. Within the company, there is a continuous uncertainty of how to proceed, yet people were so determined to work towards the best possible outcomes. I am inspired by the motivated employees who are all collaborating and working hard for better healthcare.

During this project, the company has made some impactful decisions, creating internal shifts and also causing changes in my project. Those decision required me to be flexible. But, it also opened up opportunities for me to give input into those decisions. This might have affected my project, however, it also changed my relevance within the company.

Learning goals

At the start of this project I have formulated my personal ambitions: "During this project I want to improve my strategic competences by applying them in the field. During the past years I have gathered a skillset by doing smaller projects. During my graduation I will be able to decide which skills I can use during which stage. Also, I want to learn better how to involve a client in your decisions and how to deliver something they will be able to use. Lastly, I want to experience how strategy is applied within healthcare organisations."

Applying design skills

In the project I have used many methods that I have mastered during my studies. I have experienced that applying the right skills at the right time can be complicated. In regular projects, there is often a format of steps to follow. With this graduation project, I had to find my own path to follow. Because the scope of this project was not yet demarcated, it was sometimes hard to identify the needed information. Although I struggled with identifying the right methods in the beginning, I believe that in the end I have achieved to use the right skills at the right moment. Design is an iterative process, meaning that I often had to look back to what was done, and adjust my strategies accordingly.

Involving the client

I have attempted to involve the company as much as possible. Initially, I tried to perform the project as assigned by the company. But, as the time went by, I found that it was difficult for Heart for Health to truly define their needs. Within a vibrant company, the interests and focus were shifting regularly. First, Heart for Health wanted to focus on KIS-systems, later they deviated from this initial idea and started to identify other opportunities. Even though I tried to adjust as much as possible to this diversification, I also had to create a focus for this thesis. Combining the needs of the company and the needs of the TU Delft were challenging. Creating a balance was something I strived to do during the whole project.

Delivering something valuable

At the start of the project I tried to identify the most valuable outcome for the company and my graduation. But, I have experienced that what was most valuable of my graduation for Heart for Health was not what I delivered but what I researched. As an outsider, I was able to explore their product and company from a different perspective. During the graduation project, the main focus was the viewpoint of the general practitioners, which was a perspective that was not explored as extensively by Heart for Health.

Now, at the end of the project, I believe that I was able to add value for the company. I have spoken to many employees and I was able to share new insights. Also, I sense that I have contributed in the fact that in the short term, they will not target further developing DHoTS, but rather, shifting their focus to developing a market position in their core business: EPDs.

Strategy in healthcare

My final ambition was identifying the role of strategy in healthcare companies. Within healthcare, innovation is rough. The same applies to strategy. Healthcare is a world on its own, creating many knowledge gaps between a Strategic Design student and the real world. Many competitors have to be included and there are many conflicts, trends and factors that should be incorporated before creating a strategy. I have found that strategy is very important to keep healthcare affordable and retain high quality of care. Even though this task has been difficult, it was something I was able to further develop myself in.

Planning

Overall, I managed to work according my planning throughout the project. After the start of the project, I experienced that the first created planning was unsuitable for this project, the deliverables have changed throughout the research. Nevertheless, I was still flexible enough to adjust my planning and to take an approach that enabled me to proceed the project without experiencing stress if it would be finished in time.

My new planning was created on a monthly base, were I created milestones of what had to be done in the time. Every week I reflected on what I managed to finish and what would need some extra time. In my planning, there was space for unexpected tasks. Those moments gave me the opportunity to sit back and revise my process and to set my priorities straight. Besides, I scheduled weekly moment to write on my thesis and met every other week with my university mentor. This also contributed into my reflection moments of what I had done and what was still missing.

Within this project I had to take those moments of reflection for myself. I was flattered that people from the company complimented me with my systematic approach, which confirmed my feeling of still being in control of my process without knowing what the actual deliverable would be.

One element that I did plan to do but what I did not manage to do within the given time was an extensive evaluation of the HartsVriend. This has been covered by phone calls with patients and care providers, but I would have preferred to do this testing face-to-face to retrieve more latent and tacit knowledge.
The biggest obstacle for my planning were the internal changes within the company. During my thesis the company was undergoing internal stresses in terms of new strategies and employees. I believe that I have managed to work through those stresses and to adjust to the changes without losing my own priorities.

All with all, I am very happy with my process. I am satisfied of what I was able to do in the limited amount of time.

Final reflection of the project

I encountered many complex situations during the project, but it has been a great experience. During my studies, I learned to work with many other Industrial Design students. This project has shown me what it can be like to work for a company. The project has been the last part of shaping me as a strategic designer, and it prepared me to get to work.

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10

APPENDIX

A. Trends

"Trends can be used to scan signals in a global context according to social and demographic developments, science and technology inventions, economic developments and political and regulatory changes" – Simonse, 2017

To give an overview of important developments in the primary care context, a trend analysis has been performed. For this thesis, Strategic Trend Scanning is used with the STEP trend technique, describing Social, Technologic, Economic and Political trends. Trends are essential in order to clarify contemporary developments, and subsequently, to predict what might happen in the future. Some trends were already mentioned by Heart for Health, others provide new perspectives of what the future will bring.

Trends

VWS objectives
VWS has formulated objectives to stimulate the use of eHealth in the Netherlands. They invest in research and the development of eHealth products. The formulated objectives are further elaborated in the stakeholders chapter.

General Data Protection Regulation (GDPR)
The new privacy laws of GDPR protect the personal data of consumers. Companies and organisations are responsible for ensuring the safety of data (Trends Business Information, 2019). According to GDPR law, organisations should give people the right to; give permission, have insight, be deleted, transfer data, be informed, correct information, data correction and object. With software, privacy is often a sensitive matter.

Patient centered-care
Within healthcare, patient centered care or personalised care is becoming increasingly important. Patient-centered care is the practice of caring for patients (and their families) in ways that are meaningful and valuable to the individual patient (OneView, 2015). Picker (2019) describes eight principles of person-centered care; respect for patients' preferences, coordination and integration of care, information and education, physical comfort, emotional support, involvement of family and friends, continuity and transition and access to care.

Self-care
People are becoming more involved with their own health. An example of self-care is eating healthily, doing exercises and getting enough sleep. Self-care can contribute to a better health without the need of doctors. The World Health Organization's (2019) definition of self-care is "the ability of individuals, families and communities to promote health, prevent disease, maintain health, and cope with illness and disability with or without the support of a health-care provider."

Changing roles
The role of the general practitioner and the patient is changing (McColl-Kennedy, 2017; Eyck and Smit, 2016). Whereas in the past, patients were more likely to follow the general practitioner's advice, there is currently a transition into more collaborative decision making. Patients are becoming more articulate and involved in their own health.

Demand of GPs
Caused by demographical, epidemiological and social cultural developments, the job of GPs has changed. Over the last couple of years, there has been a shift of tasks from secondary to primary care. As a result, GPs have become simultaneously more important as well as busier. Because of ageing, there is a higher demand for care, more chronically ill patients, and more multimorbidity. One of the solutions has been the introduction of organised care for chronic diseases; ketenzorg (Schäfer, 2016).

Growth of elderly and chronicle ill
According to InEen (2017) and Ursum (2011), 40% of the population of the Netherlands will have a chronic disease in 2030. On top of that, one-fourth of the population will have an age above 65. This growth will result in a higher demand for healthcare.

