

GoMedFlow

Moving towards a smart hospital

*Journey mapping as a facilitator
for the digital transformation of healthcare*



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GoMedFlow: moving towards a smart hospital

Journey mapping as a facilitator for the digital transformation of healthcare

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GoMedFlow

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Sadly, after spending a wonderful time at the Reinier de Graaf Gasthuis this project comes to a close.

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Executive Summary

Problem statement

Demand for healthcare will increase exponentially in the coming years, resulting in increased pressure on the decreasing number of healthcare providers. A digital transition of healthcare is needed in order to be able to keep offering widely accessible, quality care. Digitalization offers innovative ways of facilitating patient - specialist interactions, remote care and added layers of support for patients as they undergo their treatment.

Unfortunately, the healthcare sector has difficulties keeping up with the trend of digitalization in comparison with other sectors. This project aims to bring to light why the healthcare sector is struggling with the process of digitalization. Through this exploration it endeavors to design a solution with the intention of facilitating the digital transformation of the Reinier de Graaf Gashuis (RdGG). To keep the scope of the project limited it was decided to focus on digitalization of the colorectal cancer process.

Researching the current state of affairs with regards to digitalization

During the research phase, the following methods were used:

- 1) Conducting a literature review that explored the current state of affairs regarding digitalization in the context of colorectal cancer care and methods for digitalization of this care process.
- 2) Observing different interactions between healthcare professionals and colorectal cancer patients and observing during meetings with different stakeholders in the RdGG.
- 3) Conducting interviews with colorectal cancer patients, healthcare professionals and organizational employees.

Colorectal cancer patient journey

The research led to the creation of a patient journey map for colorectal cancer patients. The map displays the care process and reveals its 'non-digital state'. The result showed that mapping a complete care process in a clear way is challenging. Most care processes are not linear or fixed; there are different treatment options and exceptional circumstances. It was discovered that there isn't a journey mapping format available that is simultaneously comprehensive and user friendly.

Research outcomes

There are numerous factors hindering the digital transformation within the RdGG, some of which include:

- 1) The complexity of hospitals makes it difficult to keep overview over the process of digitalization.
- 2) Not all digital resources are perceived in a positive light, one reason being that they sometimes clash with existing workflows or care processes.
- 3) Patient journey maps and care pathways can help to prevent this from happening, but there are problems with the making of , managing and use of journey maps.
- 4) There are issues in the communication between healthcare professionals and organizational employees.

Design goal

Based on the research outcomes, the following design goal was created:

Design an interactive journey mapping tool for care professionals and organizational employees at the RdGG, that helps to better comprehend care and digitalization processes, by offering overview, knowledge and easy communication.

GoMedFlow

GoMedFlow is created to help hospitals transition into smart hospitals. The design utilizes journey mapping as a facilitator for the digital transformation of healthcare. GoMedFlow offers:

- 1) **Overview** in the current state of affairs of digitalization of care processes
- 2) The opportunity to easily and cooperatively **form, maintain and analyze care pathways and patient journeys**.
- 3) Aid to **effectively implement digital resources in care processes**, assuring digital resources fit well within the care processes.
- 4) **Easy communication** between different stakeholders in the RdGG; healthcare professionals and organizational employees

Using GoMedFlow results in an efficient deployment of employees and resources in the future.

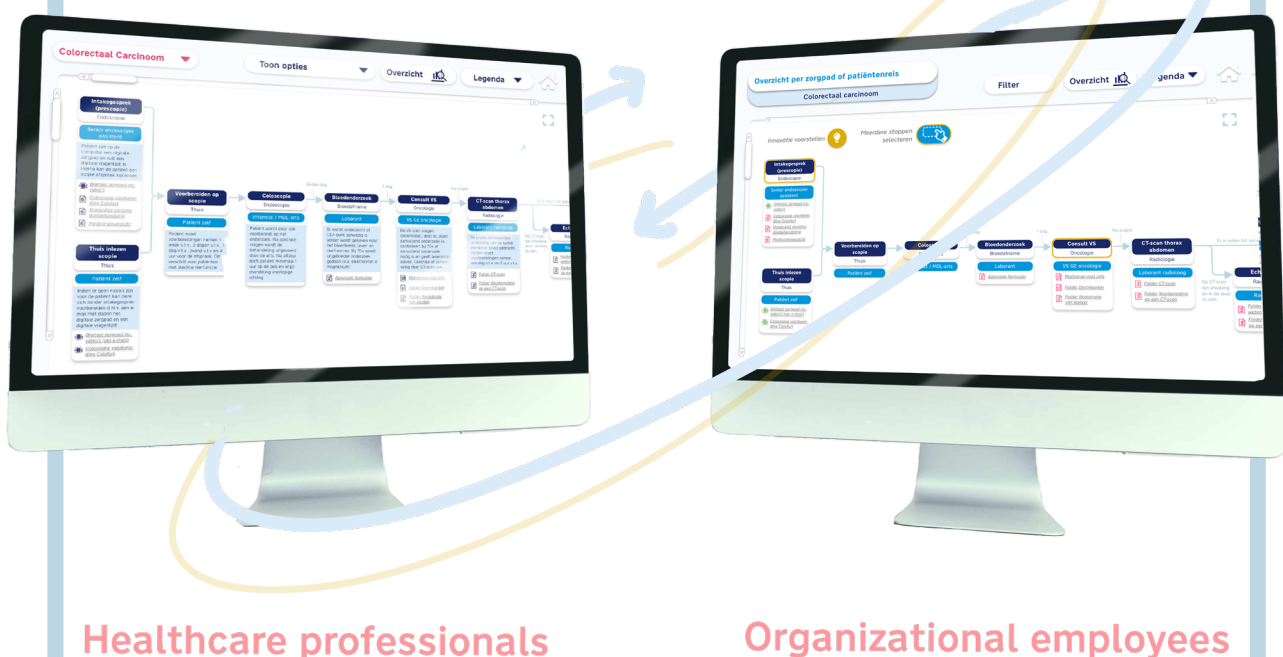


Figure 1. GoMedFlow.



Source: van der Burg, F. (2019). Innovatiecentrum

Glossary

- **Patient journey**

Overview of all phases a patient goes through within a specific care process, often including a description of the patients' experience throughout these phases [1][2]

- **Care pathway**

Overview of all phases of a specific care process, presenting the different healthcare professionals involved and a description of their tasks and actions [3].

- **Digitalization**

The activity of using digital technology to change a process [4]

- **Smart hospital**

Making use of technologies like the Internet of Things, cloud computing, big data, artificial intelligence, wearable devices and mobile applications and connecting people, programs and devices are factors making a hospital a smart hospital. [5].

- **Co-creation**

Involving target users in the creation of the design; collective creativity. [6]

- **Focus group**

Session in which a group of people discusses a topic, under guidance of a moderator [7]

- **Actor**

Someone or something that can influence the care process of patient. [8]

- **Organizational employee (RdGG)**

Employees working in the Gravin: Management and supporting staff: facilitating the primary processes of patient care and managing the operational processes of the hospital

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Chapter 1 | Introduction

This chapter explains the general scope of the project and provides a first glance at the project approach. It presents the original research question and design goal that served as the base of this project.

1.1 General scope of the project

1.1.1 The project scope

'Digitalization' is a word with a high variety of possible interpretations, evoking both positive and negative associations. Its use and impact will continue to increase as time passes and the presence of technology continues to become more prevalent in all aspects of our lives. This trend of digitalization continues to evolve and grow and healthcare cannot lag behind in the adoption of this trend [9]. The process of digitalization is evolving at such a high rate that the healthcare sector has difficulties keeping up, when there is a strong need for precisely this sector to develop in the digital field [10, 11].

The Reinier de Graaf Gasthuis (RdGG) is one of the stakeholders in the healthcare sector that is still searching for the right way to adapt to this digital trend. This project aims to determine what hinders this adaptation in order to design a solution to the identified obstacles.

Hospitals are complex organisations, with multiple departments and specialties. To keep the research focussed, it was wise to start with one specialty. This can later be used as an example for other specialties. The chosen specialty is colorectal cancer. Patients with colorectal cancer follow a very intense process; they have to face difficult decisions, frequently visit the hospital and meet a lot of different care professionals. Colorectal cancer is a very interesting specialty to examine from a viewpoint of digitalization, as patients

with colon cancer are often elderly [12], who interact with technology differently than young people [13].

This project scope was based on the following objective, composed by the RdGG and TU Delft:

'Design digital healthcare towards a smart hospital:

Journey Mapping as a tool for digital transformation of healthcare. Using journey mapping as a tool for digital transformation of the patient journey in the area of colorectal cancer'

.

The multiple facets of this assignment allowed for researching different areas within this scope, in order to find the most interesting design direction.

1.1.2 Patient journey mapping

The patient journey maps the experiences of patients during care processes, providing an comprehensive description of interactions with different parts of the healthcare system [1,2]. Different formats can be used to map this, focussing on different factors. Examples of factors that are often mapped are the location where different phases of the process take place, all actors involved in these phases, a description of the phase, bottlenecks during the phase and possibilities for improvement of the phase. Actors can be persons, products

or services influencing the care process and can be split up into human and non-human actors.

Patient journeys are often confused with care pathways as they can both visualize the same care process. The perspective from which they are drawn is what differentiates them.

Patient journeys show the perspective of the patient, elaborating on how the patient experiences a care process, whereas care pathways show the perspective of all healthcare professionals involved in this care process [3]. Care pathways describe for example which actions should be performed or which questionnaires should be shared with the patient during a consultation.

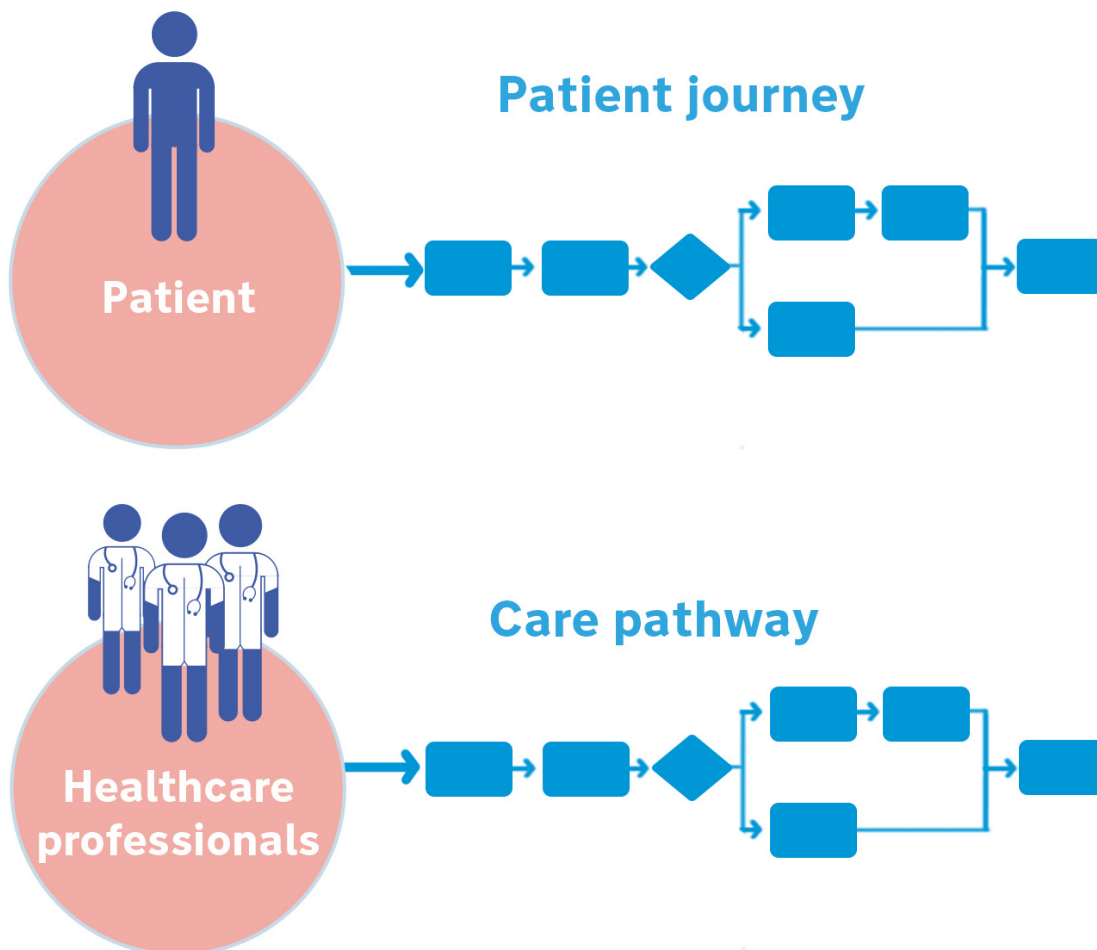


Figure 2. Difference in perspective of patient journeys and care pathways.

1.2 Project approach

The project is built up in three phases, which are shown in Figure 3.

During the first phase, the current state of affairs regarding digitalization in hospitals and its contextual factors were explored by means of literature research and observations (1). This led to the discovery of bottlenecks, design opportunities and possible design directions (2).

To further explore those design directions, interviews were conducted with different relevant stakeholders, namely: colorectal cancer patients, their healthcare professionals and organizational employees of the RdGG (3). Analyzing the findings and connecting them to earlier findings led to a selection of bottlenecks and opportunities that present unique areas to design solutions for.