Increase of technologic solutions
The rise of technological solutions is expected to grow even further (InEen, 2017). For healthcare, the emergence of technological solutions enables prevention, telecare, lifestyle coaching and self-management. According to InEen (2017) and Medic Info (2019), the growing group of self-conscious patients will be using those technologies to get a grip on their own health.

24-hours society
People are expecting a 24-hour service, also from healthcare. Consumers (and patients) do not expect that they should make time for the services, but that the services should deliver in their time.

Growing demand of workforce
There is an overall shortage of workforce. Due to the growing population in need of care, the demand for care providers is rapidly increasing. Currently, there are not enough healthcare providers. This results in a heavy workload for today's workforce. Which, in its turn, results in a growing absence and dissatisfaction (CBS, 2019).

Limited financial resources
According to the Dutch coalition agreement of 2017, the budget for healthcare will remain approximately the same. With a growth in elderly and chronically ill citizens, this will inevitably mean that more care should be delivered with the same amount of money.

Everybody online
According to CBS (2019), more than 86% of the Dutch population uses internet on a daily basis. Apart from young people, the elderly are becoming more and more digitally savvy. Currently, 68% of the elderly aged over 75 is using internet. Smartphones (87% of households) followed by laptops (78% of households) are the most frequently used devices for internet.

PGO (Personal Health environment)
As of 2020, patients have to get the possibility to communicate via their own personal health environment (PGO) and get access to their medical file. Commercial companies such as Philips, Vital10 and Patients Know Best are developing these PGOs. Care takers are able to choose their own PGO. Besides, the PGO can collect self-generated data (Rathenau Instituut, 2019).

Wearables
The growing market of products such as activity trackers and smartwatches gives users more insight into their movements, heartbeat and additional features. Apps can help to give (some) feedback on the user's process. Wearable devices can help people to stay involved and invested in their personal health (Morgan, 2018).

AI development
The rise of AI offers possibilities for health care. It provides intelligent support for recommendations, predictions and decisions. AI allows doctors to combine the data found by the machine with their own knowledge.

Transmural care
In transmural care, healthcare providers of all care levels are collaborating. To enable transmural care, agreements have to be made for integral and personal collaboration, alignment and planning. Currently, healthcare is becoming more regionally organised. The expectation for the future is that the transition from primary, secondary and tertiary care will become more fluent.

Shared decision making
Shared decision making is becoming more common in healthcare. This is one of the reasons for the changing role of the doctor. Shared decision making can contribute to more effective healthcare and a better doctor/nurse-patient relation (Broersen, 2011).

B. Ketenzorg patients

Diabetes

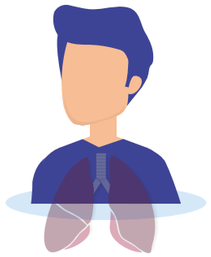
When people have diabetes, their body is unable to maintain their blood sugar. More than 1.1 million people of the Dutch population suffer from diabetes (diabetesvereniging Nederland, 2019). In 2018, the average age of people with diabetes was 42 (Meijer et al., 2018). The goal of ketenzorg for diabetes patients is a healthy lifestyle and appropriate medication.

Care givers in ketenzorg; general practitioners, internists, practice assistants, laboratory, dieticians, podiatrist

COPD

COPD is a lung disease where the lungs are damaged, breathing gets more difficult and the patients have less energy. COPD is a collective noun for chronical bronchitis and emphysema. In the Netherland, almost 600.000 people suffer from COPD (long fonds, 2019). COPD often occurs at a later age, after 65 years old (Usrum, 2019). The goal of ketenzorg for COPD patients is prevent the disease from getting worse.

Care givers in ketenzorg; general practitioners, lung nurse, lung doctor, dieticians, physiotherapist.



Heart- and cardiovascular diseases

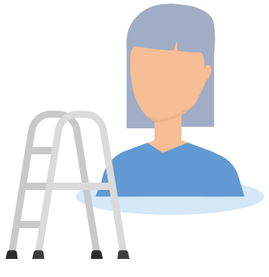
Heart- and cardiovascular diseases is a collective noun for multiple diseases such as heart rhythm disorder, heart failure and multiple other diseases. The Hartstichting estimated in 2018 that the Netherlands has 1.4 million people with heart- and cardiovascular diseases. The goal of ketenzorg for heart- and cardiovascular patients is to prevent new damage by providing aligned care, a healthy lifestyle and appropriate medication.

Care givers; general practitioners, practice assistants, dieticians, internists, cardiologists, lifestyle coaches.

Elderly care

Elderly care concerns multimorbidity care, which is a term to describe multiple (chronical) diseases at one person. Elderly are often vulnerable and need care from different care providers. The goal of ketenzorg for elderly is better and appropriate care and a better quality of life.

Care givers; general practitioners, district nurse, geriatric doctor.



C. Competitors

KIS systems

KIS has a focus on ketenzorg, which could provide favourable circumstances. Ketenzorg, is a way of organising healthcare, it appeared that the HIS system was not suitable for the intensive collaboration between care professionals (Timmers, 2019). To deal with this problem, KIS-systems were developed. The first KIS-systems focused primarily on the administrative side of Ketenzorg. Nowadays KIS-systems are focusing more and more on the healthcare side of Ketenzorg. They are beginning to offer features to enhance the collaboration between care providers. In the Netherlands, 80% of the general practitioners are currently using KIS-systems.

VitalHealth (Philips)

Within VitalHealth, Philips offers several products. Philips Coordinate has different modules for the different types of patients within ketenzorg. "Coordinate offers support for protocoled care and the exchange of information within in the care groups" (Philips, 2019). Besides Coordinate, Philips offers other products such as the platform Engage, where patients are able to get insight into their dossier, communicate with their doctor online and measure data at home (a PGO). Another interesting product is the QuestManager, where healthcare providers can send question forms online to get insight into their status, progress or care experience. With Philips Insight, doctors can get insight in the population health in order to assess which patients need extra attention.

VIPLive (VIP Calculus)

VIP Calculus offers modular solutions that provide declaration, administration and care process support. VIPLive use HIS as the base of their solution. Besides accountancy, VIPLive also offers smart data analysis for population management and the opportunity to send questionnaires to patients.

cKIS (Caresharing)

cKis is a platform used to create an overview of the care process and collaboration. It focuses predominantly on the exchange of information between care providers. With cBoard, Caresharing is able to deliver an application in which patients can get insight into their own information.

Portavita

Portrait consists of three components. The first component is an analysis environment. Here, data from (for example) the HIS, ZIS and Lab are used for analysis and reports about the population health. The second part is collaboration, where care givers can communicate and exchange information about patients. The third component is eHealth, where patients can get more insight into their files.

HiX (chipsoft)

With HiX, patients have their data in one place, from which different care takers can retrieve the information appropriate for them. Besides, they allow patients to participate in their care process, by amongst others, enabling eConsults, sending questionnaires and entering self-measurements.

	VitalHealth	VIPLive	cKIS	Portavita	HiX
eConcults/ questionnaires	✓	✓			✓
Self-measuring	✓				✓
Extensive colla-boration care providers	✓		✓	✓	
Decision support	✓				
Patient insight	✓		✓	✓	✓
Registration	✓	✓	✓	✓	✓
Referral	✓	✓	✓	✓	✓
Consultation	✓	✓	✓	✓	✓
Declarations	✓	✓	✓	✓	✓

Other competitors

Ksyos

Ksyos offers self-measurement solutions and technological solutions for healthcare. Ksyos is used for diagnosing patients. Their solutions support mental health care, cardiology, dermatology, ophthalmology, pulmonology, lab requests and sleep. In case of cardiology, the tools are frequently used for 24-hour measurements, where patients get an ECG for 24-hours which sends an Edifact message to the GP's HIS system. Besides, Ksyos enables GPs to send the ECG to specialists who consult them about the results.

Ksyos enables patients to do self-measurements and sends the analysed data to general practitioners. Ksyos might be a relevant competitor since they enable patients to measure at home. A fundamental difference is that Ksyos is used for diagnostics, where Heart for Health aims to focus on treatment as well.

NHG Doc

NHG Doc is integrated (plugged-in) in the HIS system and offers risk management support for GPs. NHG Doc compares information from the patient file with recommendations from the NHG-standards for dossiers, policy and medication.

myhealthConnect (enovation)
myhealthConnect is a platform that connects eHealth solutions with EPDs and information systems. Data measured by the patients immediately arrives in the care provider's system.

Pacmed

Pacmed focuses on specific groups within healthcare (urinary infections, Intensive Care, oncology psychiatry, cardiology and emergency care). For this group, they develop decision support tools, that show the expected outcomes for different treatment options. According to their website (2019); "Pacmed builds the bridge between medical expertise and machine learning."

PGOs (MedMij)

There is still a lot of uncertainty about PGOs (personal health environments). Currently, very little to none PGOs are in use, but they will be introduced from June 2020 onwards. PGO might become a serious competitor once patients are able to send measurements to their GP, even though the exact functionalities are still unknown. MedMij is the Dutch standard of transferring information between patients and care providers. The goal of PGOs is to give patients insight into and ownership of their data. Multiple companies are involved in creating PGO's, including Philips, Quli, MIJNPGO and Patients Know Best.

D. Interview guide

An interview guide was used to structure topics that had to be covered while still maintaining the freedom for interviewers and interviewees to elaborate on what was important to them (Patton, 2015).

Multiple interview guides were used all adjusted on the expertise of the participant. The interview guide used at GPs has been formulated below. The interviews have been translated from Dutch to English for the purpose of this thesis.

Interview guide General Practitioners

Checklist for start:
- Bring the recorder
- Ask for permission to record the interview
- Toolkit timeline and blank paper

Introductory script

Thank you for making time to see me. For graduation of my study Industrial Design I'm doing research into how a new software system for CVRM can be introduced at GPs. Simultaneously, I'm research what the impact of the product should contain to add value to the work of GPs.

Introductory questions
- Are you still active as a GP?
- What type of practice are you working in?

Subtopic 1 - Innovations at GPs

Which innovations within healthcare grab your attention?
- Why do you think this innovation is interesting?
- How would you implement this innovation within your practice?

When you want to introduce an innovation in your practice, who makes the decision?
- Are there other stakeholders important?
- How do you motivate them?

Subtopic 2 - Information ecosystem

To get a better overview of the systems that are currently used in your practice, I would like to discuss them. I brought pen and paper so that we can draw it out together. I will ask guiding questions so that we will cover the whole ecosystem.

- Which systems do you use within your practice?
- What are the functions of these systems?
- To which organisations do you exchange data via those systems?
- Which systems do you like in use? And why?
- Which systems do you like less? And why?

Subtopic 3 - Current CVRM process

What do you think of the current CVRM process?

I would like to ask you to fill in this timeline. Again, I will ask guiding questions.

- Could you describe your current process?
- What do you like about the current process?
- What don't you like about the current process?
- Do you think the process adds to the quality of care?
- What would you like to improve?
- Why do/don't you make use of a KIS-system?

Subtopic 4 - eHealth use

Finally, I have some questions about the current use of eHealth within you practice.

What is your opinion about eHealth?
- Do you recommend patients to measure at home? Why?
- What is the biggest advantage of measuring at home?
- What is the biggest disadvantage of measuring at home?
- Are there other ways of how you involve patients in their process? Why?

Wrap up
- Are there topics that you would like to discuss to end this interview?
- Do you have questions about my research?
- Do you have tips concerning this research or interview?

Thank you. If there are any questions you can always send me an email.

E. Toolkits and scenario testing

Toolkits

Toolkits have been used throughout the whole project. The goal of the toolkits was to get more information about the topic of studie. The toolkits were used during interviews.

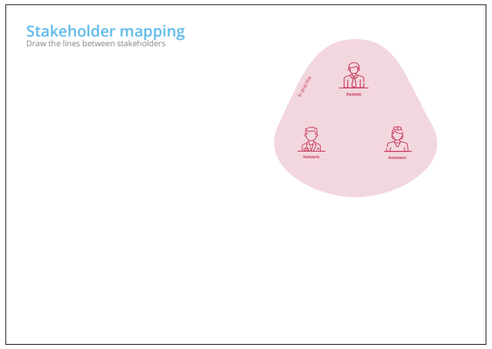
The participants were asked to draw lines and write words on the toolkit.

Toolkit 1; stakeholder mapping

This toolkit has been used to develop the discriptive value map. This toolkit has been used at the start of the project, during pre-liminary interviews. The participants were asked what they concidered as relevant stakeholders in primary care, and to draw lines together with relationships.

When the discriptive value map was created, the visual was tested for validation.

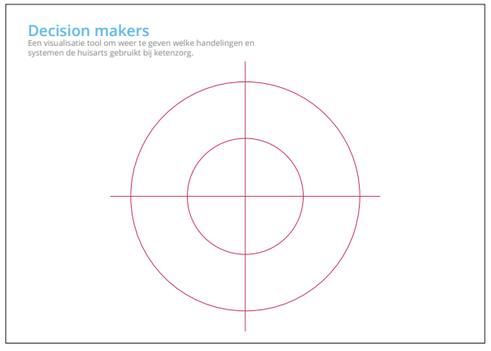
N = 2 (GP organisation, Insurance employee)



Toolkit 2; decision makers

This toolkit has been used to define the most important stakeholders during pre-liminary interviews. This toolkit was used together with the stakeholder mapping toolkit. The participants were asked to highlight the stakeholders that they found most important in the decision making process.

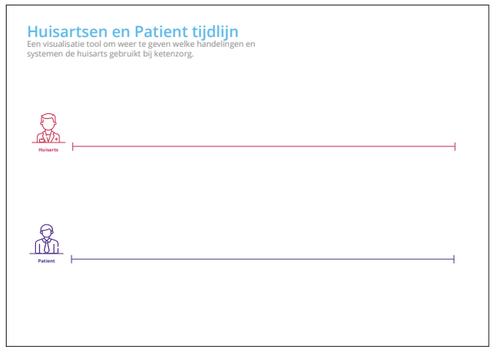
N = 2 (GP organisation, Insurance employee)



Toolkit 3; GP and patient timeline

This toolkit has been used to explore the process of CVRM patients during in-depth interviews. A timeline was introduced to the participants enabling them to draw their process. Than, the participants were asked what they saw as the most important touchpoints and were they experienced problems in their process.