These findings were the foundation for phase two, which was all about coming up with design solutions. Brainstorming to find these

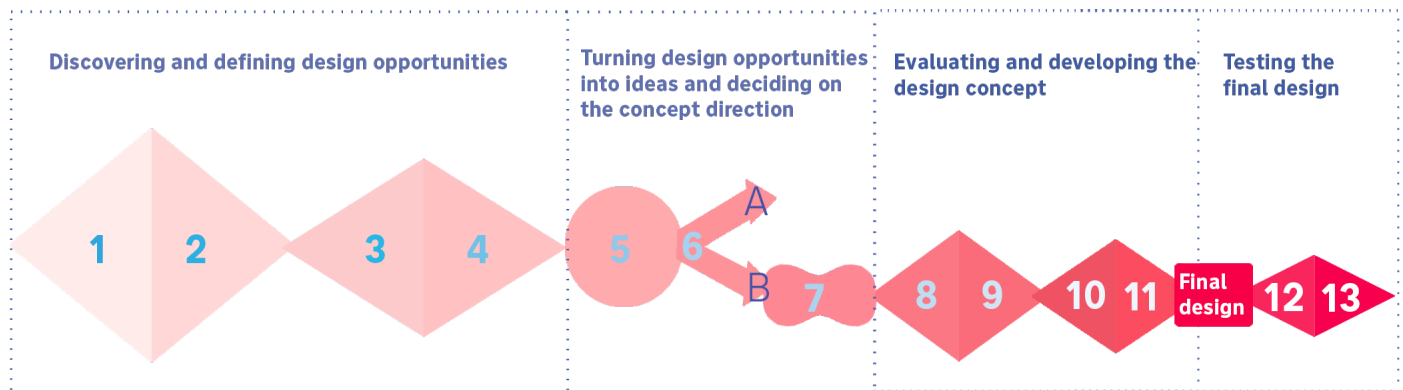
solutions led to the first concept ideas, which could be divided in two design directions. These directions were as followed:

A: improving the current colorectal cancer patient journey by designing a digital product with the patient as end user

B: supporting the RdGG in the organization of digitalization in the hospital, by designing a product designed for healthcare professionals and/or organizational employees (B).

Direction B was chosen as final design direction. A first concept was designed and later adjusted, based on a co-creation session.

The goal of the third phase was to evaluate the design concept in order to improve it and to eventually create the final design. Focus groups and usertests were used as means to identify areas of improvement of the design concepts.



1. **Exploring** the context surrounding digitalization in hospitals by means of literature research and observations
2. **Analyzing** the findings of the exploration and selecting bottlenecks, opportunities and possible design directions of interest for further investigation.
3. **Further investigating** the selected bottlenecks, opportunities and possible design directions by means of interviews with different actors.
4. **Analyzing** the findings of the interviews and defining possible design directions
5. **Brainstorming** to find solutions fitting to the previously determined design directions
6. **Deciding** one the final design direction, choosing from two possible direction.
7. **Creating** and adjusting the first design concept
8. **Evaluating** the design concept by means of focus groups
9. **Adjusting** the design concept
10. **Evaluating** the design concept by means of focus groups
11. **Adjusting** the design concept by means of focus groups, creating the final design
12. **Evaluating** the final design concept by means of individual test sessions
13. **Composing** a list of suggestions for improvement and further research

Figure 3. Visualization of the design approach taken during the process.

Chapter 2 | Context exploration



The project is based on the combination of three topics, presented in Figure 4. This chapter analyzes how these topics are related and explores the current state of affairs regarding digitalization in the context of colorectal cancer care. Reviewing literature allowed for taking a comprehensive inventory. Building on the knowledge drawn from literature, observing several work processes and interactions between different stakeholders helped to gain insight in the situation specific to the RdGG.

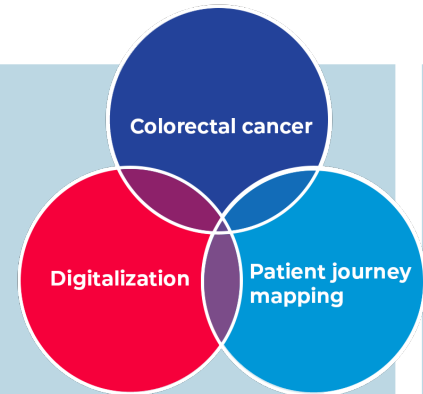


Figure 4. Main topics of the project

2.1 Taking a comprehensive inventory of the contextual circumstances of digitalization in hospitals by means of a literary review

To develop a broader understanding of the current state of 1) Digitalization in healthcare, 2) colorectal cancer care and 3) use of patient journey mapping related to digitalization, a literature review was conducted. To ensure this literary review was sufficiently narrow and targeted three research questions were created:

RQ1 What is the **current state of digitalization** in healthcare and where does the urgency surrounding digital development stem from?

RQ2 What does the **colorectal cancer patient journey** look like and how is this journey currently influenced by digital opportunities?

RQ3 Has **patient journey mapping** been used to advance the progress of digitalization in healthcare or have other techniques effectively been used to achieve this objective?

2.1.1 Digitalization in health care

As stated previously, digitalization leads to a changing medical field. Digital opportunities can play an ever more prominent role in supporting patients during their treatment. After receiving a diagnosis, patients could for example benefit from digital information or online emotional support [14,15]. Digital opportunities can contribute to solving existing problems in healthcare and can be implemented to achieve more person centered care [16]. Digitalization can support the hospital in becoming more sustainable and allows for secure data-management. A large amount of paper information is still being used in healthcare and the combined use of paper and digital resources leads to data quality issues, inconsistency and discontinuity [17].

Not only is a transition to digital healthcare beneficial for patients and hospitals, it also plays a critical role in ensuring the capacity of hospitals to keep offering quality care for everyone in the future. Healthcare demand is growing substantially, while the number of people working in healthcare is declining

[10,11,18]. In the Integraal Zorgakkoord this is even described as followed:

“If we do nothing, healthcare threatens to come to a standstill.”

(Original: “Als we niets doen, dreigt de zorg vast te lopen.”) [19]

A rise in offered technological facilities leads to higher expectations regarding digital healthcare [10]. Here the word ‘consumers’ is used, since patients can be perceived as consumers of care. This need for digitalization is also felt by the Dutch government, seen that a chapter of the Integraal Zorgakkoord discusses goals for digitalization in the healthcare sector [19].

Even though healthcare is increasingly making capital on and relying on digital support [20], this sector is still lagging behind in integrating digital solutions [21, 22, 23]. There is room for improvement looking at the adaptation of digital initiatives [24]. Hospitals are engaged in digitalization, but the attention for digitalization, analyses of the process of digitalization and an overview of what adequate organizational changes are needed to make initiatives successful are lacking [25]. A survey among employees of the RdGG shows the consequences of these three things; almost half of the 84 respondents make little or no use of the possibilities of the patient portal and more than 70% of the respondents do not use video calling [26].

As time passes by and digitalization of our society continues, patients will coherently shift their expectations concerning the use of digital facilities in healthcare. The digital adoption brought by the consequences of COVID-19 illustrates this well [27]. A survey from Penrod showed that already 64% of the participants would think about changing their primary care doctor if there was a doctor offering better technology. Even in the age group of 65+, 53 percent answered they would switch [28]. Results of another survey among patients in the RdGG show that there already is a demand from patients for the use of digital resources. Almost 69% of the 1,522 respondents indicate that they are interested in telephone and video consultations, mentioning advantages like cost and time savings [29].

2.1.2 Colorectal cancer and digitalization

Researching possibilities for the usage and implementation of technology in the care process is very relevant in the area of cancer care [24]. Colorectal cancer is the 3rd most diagnosed cancer worldwide [30]. This illness often forces patients to make difficult decisions, like choosing to undergo surgery or chemotherapy or not [31]. In addition, research shows that patients being treated for cancer have difficulties assessing what an appropriate amount of medical information would be to help them prepare for coming treatment and suffer from an oversupply or lack of information [32].

Digital opportunities could be used to support patients in their information needs during the care process. To give an example, smart devices and push technology (pushing data from a server to a client without a request from this client) can help to provide patients with practical information in a timely manner, since digitalization offers new options for conveying information than just text [25].

One of the bottlenecks for digitalization in the cancer care process is the average age of colorectal cancer patients. Most patients are 70+, which can complicate introducing and including this less tech group of patients in digital healthcare facilities [33]. Especially, since digital skills can vary a lot between different patients in this age group [34].

2.1.3 Journey mapping as a tool for digitalization

It is clear that hospitals need to digitalize to be able to keep offering high value healthcare, but what can help those hospitals to overcome the bottlenecks restraining this transition? According to Joseph et al. it is crucial to start with understanding the structure of the patient’s care process [35]. Patient journey mapping is a technique that can offer understanding in this structure.

Creating a journey map offers an overview of the care pathway patients go through, shown from the patient’s perspective. Hospital visits, examinations, treatments, and contacts with all care professionals involved in this process are mapped. Additionally, information exchange and the use of digital facilities can be made clear. Creating this patient journey map can provide insight into (unfulfilled) needs of

patients and their healthcare providers for technologies [24, 36], and reveal opportunities or bottlenecks for digital innovation of the healthcare process. This creates a greater potential for positive patient experiences [35]. It enables the hospital to meet patient's preferences and needs, leading to higher patient participation [37].

To date, few articles can be found concerning the use of patient journey mapping with the aim of optimizing a care trajectory through digitalization. New methods and approaches are needed that can be used in the design and implementation of these types of projects aimed at improving patient care [24].

The use of journey mapping as a tool for digitalization is also mentioned as necessary

in the Integraal Zorgakkoord. This describes that care pathways, a specific type of journey mapping, should be investigated and redesigned, focussing on digitalization [19]

Furthermore, it is important to identify what may limit digitalization. According to Gjellebaek et al., digitalization can be held back by factors such as skills, knowledge, expectations of technology, experience with technology and power relations [23]. This is consistent with research from Zhao and Canales, describing that in order to successfully achieve digitalization, it is needed to establish a way to create and share cross-disciplinary knowledge, forming a bridge between different participants in healthcare [38].

Key points

- Digital facilities can lead to more patient centered care and are desired by patients.
- There are organizational, financial and individual bottlenecks restraining the digital transition.
- Especially in the field of cancer treatment, digitalization offers new opportunities for supporting patients during their treatment, like new ways of exchanging information.
- Patient journey mapping can help to gain understanding of the structure of the care process, which is crucial for an effective and efficient digital transformation. To achieve this digital transformation, more research is needed in journey mapping in relation to digitalization.

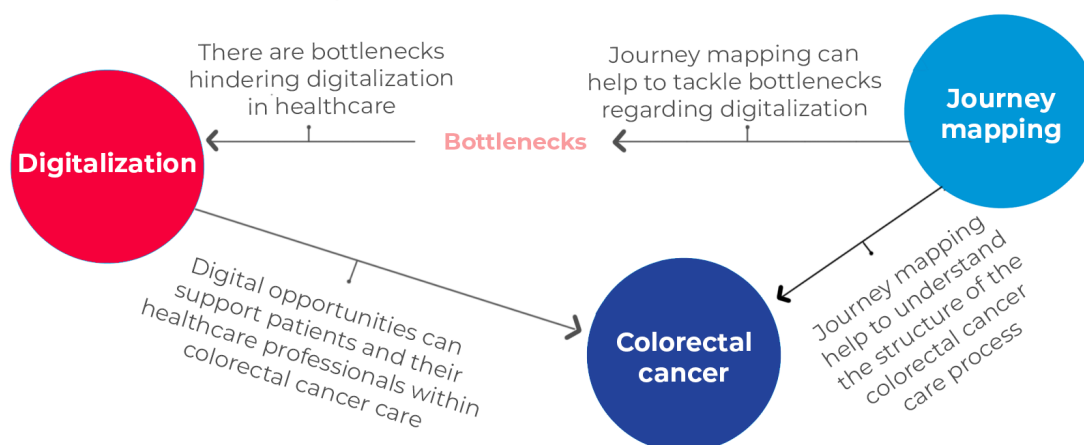


Figure 5. Correlations between the selected topics of interest around which this project revolves.

2.2 Developing understanding of the current colorectal cancer care journey and workflows at the RdGG

2.2.1 Observing situations within the colorectal cancer journey and workflows

The literature review provided fundamental insight in digitalization in healthcare overall, however, to create a design that directly positively effects patients or employees of the RdGG, targeted research was needed. To discover more about the specific colorectal cancer patient journey of the RdGG and workflows of employees of the RdGG different situations were observed. Firstly, interactions between patients and different kind of healthcare professionals, secondly healthcare professionals during their workdays and thirdly observations during meetings with healthcare professionals and organizational employees of the RdGG

Figure 6 visualizes these different scenarios that were observed. Throughout these observations I made sure to adopt a non-interrupting, observational role. Afterwards, I asked questions and started conversations to obtain more information.



Figure 6. Observing A: interactions between patients and healthcare professionals, B: healthcare professionals during their workdays, C: meetings with different kind of employees of the RdGG. (Source original foto's: van der Burg, F. (2019)).

2.2.2 Observation outcomes

Patients with different wants and needs during an intense treatment process

It quickly became clear that the treatment of colorectal cancer is a very intense process, since it requires a lot of organisation for patients. Think of taking chemo pills at the right moment, visiting the hospital almost every day or monitoring symptoms.

All patients experience this differently and have individual wants and needs. Some patients prefer knowing everything, asking a lot of questions and others prefer to stay as uninformed as possible. Another example; some patients want as many appointments as possible planned on one day, for instance because they have difficulties arranging transportation, while other patients feel drained after one appointment.