N = 2 (General Practitioner (2))



Scenario testing

Scenario testing was used to gain preliminary insights into ideas that originated from the performed research. The scenarios presented to the participants gave new insights into certain values that contribute to a relevant product. Both participants selected Scenario 1 as the most promising scenario, even though its perceived added value is still too low.

Scenario 1

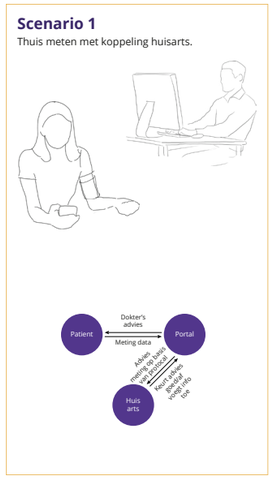
Scenario one describes a monitoring procedure in which data is sent to the doctor via the portal. The portal gives a suggestion for which protocols match the measurements. This product is based on the features of DHoTS. The most interesting insights were:

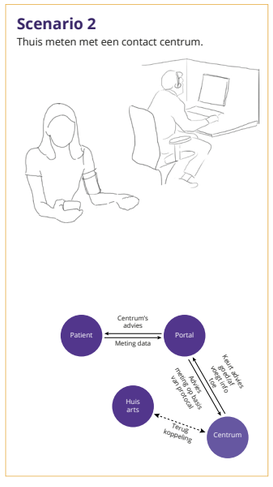
- The interviewees have indicated their preference for a more accurate measurement.
- To the majority of GPs, personalised care is currently very important. This means that they sometimes have to take a different decision within the protocol.
- GPs would like to have all the information in one place, without having to switch from the portal to the HIS document. Lab results and medication history is important to include for CVRM.
- If support is only given on the protocol, it will be likely to only improve the delivered care when a patient has a strongly fluctuating blood pressure and is hard to get under control.
- For GPs, it is not necessary to constantly monitor his/her patient's blood pressure. They have different measure appointments with different patients based on their needs.
- The idea of an alarm is illogical to GPs. They would like it better when the patient gets an alarm, making it their responsibility to get in contact with their doctor.
- The two-way interaction between patient and GP is important.
- Current measurements are often done by multiple care givers in the same period of time. Therefore, it might be interesting to have a platform that not only gives the GP and practice assistant insight but also the specialist.
- CVRM is currently not a big problem to GPs. For most patients, it is not too hard to determine the most appropriate medication. Only approximately ten patients per year are very hard to set, therefore the investment for such a product should be very low.

Scenario 2

Scenario two describes monitoring from a centre, based on HartWacht but implemented in primary care for CVRM. This centre consists of a team monitoring the data. The most interesting insight were:

- It is expected that this scenario will cost extra money, considering that the cost of CVRM control is not very high (patients come back four times a year in the beginning, when the blood pressure is under control they will come back one time a year at the practice).
- When patients experience problems, they will still have to go to their own GP.
- The personal conversation is important with blood pressure, since stress and lifestyle have a big influence. Participants expect that it will not be possible to do this digitally.





F. Analysis on the Wall

Clusters

To get a deeper understanding of the interviews, an analysis on the wall has been performed. This analysis helped to gather information and inspiration. First, I selected the most interesting quotes from the interviews. Around 100 quotes were selected. Then, clustering was done to create a deeper understanding. Those clusters can be found in figure above. The description bellow describes every cluster.

1. Saving time is important for GPs due to the high work load
2. Patients are often not making use of the current possibilities
3. eHealth is going to happen in the future
4. Privacy for patients is very important
5. It's important that the software is connected to the HIS
6. (Almost) everybody is already doing things online
7. Learning, both for patients and care providers, is important with the implementation of new systems
8. Some GPs are unsatisfied about their HIS
9. Some eHealth solutions failed because there was no connection with the HIS
10. Communication should be smooth
11. The responsibility of stakeholders should not shift (too much)
12. There are many eHealth solutions
13. eHealth can be seen as an investment, costs vs benefits is therefore important
14. There are some financial possibilities
15. The attitude towards eHealth should change
16. eHealth can make care better, but not substitute physical consults
17. The final responsibility of the practice should be with the GP
18. The uncertainty of cost efficiency makes the implementation difficult
19. All ketenzorg stakeholders should ideally be involved
20. Flexibility (in time management) of eHealth is a plus
21. Self-measuring can improve self-management (if it's done right)
22. Co-decision making is very important
23. The growth of chronicle ill is a problem
24. Analysing the data should be easy and fast
25. Practice assistants are very experienced with working with chronicle ill
26. Implementation of big innovations should be organised regional
27. Feedback of lifestyle is important with ketenzorg
28. Healthcare is going towards a transmural approach
29. Protocols are very important for GPs

Themes

With the clusters, themes were formed. This has been done by finding similarities and interesting outcomes for this project. Every theme comes from multiple clusters, described in the theme. Some interesting quotes were selected for support. On the basis of the themes, interesting search fields for this project were described.

Low expectations of eHealth
Cluster 2, 8, 9, 12, 15
The interviewees pointed out that many GPs are already using eHealth solutions. But there have been multiple products that turned out to be time consuming. Besides, the products are not always used by the patients and/or care providers.

One interviewee stated: "the investment of time was not representative for the results we gained from using the product."

For Heart for Health it will be essential that consumers trust their products. Because of the overload of possibilities and the bad experiences some GPs have, it might be difficult for Heart for Health to convince them that this product is actually going to improve their work.

The importance of a connection to the HIS system and a good interaction
Cluster 5, 8
All interviewees stated that it is relevant for doctors to be able to work from one system (the HIS). But at the same time, a lot of GPs are disappointed by the slow innovation of their HIS systems. A hired consultant stated that the satisfaction of a system is often dependent on the HIS system.

One interviewee stated: "this system contains a lot of clicking. Clicking, clicking, clicking.."

From this statement, we can also conclude that GPs find the interaction of systems important. Unfortunately, the transition between systems is very time consuming, and therefore they rarely switch.

Since the satisfaction of systems often depends on HIS systems, it might be valuable to look for a good HIS system to collaborate with. If all HIS systems are connected, a solution has to be found to prevent any dissatisfaction.

To prevent discontent with the product, good user interaction with the system is indispensable. Besides, the product should be designed in such a way, that there is room for innovation in the future.

eHealth solutions should fit the current way of working
Cluster 1, 5, 11, 17, 20, 24
There is a lot of pressure on general practices. New innovations should not cost time, and they should match the current way of working. Solutions should adapt to the GP, not the other way around. For the stakeholders, it is essential that the responsibility is not only in the hands of care providers but also in hands of the patients. Due to the pressure already at hand, eHealth should not cause an even higher workload.

One interviewee stated: "I see the value of self-measurement data, but it depends on what I have to do with it. If I first have to analyse it myself, it would be too much."

GPs and practice assistants like the fact that they can currently choose their own moments to respond on incoming e-consults.

New solutions should not cause any data overloads at the practices. There should be some flexibility in when practitioners can answer to patients' questions. With the incoming data, the right division of responsibilities should be very clear for all stakeholders and should not all be delegated to the care providers.