Still, one thing that is similar for most observed patients, is that they are looking for certainty

and clarity. This became evident from quotes such as ;

“What will the future look like, what is the plan?”

Something else that stood out, is that almost all patients take a passive stance during consultations and trust the health care professional to make the right decisions. Overall, all patients seem content with the way they are treated. There is a lot of room for ‘personal contact’, which seems to be valued by the elderly patients, who want to tell their story and also often talk about other things than the treatment.

A large amount of information leads to challenges for both the patient and the health care professional

Patients get a lot of information in the course of their treatment and see multiple different health care professionals. I observed that

during most of the consultations, the health care professionals are continuously checking if the patient remembers and understands everything that is discussed. This is clearly necessary, since I noticed that patients forgot a lot. This extended from forgetting minor instructions, like using the priority button at the blood collection department, to important details such as the duration of their chemotherapy.

Even though they already get a lot of information, some patients can feel like they missed information. Quoting a patient talking about her stoma;

"If I knew what I know now, I don't know if I would choose it again."

The combination of a lot of information and different kind of health care professionals sometimes leads to confusion and a lack of overview. It does not always seem to be clear for health care professionals what information is already shared with the patient, which can lead to redundant information.

Most of the information is stored in a program called Zenya. This program contains a lot of files, but is not friendly in use. Finding specific files is time consuming, which can lead to irritation.

Large amount of paper information - both disliked and valued

Patients receive a lot of paper information. This has advantages and disadvantages. Advantages include a personal interaction between healthcare professionals and patients, handing over information, pointing out words and sentences and highlighting things with a marker. Furthermore, the binder (Figure 7) that contained a substantial part of the paper information can provide guidance for patients, considering some patients pointed out they liked that they could get back to the information binder at home. Disadvantages include the amount of time needed for printing all papers, leading to frustration, and patients losing the forms or pamphlets. As one patient mentioned:

"The wind swept my pamphlet right out of my hand"

Lastly, the use of so much paper is not sustainable. Especially given that forms are

often printed in twofold, allowing the health care professional to read along.



Figure 7. Binder with information for patients in the colorectal cancer care pathway.

Minimal use of digital possibilities

During the treatment a minimal amount of digital possibilities is used. At the start, before getting a colonoscopy, patients will receive digital information, but later in the process all information is on paper or spoken. The patient portal or e-consults are barely used. However, quotes like:

"It would be helpful if I could show a picture now"

show that in some situations digital opportunities could improve the care process.

The predisposition of patients towards healthcare is largely determined by the degree to which they use technology in their everyday life. Attitudes on the subject range from dismissive to willing:

"I can only pull the plug out of the computer" versus "I would rather receive questionnaires by email"

Problems and difficulties with current digital possibilities

There are some frequent technical hiccups when using digital facilities. Think of difficulties placing pamphlets or instruction videos in the patient portal and different digital opportunities not connecting to one another seamlessly. Moreover, the use of digital opportunities can lead to confusion. To illustrate, patients can see their lab-results after a build in lag-time, but often don't understand the medical language or numbers. This results in feelings of stress, triggering patients to reach out to their care professionals.

Differences in the workflow of employees

Throughout the various observation periods, it became clear that there are not only differences between patients, but also between health care professionals. Differences in the use of e-consults, the use of drawings to support explanations and in referring to the binder with information or not. The dissimilarities are not only on an individual level, but also exist between different departments or specialties. For instance, at the department of radiology appointments are not planned via Chipsoft like the other departments, which results in patients not being able to see these appointments in the patient portal.

Difficulties in connecting different kind of health care professionals or organizational employees

There are difficulties in the communication between different kind of employees in the RdGG. These can be broken down into two categories:

- 1) Intra departmental communication between health care professionals. To illustrate, specialists and nurse specialists use a different electronic dossier than nurses, thus both parties can read different information about the same patient, occasionally leading to confusion or redundant work.
- 2) Interorganizational communication. There is room for improvement in the communication between health care professionals and organizational employees at the RdGG.

Through observation of a meeting with nurse specialists brainstorming about digitalization, it became evident that it was unclear who they could contact with ideas for or questions about digitalization.

Incoherent care pathways that are time-consuming to create

The treatment process is based on existing care pathways in the RdGG. Care pathways are important to bring unity and clarity in the process. Furthermore, care pathways are shown during quality visitations. At this moment, a lot of differently visualised care pathways exist at the RdGG and uniformity is lacking. To tackle this problem, a new format is chosen, called the swimlane (Figure 8).

During another meeting that I attended, a nurse specialist and organizational employee worked on creating and adjusting a care

pathway in this format. The meeting revealed that it takes a lot of time and energy to create and maintain those care pathways. The program that is currently used to produce these is not user-friendly and only one employee of the RdGG knows how to operate the current program in its entirety. Furthermore, it is only use to build care pathways, not to create patient journey maps. This does not only limit the amount of care pathways that can be created but is also problematic since care pathways often need adjustments as care processes are continuously evolving.

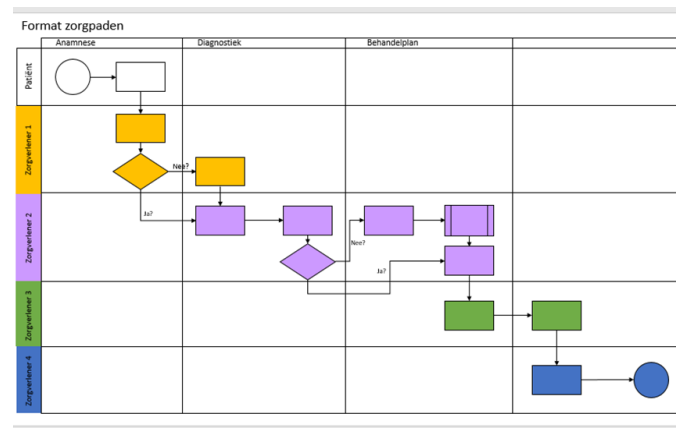


Figure 8. The swimlane format

Key points

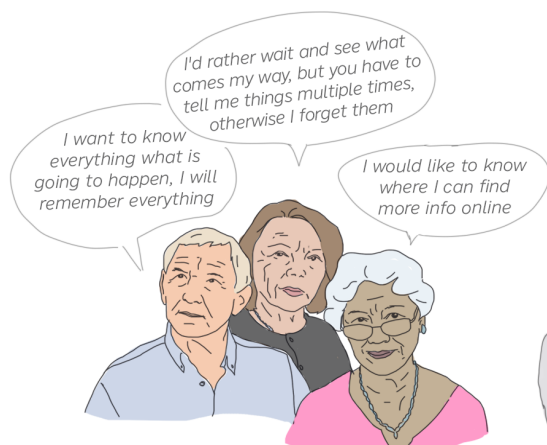
- Patients receive a large amount of paper information during their treatment and make minimal use of digital possibilities.
- This large amount of information leads to challenges for both the patient and healthcare professional.
- Patients and healthcare professionals experience problems while using digital resources.
- Differences in the wants and needs of patients and between workflows of healthcare professionals
- Difficulties in the communication between healthcare professionals and between healthcare professionals and organizational employees
- Care pathways are incoherent and time-consuming to create

2.3 Areas of interest for further research

The results from the literature review and observed meetings and interactions led to a broad scope of results. Analyzing these results,

certain areas were valuated as relevant for further investigation, presented in Figure 9. These areas already had an existing connection with digitalization implementations or could potentially benefit from digitalization.

Areas of interest for further research



There are different type of patients, with different needs and wants
Get to know more about the different needs and wants. How can digitalization be used to offer more patient centered care?



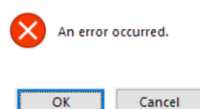
A large amount of information brings challenges for both the patient and the health care professional
What do health care professionals and patients think of this amount of information? Can digitalization help to convey this in a better way?



A large amount of paper information is used, which is both disliked and valued
What is the attitude of health care professionals and patients towards digitalizing the provision of information?



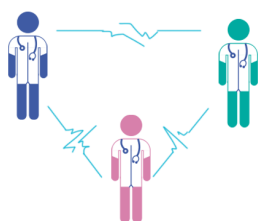
There is only minimal use of digital possibilities
What is the attitude of health care professionals and patients towards digitalizing the provision of



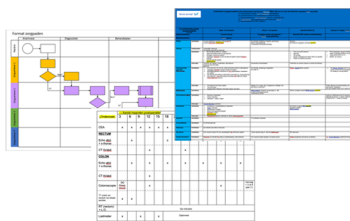
There are problems and difficulties with current digital possibilities
What are the main problems and difficulties? What could be a solution to solve this?



There are differences between workflows of employees at the RdGG
Why are there differences between healthcare professionals? Is this a problem?



There are difficulties in connecting different healthcare professionals and organizational employees
Do more employees of the RdGG recognize difficulties? What can be done



Incoherent care pathways that are time-consuming to create
What do health care professionals think of these care pathways? Do they use them? And can digitalization help to make creating and



Organizing digitalization at the RdGG is challenging
Do employees experience other problems during the organization and implementation of digital opportunities?

Figure 9. Areas within the colorectal cancer patient journey which were seen as interesting for further research.

2.4 Creating the colorectal cancer patient journey

Based on 1) observations of interactions between patients and their care providers, 2) retrieved colorectal cancer care pathways provided by the RdGG and 3) feedback sessions with the nurse specialist GE Oncology

(who is responsible for the care pathways), a patient journey map was created. This journey map divides the care process in four fases with different subphases, as shown in Figure 10.

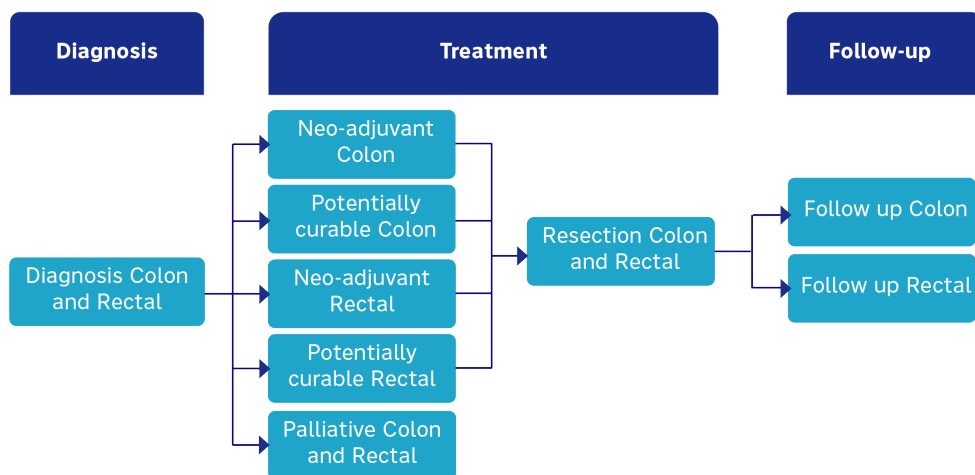


Figure 10. Phases shown in the patient journey map of the colorectal cancer treatment at the RdGG



The full journey map is presented in Figure 11, with the aim of showing the complexity and extensiveness of the colorectal cancer patient journey. Appendix A can be consulted for a 'readable' version.

Due to time limitations, the journey map could not be finished. But even though it is not finished, it still shows the amplitude of the colorectal cancer care process and the lack of digital resources and high amount of paper information within this process.