In the future there will be eHealth
Cluster 3, 6, 16
Despite the perceived downsides of eHealth, many interviewees stated that they do believe that the implementation of eHealth will grow in the future. According the literature and interviewees, eHealth might be a good tool for better healthcare, but it cannot entirely replace physical consults. They believe in blended care.

Care providers do believe in the future of eHealth, but they are often hesitant about how it will work. An interesting search topic could be how Heart for Health can start now and grow with the GPs towards the future.

The financial aspect of eHealth
Cluster 13, 14, 18
Within the healthcare structure of the Netherlands, it is often hard to decide who should pay for what. General practitioners want to be able to declare their work. On the other hand, insurance companies expect GPs to be investing into their practices. At the same time, GP organisations suggest that a business model is needed to convince health insurances.

This disagreement is partly due to the fact that there is no certainty for the role of eHealth. It is possible that eHealth will replace a physical activity, yet it is also possible that a new activity will be added upon the implementation of eHealth.

Another complicating factor is the fact that every insurance company has their own agreements with care providers and/or organisations about ketenzorg. Some insurances pay a standard amount per patient, while others have to declare per action.

GPs can already get some investment from health insurances to innovate. But these budgets are often available only for three year pilots. After this period, GPs find it hard to find a business model on how they can keep the innovation in their practice.

One interviewee stated: "We currently have a practice assistant for cancer care, supported with a budget from the insurance company for three years. But after those three years, we do not have enough resources anymore."

To successfully implement eHealth in primary care, a sustainable business model should be found. Therefore, it must first be clear what the role of eHealth will be.

Collaboration in the first line
Cluster 10, 19, 26, 28
With the switch to a more primary care focused model, collaboration within the primary line has become more essential. Primary care is regionally organised, and therefore it is stated by interviewees that if a big innovation is going to be implemented, it should be done so regionally. By doing this, eHealth can help to facilitate a better collaboration between care providers but also between care providers and patients.

During the design of the product, the possibility of enhancing collaboration should be explored. Besides, it seems like an interesting strategy to implement the product on a regional level instead of on a practice level.

The role of the patient
Cluster 4, 11, 21, 22, 23, 27
From research it was found that the role of the patient is already changing. Patients get more insight into their own health. Along with the growth of chronic patients, the workload for care providers is growing as well. The role of the patient might have to change into a more self-managing role. Especially for ketenzorg patients, an important aspect of their health improvement is a better lifestyle. Practice assistants are currently focusing on co-decision making. They have done so by providing patients with all the information they wish to have. Additionally, they try to involve their patients as much as possible in the decisions on medical actions.

One interviewee stated: "Self-measuring might improve self-management if it's done right."

A difficulty in Ketenzorg is that chronically ill patients often have a less pro-active attitudes towards their health. This naturally differs widely from patient to patient, but ketenzorg diseases can arise from problems like high salt intake or smoking. The interviewees note that it is often difficult to change or help to change these habits.

From the healthcare perspective, there is an interest in improving the self-management of patients. Especially within ketenzorg, a lot of improvement can be obtained when patients become more aware of their lifestyles. Practice assistants already have a big role in these kind of health improvements. Therefore, when designing for CVRM, it could be very interesting to focus on the interaction between the practice

G. Budgets and implementation structures

Possible ways have been discussed during the interview of financing products such as DHoTS 2.0 are;

- S3-/innovation budget; a budget used for GPs who want to try out an innovation. The problem with this budget is that it's often for a few years. After this, a new way of including this innovation within the insurance package should be found.
- S2- budget; a budget used for ketenzorg patients.
- The use of eHealth solutions could be included in the budget. If DHoTS 2.0 would be included into the budget, academic proof of the effect should be delivered. This means that there should be proved that the eHealth application saves an x amount of money or improve people's health (lowering the amount of people with heart diseases). This can take many years to prove.
- GPs could make the investment themselves. To save time or 'serve' their patients better. They could, for example, include using the software in the tasks of their practice assistants.
- Other budgets

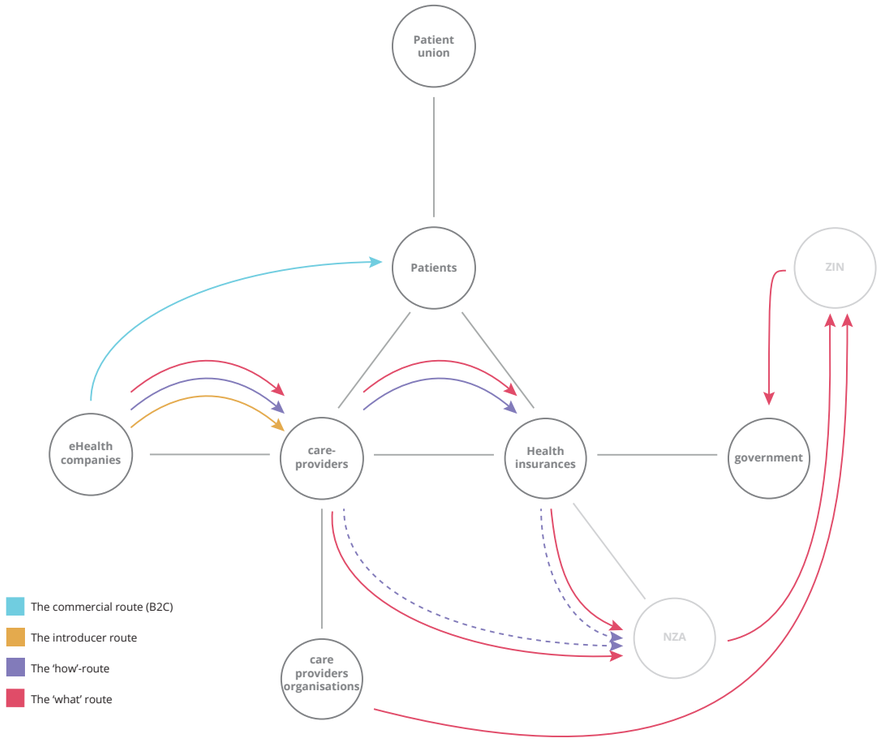
In 'het co-creatie eHealth boek', several implementation routes are described.

The consumer route
The eHealth application is directly offered to the user (patient), possibly recommended by a care provider. With this route, the patient pays for the use of the product. eHealth applications in this route should be a solution to problems that are recognized by the user.

The provider route
This route is appropriate when there is a direct advantage for the care provider. An example is more efficient healthcare or an 'improvement of their image'. The care provider invests in the eHealth application.

The healthcare insurance route
The eHealth application becomes a part of the existing care which is reimbursed. The exisiting care becomes, for example, more accessible or more efficient.

The government route
This route is used when a medical-technological application leads to care that is not yet existing or reimbursed.



H. Strategy wheel

A strategy wheel can be used to determine the feasibility of DHoTS 2.0. The wheel has been created from input of two team members and my own experience at Heart for Health. The Strategy wheel shows the average (of the two team members and my own analysis), compared to an estimation on Philips (biggest competitors) position within the wheel. To form the strategy wheel, participants were asked to score the company from 1-5 on the questions displayed below. The questionnaire is anonymous, so that participants were able to give their honest opinion.

Financial resources
What is Heart for Health's current financial status compared to (possible) competitors?

One participant stated; 'compared to Philips, we have way less money. But compared to small companies like we, we have around the same or even a better budget.'