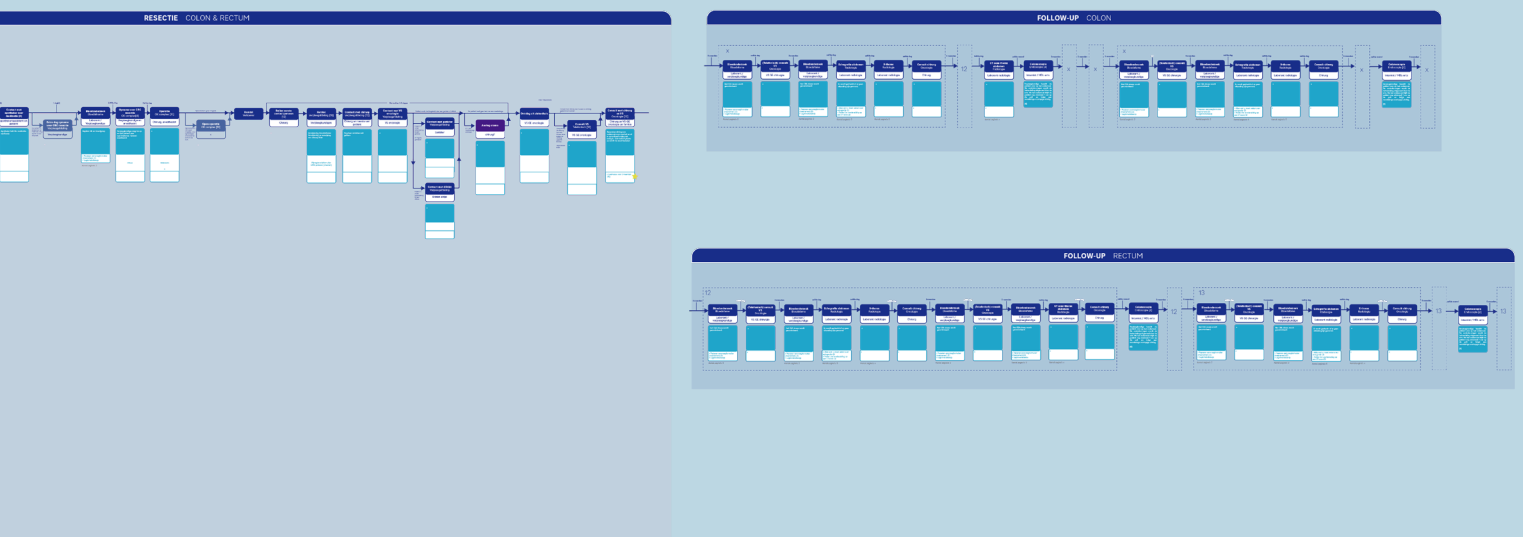
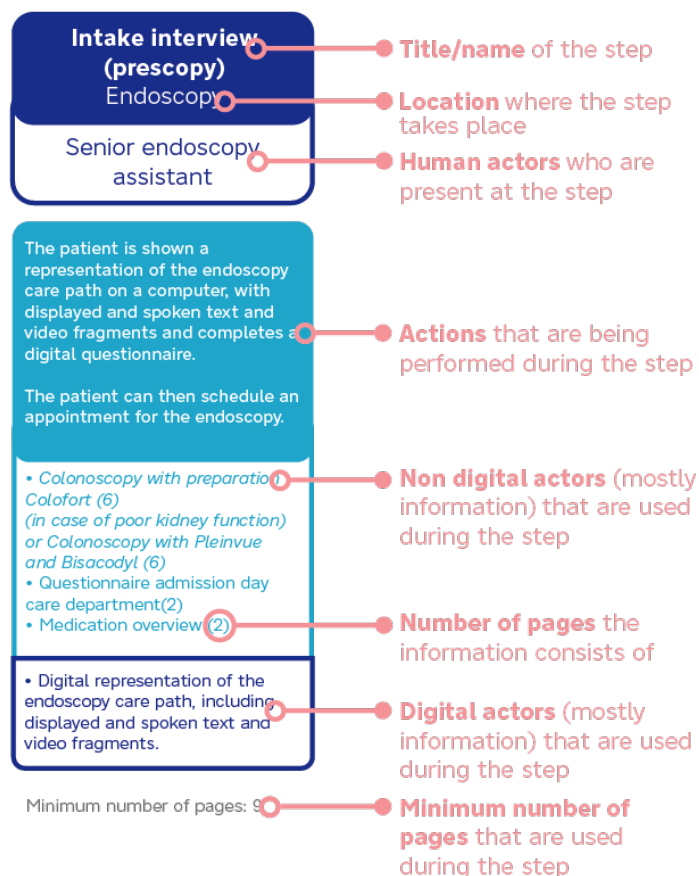


Figure 11. The patient journey map of the colorectal cancer treatment at the RdGG.



Each step contains seven types of information, shown in Figure 12 and the reader is informed of the time interval between different steps (see Figure 13). At certain points the path splits into multiple subpaths, which shows a decision needs to be made. If there is a split, the map shows information about this split. (Figure 13).

Figure 12. Information shown in each step of the patient journey map

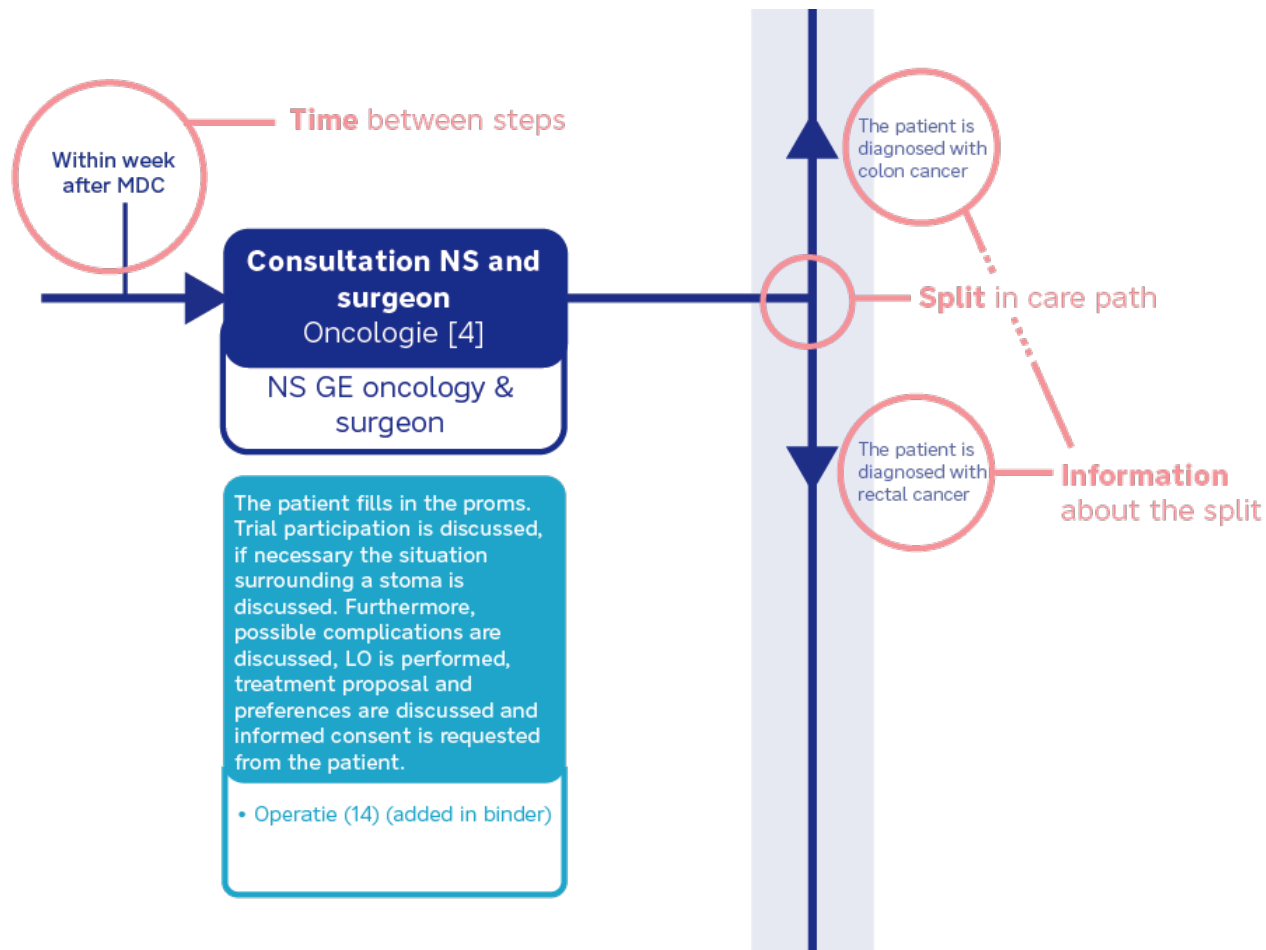


Figure 13. Information shown in the patient journey map

2.5 Is the created patient journey visualised in the right format?

The format of the created patient journey can be seen as to be an analogy for the real life patient journey: the amount of steps are overwhelming and analyzing it can be daunting.

With the aim of making the patient journey more comprehensible and compact, two options were considered. The first option is combining the specific steps in bigger steps (as shown in Figure 14). While this can on the one hand, reduce the possibility of the patient being overwhelmed by the volume of information, it mainly leads to the undesirable loss of valuable information. This also detracts from one of the earlier mentioned values of the patient journey 'a technique that can offer understanding in this structure of the patient's care process'.

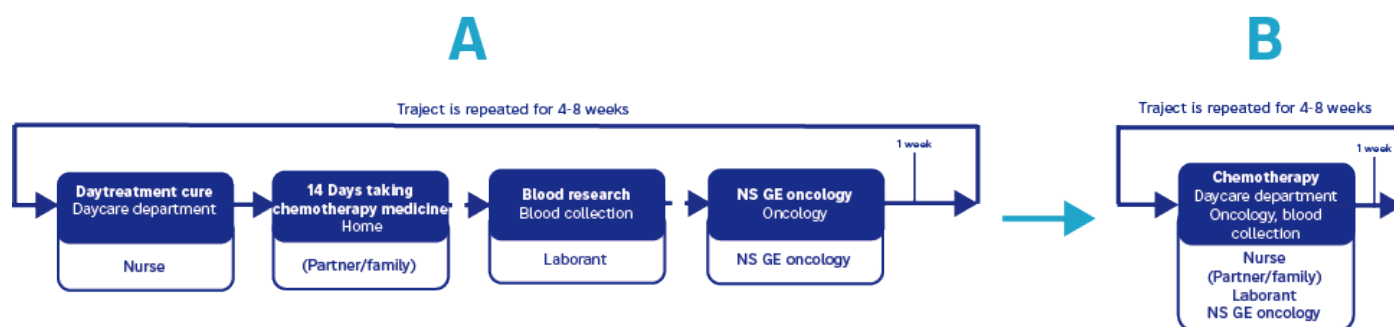


Figure 14. Possible method to create a more concise patient journey map

The second option considered was reducing the time frame of the patient journey, by for instance focussing solely on the diagnosis, or the treatment. While this increases the amount of steps, this is also not optimal, considering that only showing the total overview really enables the viewer to put things in perspective. Think of the total amount of information patients get from diagnosis to follow up, or how scarce the usage of digital opportunities really is over the whole process.

Seeing as both considered options carry drawback, it was evident that another method had to be used to improve the format of the patient journey. To be able to understand how to achieve this, the exact purpose of the patient journey and its use should be more clear. To discover this, more research on the earlier mentioned areas of interest was needed.

Key points

- The created patient journey presents all steps of the colorectal cancer care process, for each step showing the location, attendees, activities, information given to the patient and digital resources used during the step.
- There is need for a patient journey format that is easier to comprehend and less overwhelming

Chapter 3 | In-depth research

In Chapter 2, areas of interest for further research were established. This chapter will describe in-depth research on these areas, consisting of semi-structured interviews with colorectal cancer patients, their health care professionals and organizational employees of the RdCG.

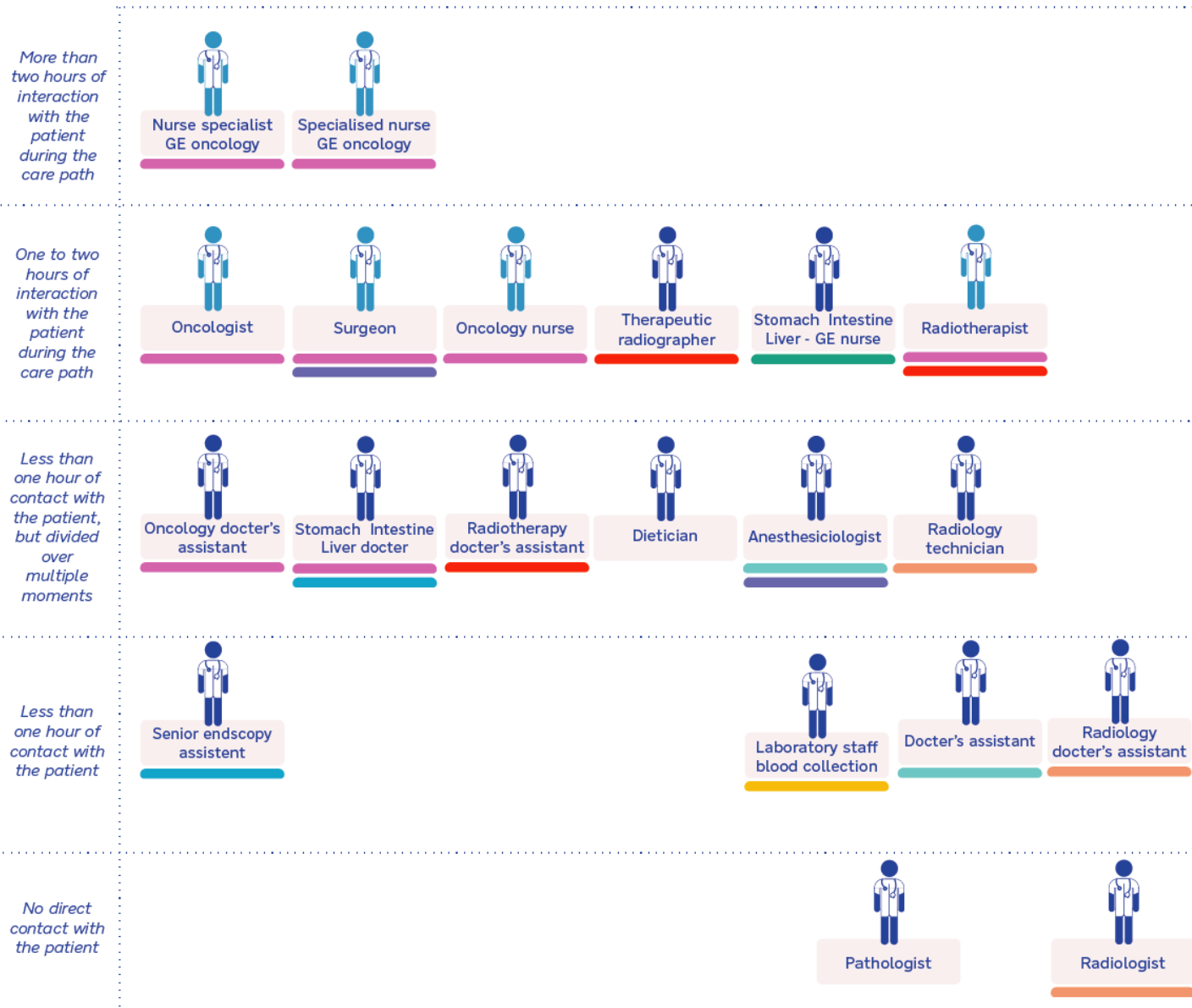


Figure 15. Map of human actors the patient interacts with during the care process.

3.1 Selecting participants for the interviews

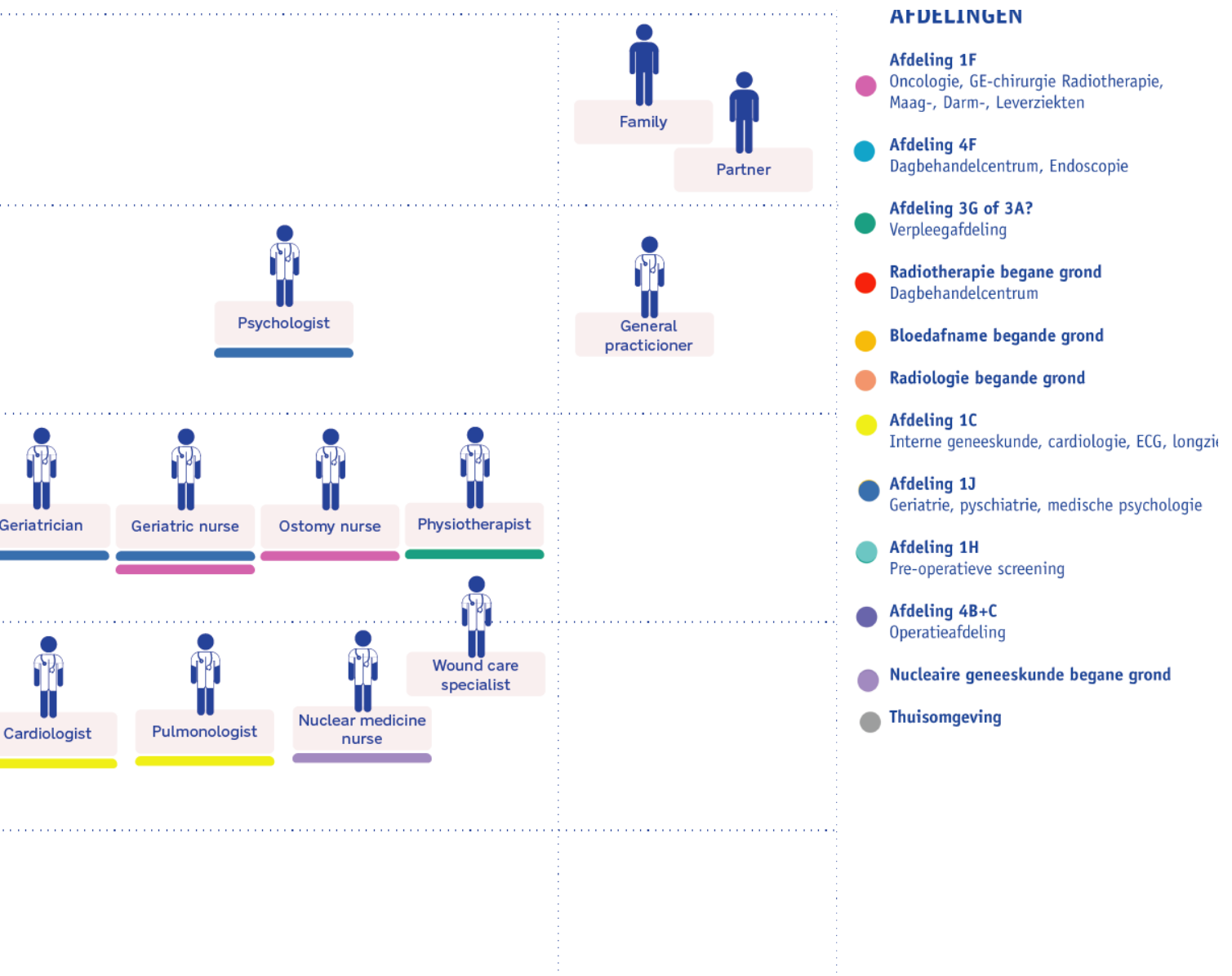
To find the most promising design direction, further analysis of the areas that were labeled as relevant (in Chapter 2) was needed.

Conducting 30-45 minute interviews was selected as an effective technique to obtain a better understanding of the participant's perspectives on these areas. The interviews were semi-structured, making sure to keep the focus on the areas of interest, without being limited in exploring relevant ideas that could come up during the interview [39]. All participants were selected with purposive sampling; maximum variation sampling, to be able to collect a wide variety of experiences and to gain as much insight as possible into the areas being studied [40]. According to literature, most of the new information is gained in the

first 5 to 10 interviews [41]. Therefore the aim was to interview a minimum of 5 patients, 5 health care professionals and 5 organizational workers.

3.1.1 Health care professionals

Figure 15 shows a map of all relevant actors that are in contact with the patient during treatment. The higher the actor is placed higher in the figure, the more the actor interacts with the patient. The decision was made to approach the type of health care professionals placed in the top two rows of the figure, since these are most connected to the patient. Six different types of health care professionals agreed to be interviewed. These are colored in light blue in the figure.



3.1.2 Colorectal cancer patients

To ensure a diversified sample group of patients, variety in their treatment proces, age, gender and digital skills were taken as key indicators. As it was difficult to quantify digital skills from an outside perspective, the nurse specialist was consulted and asked to provide a rough estimate of the patients digital competency.

Based on these indicators, several patients were selected. Research protocols were created and checked by the METC. After receiving confirmation that the research is not WMO-obligatory, the patients were sent an envelop containing information regarding the reasearch and what information they were expected to provide if they decided to participate. This included the folder presented in Figure 16 and Appendix B. Seven days later, the patients were called and five patients agreed on an interview. Figure 17 shows the characteristics of these patients.



Figure 16. Information used to recruit patients for the interviews.

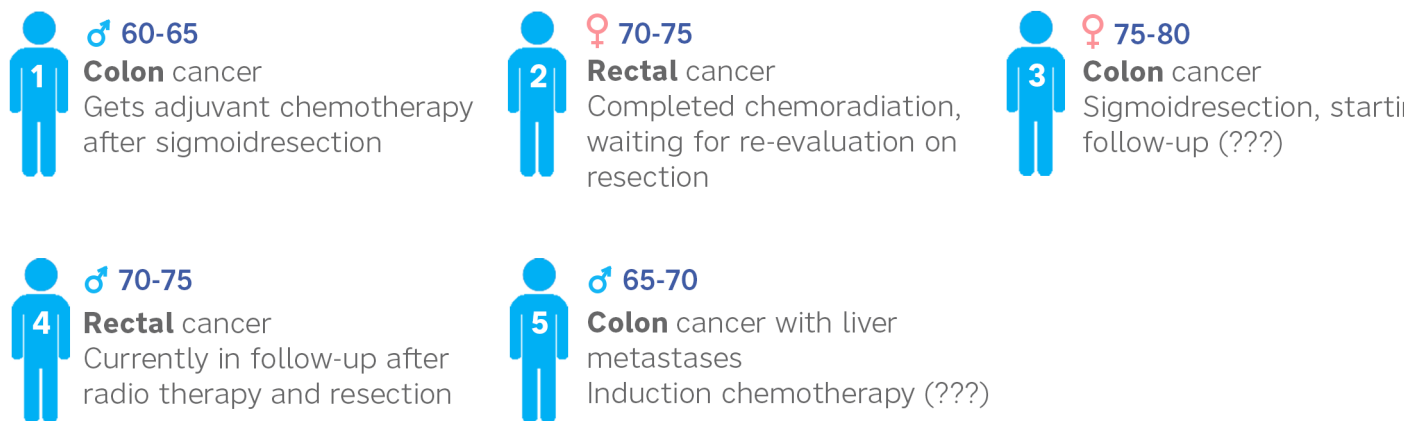


Figure 17. Characteristics of interviewed patients.

3.1.3 Organizational employees at the RdGG

Multiple employees within the organization of the RdGG were approached for an interview, each occupying a different function at a different hierachical level within several different departments,. Job descriptions of the six employees who agreed on the interview are shown in Figure 18.

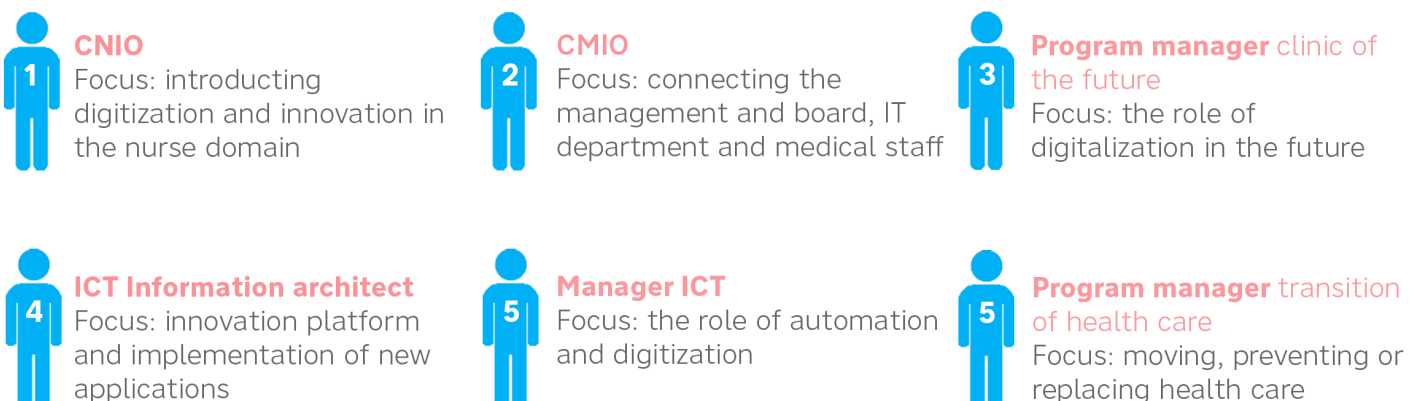


Figure 178. Job descriptions of interviewed organization employees

3.2 Preparing and conducting the interviews

With the purpose of guiding the interviews and providing coherence between them, two interview protocols were drafted; one for healthcare professionals and one for organizational employees (Appendix C). After each interview, the corresponding protocol was reviewed and slightly adjusted, in order to streamline the process and refine data collection for the following interview. All interviews were recorded with a sound-recorder. The patients interviews were guided by the posters in Figure 19 and Figure 20.

3.2.1 Interviewing the patients

Two posters were created with the aim to make the interviews with patients more interactive. These posters also served as clarification of the interview questions, illustrating the contexts of the different topics that were discussed. The first poster displayed examples of digitalization (Figure 18, Appendix D.1) to help patients envision what digitalization could mean in the context of their treatment process and the second poster was personalized per patient, visualizing their treatment process (Figure 19, Appendix D.2). The interviews started with questions about the patients' attitude towards these examples, followed by questions about the patients' experience at different treatment stages and the potential role of digital opportunities during these steps.



Figure 19. Poster displaying examples of Digitalization.



Figure 20. Poster displaying a personalized treatment process

3.2.2 Interviewing the health care professionals and organizational employees

In total, seven healthcare professionals and six organizational employees within the RdGG were interviewed. Figure 21 and Figure 22 show the main themes that were discussed during these interviews.



Figure 21. Main topics discussed in interviews with healthcare professionals



Figure 22. Main topics discussed in interviews with organizational employees

3.3 Analysis of the interviews with healthcare professionals

After transcribing and anonymizing the recordings of the interview, a thematic analysis was conducted on these transcripts, using consecutively open, axial and selective coding [42]. This led to the identification of a set of themes, connections and theories. Appendix E.1 presents an overview of these results.

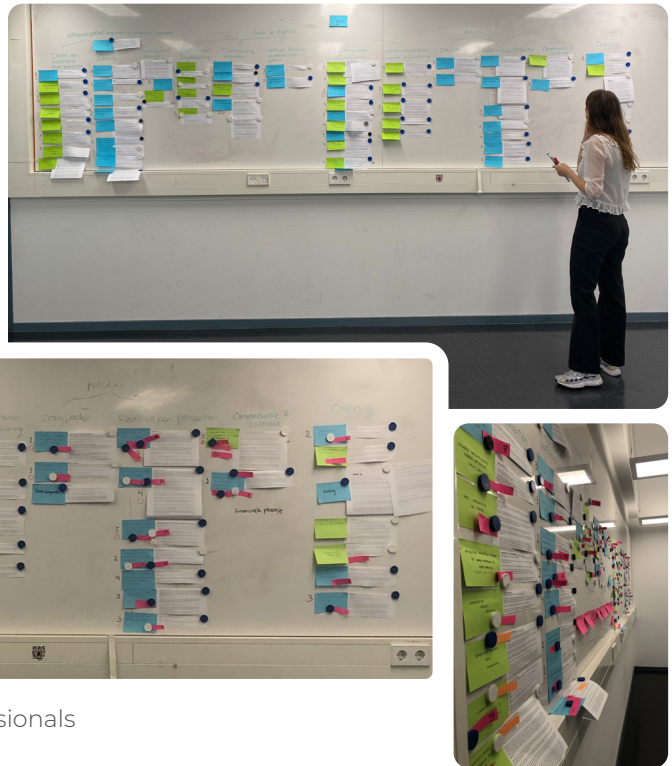


Figure 23. Analysis of the interviews with healthcare professionals

3.3.1 Found themes and theories derived from these themes

Sharing information with patients

Outcomes of the interviews with healthcare professionals validate earlier findings regarding information exchange between patients and healthcare professionals. Healthcare professionals state that patients get a lot of information, mostly on paper. In their experience this can be overwhelming for patients, making it difficult for them to remember or comprehend all information. Healthcare professionals expect the visualization of information or offering information video's prior to consultations to be valuable. Some mentioned that they would not want this visualized information to replace the original information binder, explaining that binder could offer support to patients.