There is already invested quite some money in DHoTS, coming from funds and investments. Since the product is not Heart for Health's core business, most money will be invested in creating the EPD. Both products do not have a working business model yet.

Product portfolio
How well do the current products of Heart for Health fit to the developed product?

Currently Heart for Health has experience with the HartWacht (which is monitoring for cardiology, secundairy care) and DHoTS. Some features of those products are relevant for their future product, but still many features are missing.

Research & development
How well do you experience Heart for Health to be able to research new ideas and opportunities?

One participant stated; 'Heart for Health is very good in creating new ideas, but developing towards something valuable does not always go right'.

User knowledge
How much knowledge does Heart for Health has of GPs?

One participant stated; 'with the ROHA we have access to the users. But, Heart for Health sometimes tends to only see the positive things'.

From my experience, I have learned that Heart for Health struggles with tackling the problem from a user perspective. Coming from cardiology, they seem to have different interests than GPs.

Strategic capabilities
How well does Heart for Health know the competitors and other possible threats?

One participant stated; 'We are starting to get a better picture of them. But in the beginning we didn't look at them at all'

Knowledge of context
How well does Heart for Health know the context?

All participants thought Heart for Health knows the context very well. Since the company comes from healthcare, they have a lot of experience with it. Besides, Heart for Health is a very valuable conversation partner to care providers.

Technical know-how
How skilled are the people working at DHoTS (and on a future new eHealth product)?

One participant stated; 'There is potential for Heart for Health in eHealth, we can do a lot. The question is; can we create something with value?'

I. Creative session

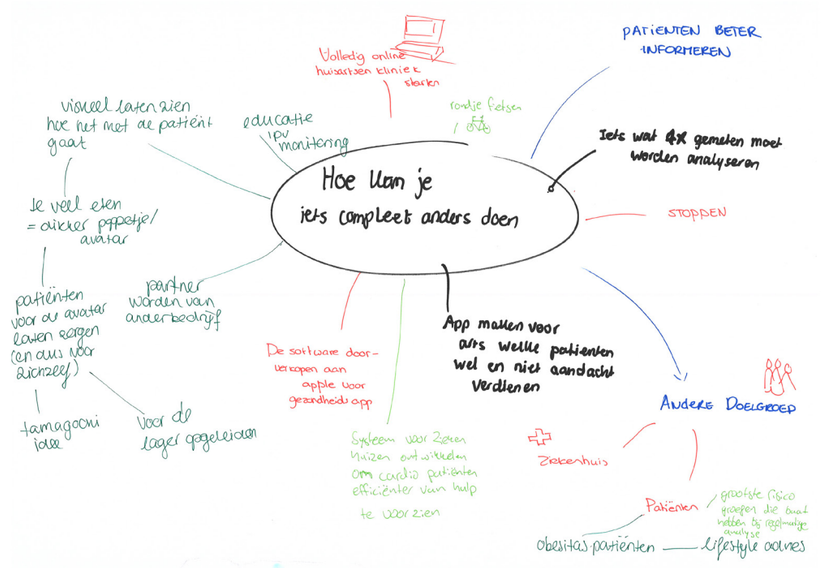
During this creative session, four participants were asked to generate as much ideas as possible. The generative sessions started with an introductory presentation of the topic. Then, four predetermined how-to's were shared. After performing the How-To method, the participants discussed the outcomes. Together, they further developed four promising ideas in groups of two.

How-to method

The How-To method is regularly used in Industrial Design. Predetermined How-Tos were used due to limited time. The How-Tos focused on current problems that where found during this project. The participants were asked to think of one how-to themselves, resulting into some extra input. The selected How-Tos were:

- How to make healthcare more efficient?
- How to improve quality of care?
- How to do something completely different?
- How to make someone pay for healthcare?
- How to lower the workload in healthcare?

The How-Tos were all written down on separate papers. Then, every participant (including myself) got a paper in front of them. Every participant was given two minutes to write down as many ideas as possible and to elaborate on other's participants' ideas.

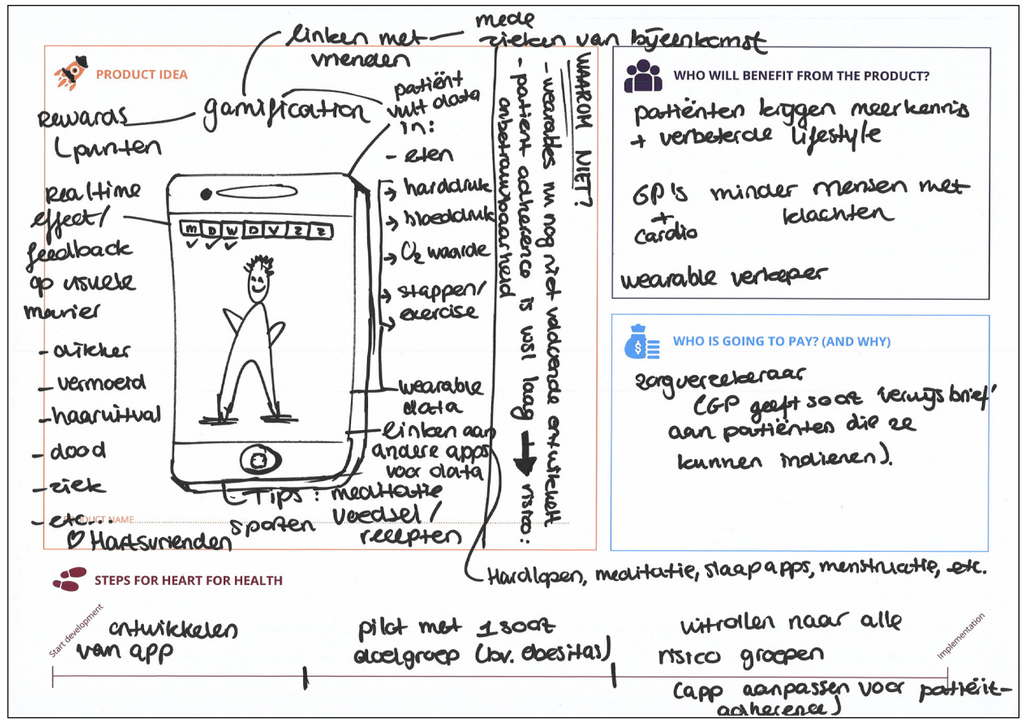


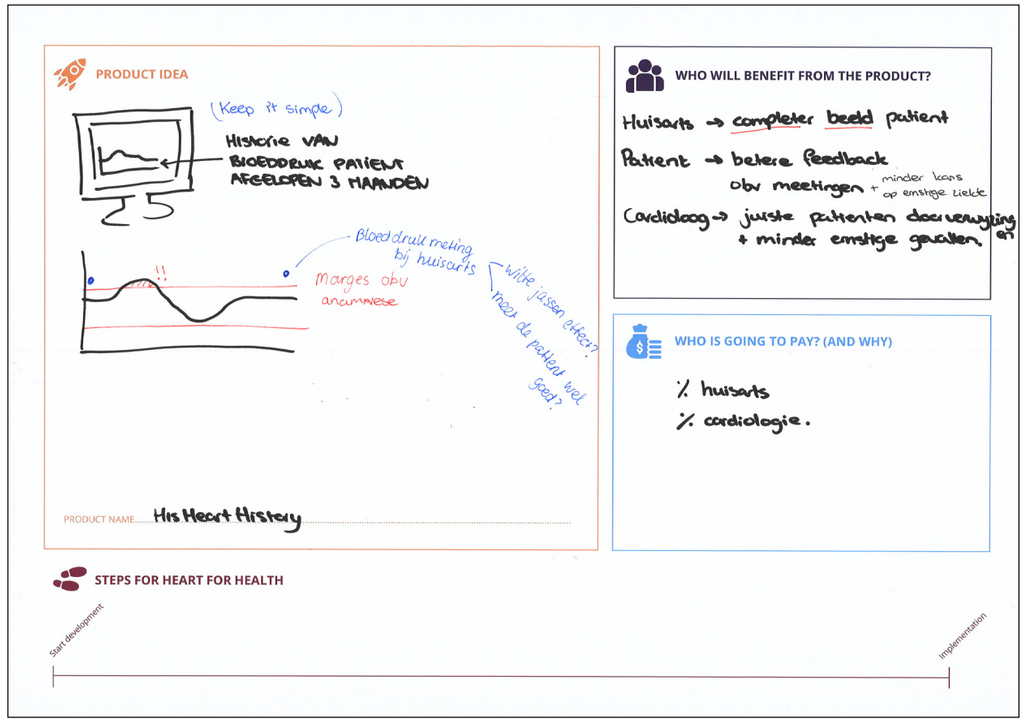
Idea canvas

After generating as many ideas as possible, the participants were devided in groups of two to each develop 2 ideas. For the development of those ideas, a idea canvas was developed.

The idea canvas contained four parts that were considered as relevant for this research;

- Product idea
- Who will benefit from the product
- Who should pay for the product
- Steps that Heart for Health should take





J. Value Proposition

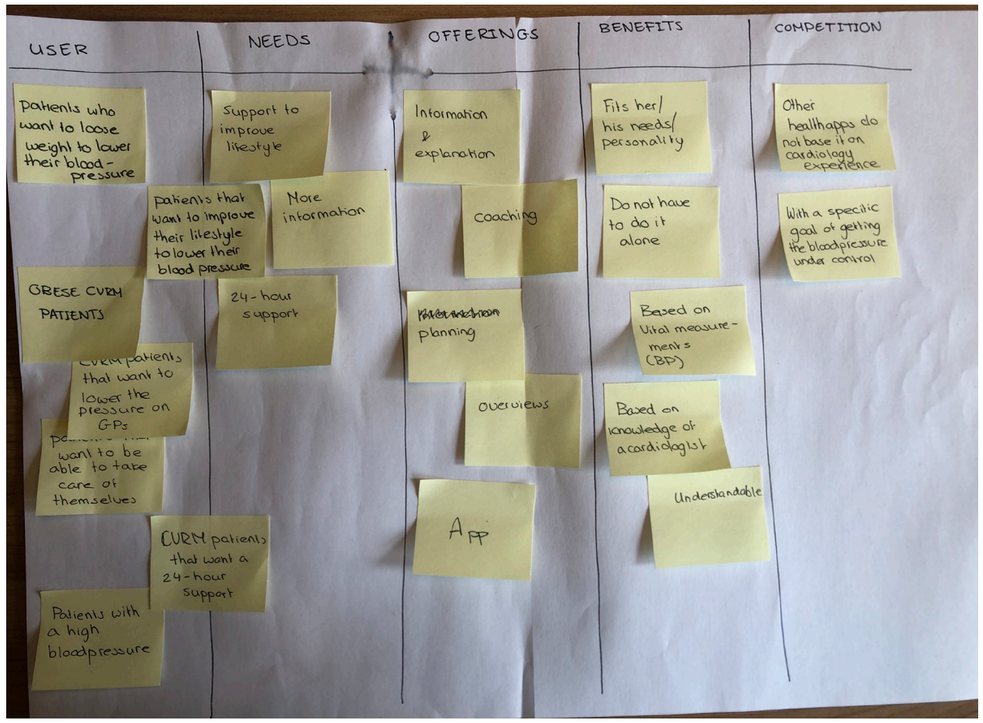
The Value Hypothesis method

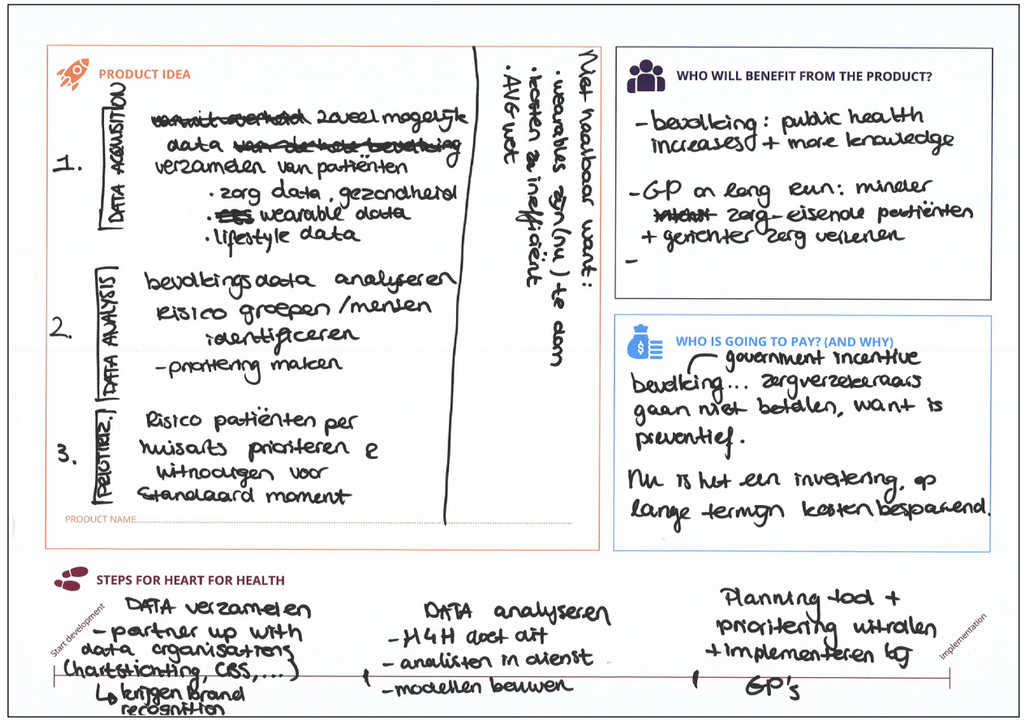
The Value Hypothesis method has been used to explore different opportunities and possibilities for the value proposition. The Value Hypothesis method has been performed according the method described by Kumar (2013).

Five questions to answer the value hypothesis;
Who is the target customer?
What are their unmet or underserved needs?
What are the proposed new offerings?
What are their benefits to users?
Why will the user choose this offerings over those of the competition?