Contact with patients

Healthcare professionals show interest in new digital ways of communication with patients, like the use of the application BeterDichtbij. While such applications produced a sense of curiosity and optimism, discussing these also induced some stress reactions and apprehensive resistance. In contrast to the

interest in such applications, it was observed that discussing this theme during the interviews also triggered stress responses and resistance. Some healthcare professionals fear an increasing workload caused by disappearing triage, pressure to quickly respond or expect that they will be available after working hours.

Most interviewed healthcare professionals do not make use of e-consults and are not eager to start to use them, once again mentioning a disappearing triage in combination with feelings of stress related to these e-consults;

"I experienced that once, I think two years ago. At that time I thought like oh, I got a kind of knot in my stomach, thinking help do I have to do that too and figuring out how it works etc."

Attitudes towards videocalling vary from positive to negative. Fear of losing human connection and missing valuable information were often mentioned as a rationalization for not using this digital opportunity. Organizational issues, like supporting staff planning in normal consults instead of videoconsults also stands in the way. Some

healthcare professional take a pro-active stance towards videocalling, especially with the intention of improving current phone call consultations.

Contact with colleagues

Different options are used for interacting with colleagues, like discussing patients face-to-face or communicating through the electronic patient portal. Multiple problems are experienced in this area, like having to switch between different online health records and not being able to read through what was discussed face-to-face.

Bottlenecks digitalization

The interviews confirm what was observed when following healthcare professionals throughout their workday; software programs do not always synergize well with one another, leading to frustration. Another bottleneck for digitalization is the temporary extra workload that arises when one has to get familiar with the use of new digital resources. Last but not least, healthcare professionals fear that patients will lack behind in the adaption of digital resources.

Use of digital opportunities

Outcomes of these interviews reinforce the idea that the adoption of digital opportunities are embraced differently by individual healthcare professionals. This could be due to the fact that almost all interviewed healthcare professionals mentioned running into problems with current digital resources, possibly demotivating some of them, whereas others are more tech-savvy and adopt more readily.

Attitude towards digitalization

Multiple healthcare professionals have both a positive and negative attitude towards Digitalization. They often expect colleagues to also have a both skeptical and open stance towards digitalization. These mixed feelings probably exist due to the fact that digitalization is not constricted to one definition. The negative attitude stems from fear of losing human connection, decreased job satisfaction caused by an increasing amount of technology or doubts about being replaced by technology. The interviews confirmed that there is a lack of knowledge

about the opportunities of digitalization amongst healthcare professionals. The positive attitude

Wishes regarding digitalization

Amongst the healthcare professionals there were also clear wishes regarding digitalization: for instance, a smoother workflow with digitally connected components, informational videos and more patient tailored care. Home monitoring was also brought up as potentially valuable.

Realizing projects regarding digitalization

If the implementation of digitalization were to follow its current trend within the RdGG, these wishes will probably not be transformed into reality. The majority of health care professionals does not know who to approach in order to voice their ideas for digitalization and were demotivated by the current situation regarding the implementation of digital opportunities. There is a lack of faith in ideas actually getting developed and the implementation of new opportunities can be slow and arduous.

Care pathways

The interviews verify that the process of creating care pathways is time-consuming and labor-intensive. There is room for improvement looking at the presentation of information in the care pathways as they were described as unclear and difficult to read.

Organization and culture

More than half of the healthcare professionals mentioned a lack of different kinds of coherence in the care process, difficulties in the management of files or difficulties in maintaining a clear overview regarding different aspects of the care process and work flows. During the interviews, it was observed that some of the healthcare professionals seem to feel like they have different aspirations regarding the objective of digitalization of care processes than the organizational department of the hospital.

3.3.2 Second analysis

To develop a more thorough understanding of relations between the different themes and findings, a second analysis was performed on the results of the initial analysis. This analysis

endeavored to look for overarching theories and find out how these are intertwined. Figure 23 shows the visualized result of this analysis. Appendix E.2 can be consulted for a larger size of the Figure.

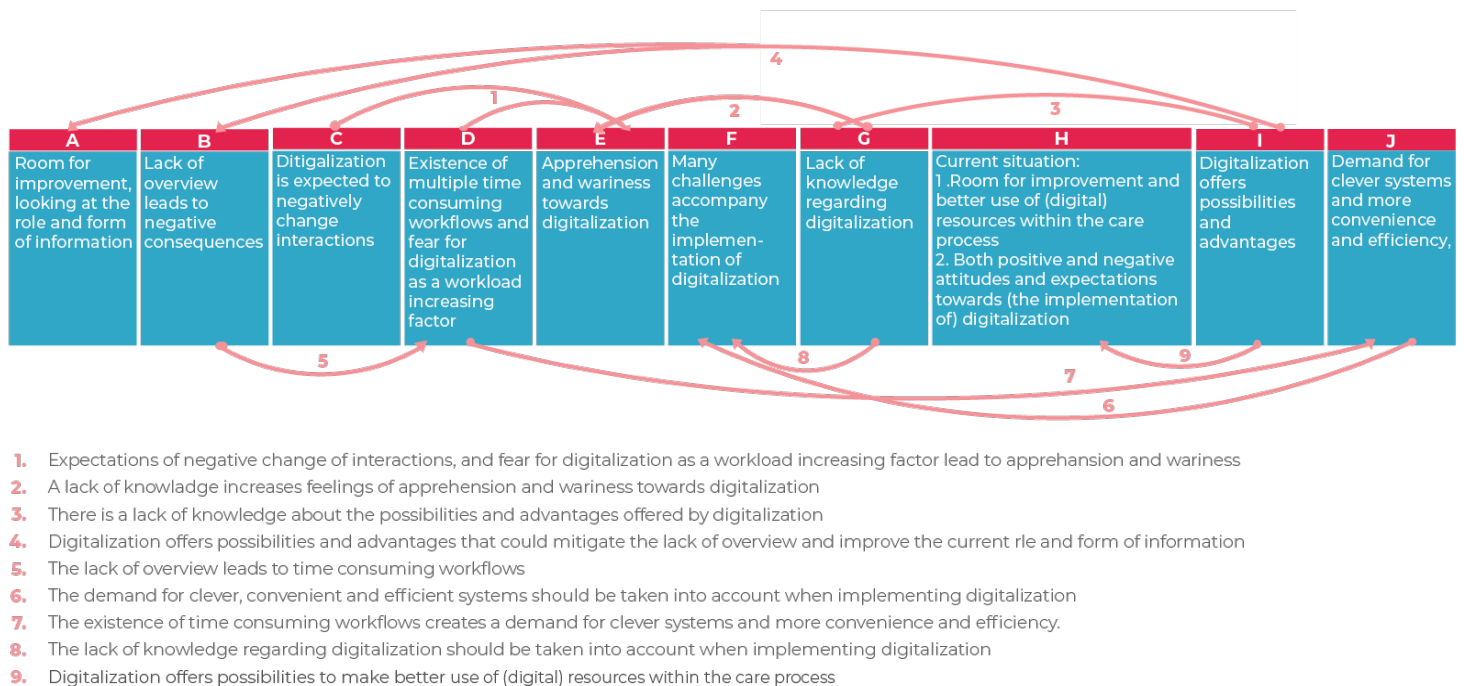


Figure 23. Overarching theories and connections between these theories, based on the outcomes of interviews with healthcare professionals

Short conclusion

Briefly said, there seems to be a lack of overview, and knowledge and there are issues in the communication (with care professionals and with organizational employees). This leads to time consuming interactions and double information. Furthermore, patients receive an intense amount of information during the care pathway. Digitalization could help solve these problems, but the negative attitude towards this term impedes this.

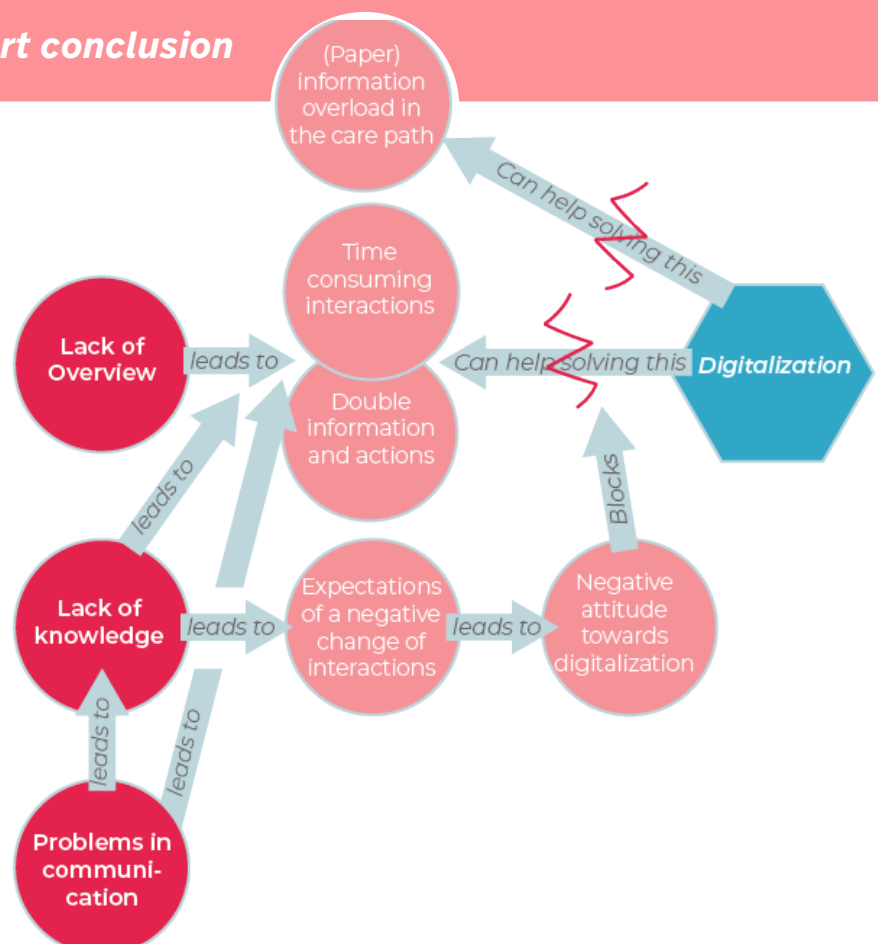


Figure 24. Visualized conclusion of the thematic analysis conducted on the interviews with healthcare professionals

3.4 Analysis of the interviews with organizational employees

The interviews with organizational employees were as well analyzed with a thematic analysis, leading to the identification of a set of themes, connections and theories, presented in Appendix F.

3.4.1 Found themes and theories derived from these themes

Current situation: Problems

Analyzing the current state of digitalization at the RdGG revealed that there is room for growth. Digital possibilities are not well embedded in care process, resulting in the scarce use and deployment of digital resources by healthcare professionals. Projects related to digitalization are time-consuming, which can be demotivating for organizational employees and add to the negative association with digitalization amongst care professionals.

Current situation: Expected attitude care professionals and patients.

Organizational employees expect most patients to have an open attitude towards the use of digital resources, depending on the type of patient and treatment patients receive. As to the care professionals, they estimate that some of them feel anxious and stressed about digitalization and others more enthusiastic. It is mentioned that healthcare professionals often react with counterarguments when offered new digital opportunities.



Figure 25. Analysis of interview results

Collaborating with care professionals: Interacting with care professionals

A physical division exists between organizational employees working in the Gravin and healthcare professionals in the main hospital. Some lack of mutual understanding/interaction between them was observed. It seems like the split between the two buildings also divides the teamspirit between the two types of employees within the RdGG. Despite this, all organizational employees mention the importance and value of collaborating together and efforts are being made to get in contact with healthcare professionals to involve them in the Digitalization process.

Collaborating with care professionals: Care professional's input regarding

One of the reasons collaboration between care

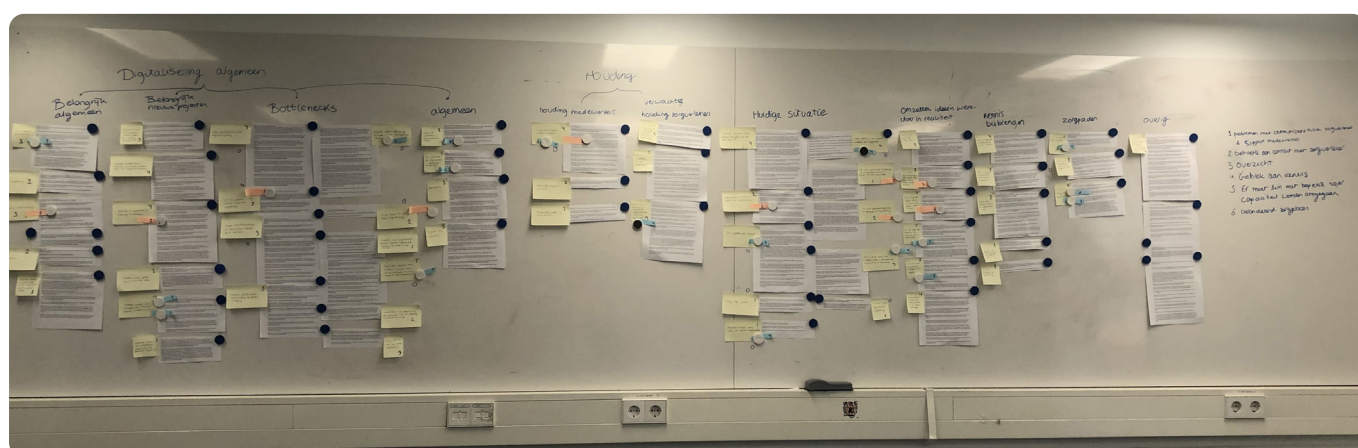


Figure 26. Analysis of interview results

professionals and organizational employees is of importance, is that care professionals come up with ideas for innovation of care for during their workdays. Organizational employees confirmed that it is probably unknown amongst healthcare professionals where and how to share these ideas. One is still searching for an effective way to share and retrieve knowledge.