How it's done;
Step 1: Select important findings from previous research
Step 2: Align on a structure for the Value Hypothesis
Step 3: List options and iterate
Step 4: Evaluate options and define the Value Hypothesis

User: CVRM patients who want to improve their lifestyles for better health outcomes
Needs: empowerment, support and information
Offerings: an app including coaching and overviews
Benefits: personalised, accessible and understandable for people without a healthcare background





The Value Proposition canvas

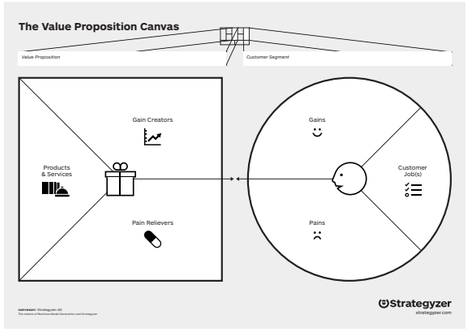
The commonly used method of Value Proposition (Osterwalder, 2015) canvas has been selected.

How it's done;

Step 1: Define the customer profile
Identifing customer's Jobs-to-be-done, the pains they face when trying to accomplish their Jobs-to-be-done and the gains they perceive by getting their jobs done.

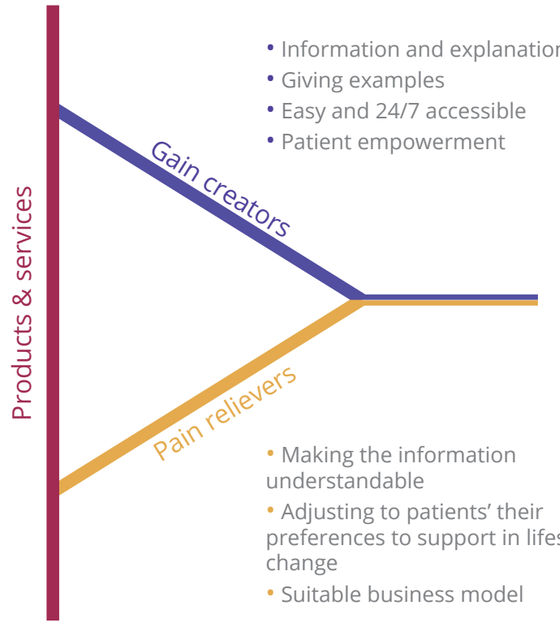
Step 2: Visualize the value you create
Define the most important components of the offering, how the pain will be relieved and how to create gains for the customers.

Step 3: Create Product-Market fit
Adjusting the Value Proposition based on the insights gained from previous research.



Value proposition canvas retrieved from Strategyzer.

VALUE PROPOSITION



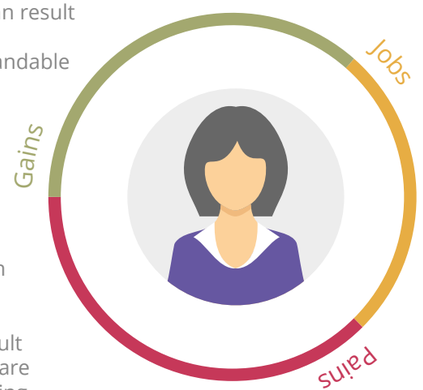
- Patient app
- Personalisation of app
- Lifestyle coaching/support
- Smart use of bloodpressure data
- CVRM information
- Daily life use

- Information and explanation
- Giving examples
- Easy and 24/7 accessible
- Patient empowerment

- Making the information understandable
- Adjusting to patients' their preferences to support in lifestyle change
- Suitable business model

CUSTOMER PROFILE

- Empowering patients can result into better health
- Accessible and understandable information and steps
- Possibly less practice visits



- Responsibility of visiting and contacting the GP
- Medication intake and lifestyle change

- Data, devices and health are often difficult to understand
- Lifestyle change is difficult
- Paying extra for healthcare
- Selfcare is time consuming

K. Other applications

MyFitnessPal
MyFitnessPal empowers their users with information about their food intake. They have a focus on losing weight and retaining their healthy weight. In the application, users can register their food intake and activities. Besides, the application contains a database with extensive information about nutritional values. The application is available for free.

Fooducate
Fooducate empowers their users to achieve diet, health and fitness goals. Like MyFitnessPal, they offer an extensive database with nutritional values. In addition, they offer a community and share recipes. The application is available for free.

WeightWatchers
WeightWatchers is an application used to register food intake and activity. The app also offers a recipe database and a community. The application also gives personalized support and workshops to their members. The application is available as a subscription.

Quli
Quli is a platform that can be used by individuals, their personal network and care providers. The platform is a PGO and gives insight into the users' medical record. They focus on empowering users with control on their own health process.

Healpt
Like Quli, healpt is a PGO. The app gives users the opportunity to register their own health data. The application gives graphs of the progress of the data. Also, the application sends reminders for e.g. consults or medication intake. Healpt also connects to care providers.

Quin
Quin also gives insight into users' their medical record. The application also contains a search engine to check symptoms and provides information about the symptoms. They have a focus on empowering patients with information. Besides information, Quin offers consultations of their own healthcare team.

Thuisarts
Thuisarts is an application and website that has been created by doctors. The app contains reliable information about diseases and symptoms. It focusses on keeping people healthy, empowering them to perform self-care, giving support for GP consultations and preparing people or enriching them with extra information.

FitBit
The FitBit App contains overviews of activity, workouts, sleep, nutrition and stress measured by a FitBit device. The free application contains a database for workouts, nutrition, meditation and sleep tools. Besides, the app allows users to set goals and milestones for motivation.
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QardioCore
The QardioCore app can be used in combination with measurement devices of QardioCore. The free application gives overviews of measurements and it can send information to GPs.

L. Business model canvas

Finding a suitable business model is very complicated. The business model canvas can help to find a strategy, it can also be used as a tool to find new opportunities throughout the project.

In this project, a business model canvas is used to explore the possibilities for Heart for Health for the HartsVriend application. The business model is not finalised and it is very much relying on the (rapidly) changing context. The business model is an indication of what it could look like.

<table>
<tr>
<td rowspan="2">KEY PARTNERS

PHAROS - For information that is understandable for people without health knowledge

MedApp - For a medication adherence feature

Harstichting - For information

Device suppliers - For e.g. bloodpressure measurement devices and possibly others

HIS sypppliers - For a connection with practices</td>
<td>KEY ACTIVITIES
R&D

App development

Proving & improving efficiency

Marketing

Lifestyle module development

Data management</td>
<td rowspan="2">VALUE PROPOSITION

“For CVRM patients who want to improve their lifestyle for better health outcomes, Heart for Health offers an app that empowers patients to make a lifestyle change by offering personalised information and support which is understandable and accessible for people without health knowledge.”</td>
<td>CUSTOMER RELATIONSHIPS

Supporting patients with lifestyle advice and information

Improving health

Improving efficiency of healthcare</td>
<td rowspan="2">CUSTOMER SEGMENTS

For CVRM patients that want to change their lifestyle

For Health Insurances that want to lower their costs in secundary care.

In a later stage GPs will be involved</td>
</tr>
<tr>
<td>KEY RESOURES

Application use by CVRM patients

Health Insurances paying for delivered value</td>
<td>CHANNELS

App store

Website

Flyers at GPs</td>
</tr>
<tr>
<td colspan="3">COST STRUCTURE

App development, lifestyle module development, data management, employees</td>
<td colspan="2">REVENUE STREAMS

Paid by the healthinsurance of the patient

Price per patient

Pricing is on a monthly base</td>
</tr>
</table>