Promoting : Imparting knowledge

Health professionals often have to be disappointed when sharing ideas, for instance because of problems with privacy or security. Having to disappoint healthcare workers who share ideas stems from a lack of knowledge about requirements for digital possibilities and lack of overview in the process. Think of a care professional seeing a nice app and proposing it, but discovering that a similar app is already being used in other departments. Therefore, conveying knowledge about digitalization to care professionals can be valuable. Not only understanding of existing digital resources or requirements for products, but also developing expertise on the use of the existing digital resources to lower the usage threshold.

Promoting : Bringing to the patient

The interview results revealed that besides informing the healthcare professional about digital opportunities, it is just as important to empower patients through knowledge on available digital resources. According to organizational employees it is most effective to let healthcare professionals introduce digital resources to patients and subsequently use shared decision making to decide on using these resources or not.

Implementing : Bottlenecks

Quite some bottlenecks related to the implementation of digitalization were mentioned. Once again, problems in the interaction with healthcare professionals were brought up. It is difficult to get in contact and low willingness to change is encountered. This low willingness to change could be caused by the high work pressure among care professionals, leaving no time and energy to learn or implement new things. Other bottlenecks that were mentioned were limited capacity and finances, external parties and the organizational structure of hospitals; who is in charge of the care process, organizational employees or healthcare professionals?

Implementing : Important for new projects

Quite some requirements to successfully implement digital opportunities where listed, think of sufficient security and privacy. According to the interviews, projects have a higher chance of success if they are based on problems put forward by care professionals and are simultaneously of added value to both the patient and healthcare professional. To conclude, due to the limited capacity and finances, digital opportunities must be widely applicable.

Implementing : Consequences of digitalization

One of the causes of wariness towards digitalization amongst healthcare professionals are possible consequences of this trend. The interviews revealed that digitalization leads to changing responsibilities and replacement of healthcare activities, which can also be found in literature [27]. Without knowledge of the circumstances surrounding these consequences, digitalization can have a negative connotation.

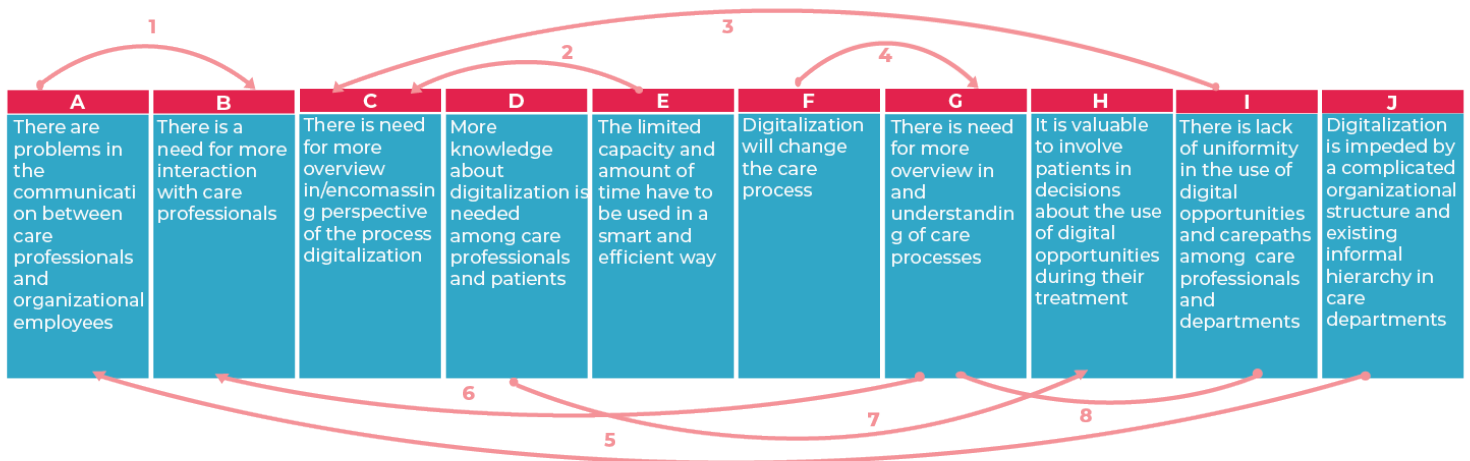
Process overview and organization: The difficulties of creating overview and uniformity

The hospital is a complex organisation with a lot of different departments and specialties within these departments. This can complicate keeping track of where certain digital resources are used and of the different needs and wants of all different departments and specialties. There are various initiatives to collect this knowledge about wishes of healthcare professionals, like meetings and the Innovatie Platform.

Care pathways were described as a useful tool to provide understanding and overview of care processes in the hospital, facilitating the implementation of digital resources in these processes. Unfortunately not all treatment processes are translated into care pathways yet. Keeping track of the digitalization process is also hindered by dissimilarities between work flows of different care professionals and departments. An example is variation in the use of videocalling or e-consults.

3.4.2 Second analysis

Likewise, a more thorough understanding of relations between the different themes and findings was formed via a second analysis. Figure 27 shows the visualized result of this analysis and Appendix F.2 shows a larger version of the figure.



1. More frequent interaction with care professionals can lead to better communication between organizational employees and care professionals. F-I
2. To use the limited capacity and amount of time efficiently, more encompassing perspective of the digitalization process is needed.
3. Lack of uniformity in the use of digital opportunities and carepaths can make it difficult to create clear overview in the digitalization process
4. Knowledge of care processes is needed to digitalise these processes without interrupting the workflows during these processes.
5. The complicated organizational structure can lead to problems in communication between care professionals and organizational employees
6. More interaction with care professionals can help to create a better understanding of care processes
7. Since patients lack knowledge of possible digital resources, it is valuable to involve them in decisions about the use of these resources.
8. More uniformity in care paths can help to create a better understanding of care processes and therefore for

Figure 27. Overarching theories and connections between these theories, based on the outcomes of interviews with organizational employees

Short conclusion

There is a limited capacity and amount of time available for digitalization.

- In order to utilize resources as effectively as possible, it is important to create a clear overview in the digitalization process; which resources are used at different departments or in various care processes and what are wishes from stakeholders navigating in these departments and care processes.

More frequent interaction with care professionals can lead to better communication

- between organizational employees and care professionals. This communication is essential to effectively integrate digital opportunities in care processes. To achieve this, it is necessary to understand how care processes are build up. Next to more frequent interaction, uniform care pathways can facilitate this.

- There is low change readiness amongst care professionals. This could be due to misconceptions about digital opportunities, thus due to a lack of knowledge about these opportunities. Involving care professionals in the process of digitalization was mentioned as helpful for this low change readiness, emphasizing the need for more communication with this usergroup.

- Patients also lack knowledge about possible digital resources. It is important that care professionals involve them in decisions on the use of digital resources, introducing them to digital opportunities.

3.5 Analysis of the interviews with patients

Lastly, thematic analysis was also used to analyze the interviews with patients. Leading to the identification of a set of themes, connections and theories, presented in Appendix G.

3.4.1 Found themes and theories derived from these themes

Current use of digital resources

A positive outcome of the interviews is that patients are very enthusiastic about two digital resources they encountered in the RdGG: the self check-in kiosks (Figure 28) and the endoscopy informational video. A negative outcome is that patients are not familiar with all digital resources offered by the RdGG. The patient journal is barely used and not one of the interviewed patients knew that they could send e-consultations. There is a need to establish an effective way to inform patients about digital resources. All interviewed patients were familiar with digital products, mentioning the use of smartphones, Ipads and computers.

Attitudes towards digital opportunities

Patients show an open attitude towards digital resources; the option to get digital reminders and instructions (for instance about fasting before a CT-scan) was positively received and patient showed interest in tracking symptoms at home while being supervised by a doctor. Most patients are open to or prefer video consultations instead of normal consultations.

"In the end I could no longer stand the sight of the hospital ... so in the future I would like to make video calls."

However, it isn't preferred to change all consultations, mentioning the loss of human touch and

"There are bad messages, you almost burst into tears. I find that difficult in front of the computer."

Information provision

Patients are content with the amount of information they receive, but experience difficulties remembering all information. This relates to one reason for preferring more informational video's being the option to

rewind video's.

Even though patients show an open attitude to receiving digital information, most of them prefer reading paper information. Given arguments were that is easier to search for information and that patients often have the information on hand making it easy to consult. Paper information was simultaneously seen as unhandy, leading to a chaotic and bulging information binder.

Furthermore, most patients indicated that they like to know what they can expect.

Interacting with care professionals

Most of the patients prefer videocalling over normal calling, describing it as more personal and direct.

A worrying outcome is that two of the 5 patients mention that they postpone calling when experiencing side effects. They don't want to bother the doctor and one patient is afraid to be send to the ER; ; the long waiting times make this a daunting prospect. Multiple patients expect the threshold to communicate with care professionals via online chatting to be lower.

Self-contradiction amongst patients

Something that stood out during the interviews, was that the patients often contradicted themselves. For instance, first stating that informational video's are not needed and subsequently responding very enthusiastically when being asked about the endoscopy informational video. Perhaps, it is difficult for patients to see the value in digital opportunities until they have experienced it. This underscores the need to establish an effective way to inform patients about digital resources.

Short conclusion

- Colorectal cancer patients show an open attitude towards the use of digital resources, but can find it difficult to envision the use of these new opportunities.
- Most patients prefer paper information, but bearing in mind that it can be difficult for them to envision what digital information will look like they might change their opinion after being exposed to it.
- Patients lack awareness of the digital resources offered by the RdGG.
- There are big differences between patients regarding wishes for the use of digital resources, emphasizing the importance of shared decision making.



Figure 28. A self check-in kiosk at the RdGG.

3.6 Conclusions

There are several bottlenecks holding the RdGG back from achieving a digital transformation. This subchapter describes these bottlenecks.

Lack of overview

First of all, hospitals are complex organizations with multiple stakeholders. This results in difficulties maintaining an overview over different aspects within the process of digitalization. Think of monitoring wishes and needs of different healthcare professionals and patients, overseeing which projects of initiatives related to digital opportunities exist and keeping track of all digital resources used in different care processes.

Failing these first two actions can lead to duplications of effort, work and activities. For example, multiple healthcare professionals are interested in or already involved in a project regarding the use of informational video's, but they were unaware of each others efforts and wishes. Creating overview over all wants and needs regarding digitalization can bring this to light. This offers the possibility to connect these healthcare professionals or start a project group.

More comprehensive overview of the care processes is also valuable. This can prevent

offering patients redundant information. In addition, understanding all steps of a care process patients go through can help healthcare professionals to emphasize with patients or create insights in options to optimize this process

Lack of knowledge

There seems to be a lack of knowledge of digitalization amongst healthcare professionals. Knowledge can be described as a the product of a person's attitudes, experiences, information and skills:

Knowledge = information x (experiences x attitudes x skills) [43]

This formula could be filled in with the research outcomes shown in Figure 29.

When looking at 'knowledge' from this point of view, it can be concluded that the knowledge about digital opportunities among a share of the healthcare professionals at the RdGG is limited and has a negative connotation, resulting in a negative association with the term digitalization. To change this negative association into a positive one, all aspects of the formula have to be influenced. This is easier said than done, but ideally healthcare

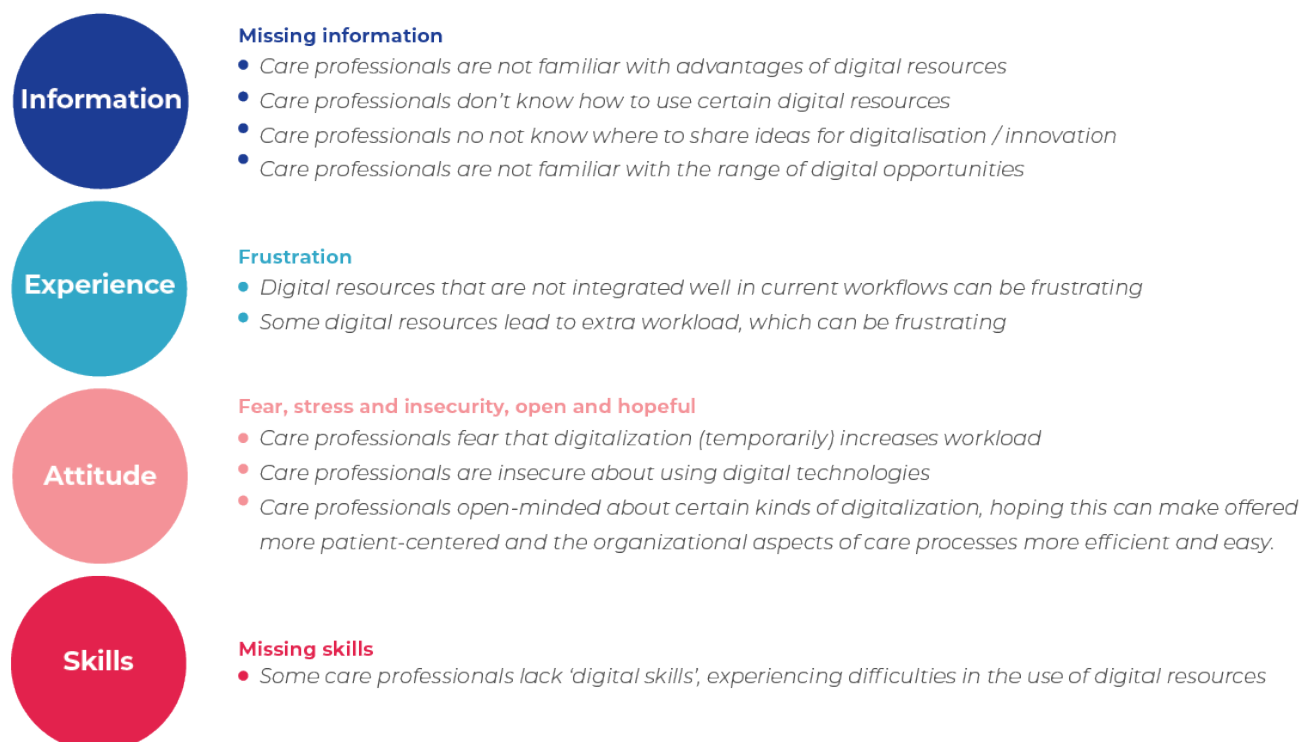


Figure 29. Research outcomes regarding the aspects information, experience, attitude and skills.

professionals should:

- 1) have access to information and time to take in this information
- 2) have more positive and less negative experiences with digital resources
- 3) be supported in creating new skills to be able to use new digital resources

Personal experience led to believe a person's attitude can be seen a product of the information this person has access to and experiences this person has had. Therefore, improving the factors 'information' and 'experiences' should lead to a positive change of attitudes.

Issues with care pathways

One way to create less negative experiences is to make sure digital resources are integrated well in current workflows. Care pathways and patient journey maps can help to achieve this, offering the possibility to analyze where and how this resource could fit in the care pathway/patient journey instead of offering digital resources to a whole department or specialty.

Unfortunately employees at the RdGG experience difficulties when working with and creating care pathways. Not all care processes are translated into care pathways and the formats of the care pathways that are available are perceived as chaotic and uninviting to read. As mentioned in Chapter 2, there is no uniformity in the format of care pathways and they are time-consuming to create. Recently, the decision has been made to create all new care pathways in swimlane format, but care professionals still describe this format as difficult to read.

Communication problems

The interview outcomes show that there are problems in the communication between healthcare professionals and organizational employees. There is a field of tension between people working in 'de Gravin' and 'het Hoofdgebouw'. Organizational employees find it difficult to find out or understand why healthcare professionals show resistance to certain digital resources and healthcare professionals do not always understand the need to use these digital resources.

Furthermore, healthcare professionals often don't know who to contact if they come up with ideas for innovation or digitalization. This is a shame, since organizational employees state

that projects have most chance of success if they are initiated by healthcare professionals.

Opportunity for provision of information with patients

The outcomes of interviews with patients and healthcare professionals show that there is an opportunity to improve aspects of the provision of information.

All patients would like to receive digital reminders and instructions during their treatment and both the patients and healthcare professionals were enthusiastic about the use of informational video's. This offers an interesting opportunity to tackle a problem that came up during the interviews with both groups: patients have difficulties remembering everything that is said during consultations.

Showing the patient informational video's before consultations could help to solve this problem and could offer healthcare professionals the opportunity to use the consultation time differently. Furthermore, there is need to establish a better way to inform patients about all digital resources offered by the RdGG and need for shared decision making on these.

Key points

- The complexity of hospitals makes it difficult to keep overview over the process of digitalization.
- Not all digital resources are perceived in a positive light, one reason being that they sometimes mismatch with existing workflows or care processes.
- Patient journey maps and care pathways can help to prevent this from happening, but there are problems with the making of, managing and use of journey maps.
- There are issues in the communication between healthcare professionals and organizational employees.
- There are opportunities to provision of information with patients.

Chapter 4 | First concept ideas



Due to waiting for acceptance of a METC-submission, the planning of the project had to be changed. Therefore, I already started brainstorming for ideas while still being in the process of interviewing. This chapter describes the first brainstorm and concept ideas created during this period of time. These ideas were based on the results of the observations, literature research and the results of the first finished interviews.

4.1 First brainstorm

The figure below shows all possible design ideas that were written down during the first brainstorm.

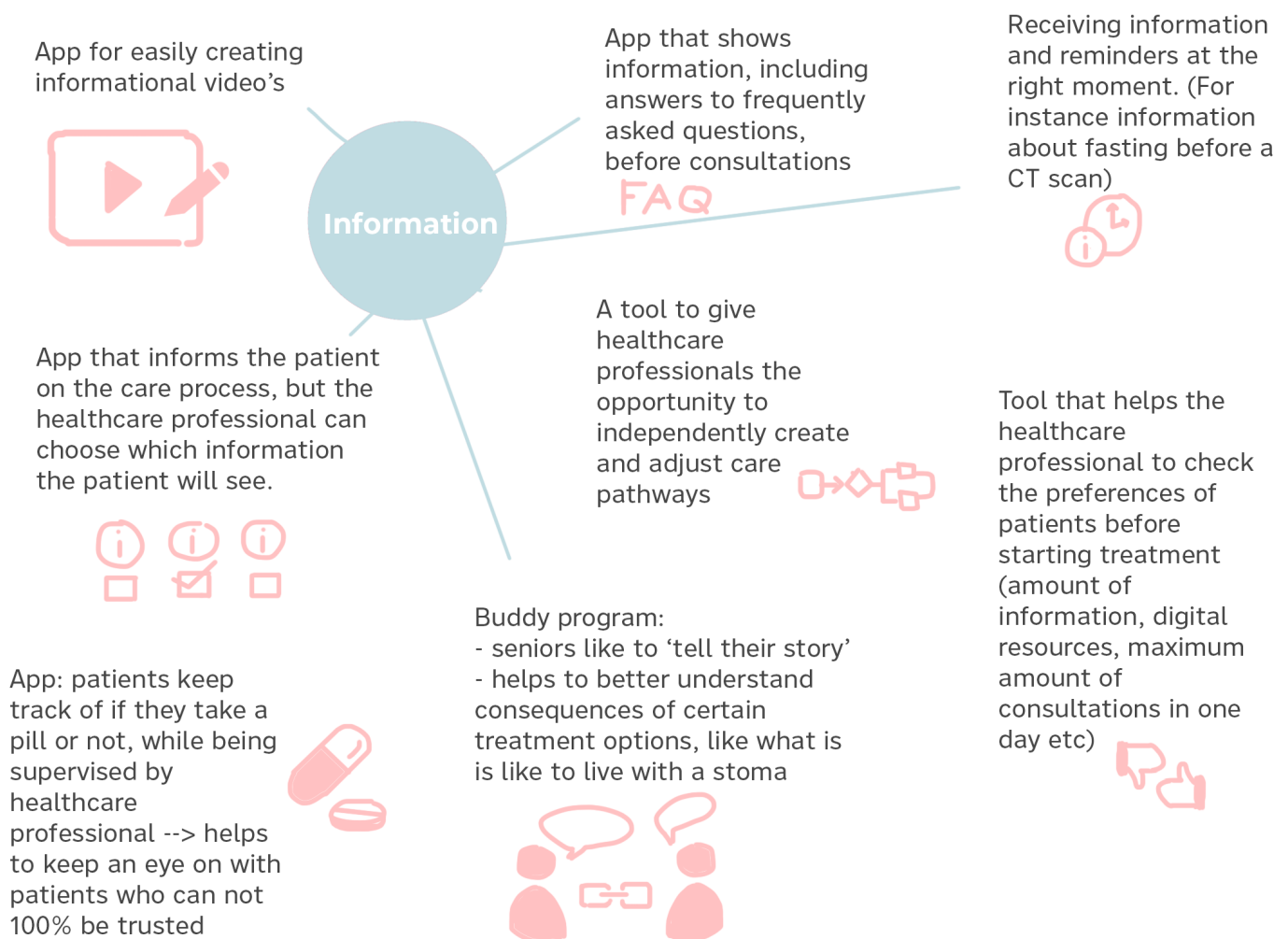


Figure 30. Ideas that were written down during the first brainstorm.

4.2 Concept ideas

4.2.1 Concept idea 1

The first concept idea was a digital application or program that would tackle two problems: 1) the large amount of paper and amount of time needed to print this paper during the care process and 2) patients forgetting and misunderstanding information, due to an information overload. Figure 31 shows a visualisation of what this idea could possibly look like when choosing to continue with it.

Redesigning the information exchange

Design direction 1: *Design a clear, concise and understandable interaction to help health care providers exchange information with patients of the colorectal cancer care pathway*

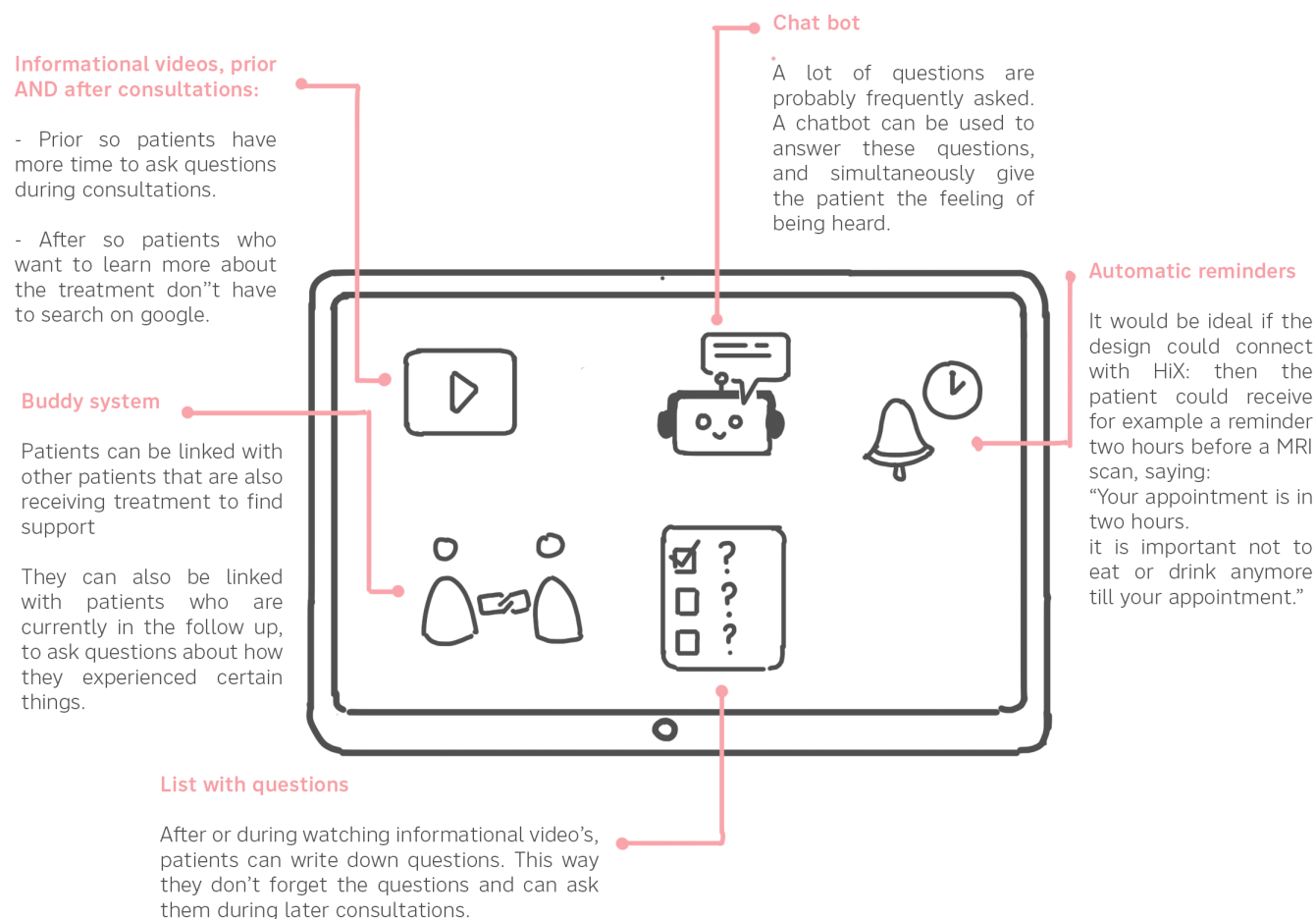


Figure 31. Concept idea 1:

4.2.2 Concept idea 2

The previously drawn conclusion stating that the patient journey map is not user friendly led to the inception of the first concept. The results from the observations and first interviews painted a picture highlighting a lack of overview during the care process. As mentioned before, understanding the structure of the care process is crucial before starting a digital transition.

Design direction 2: *Design a patient journey map that is concise, easy in use and provides overview in the care- and digitalization process, enabling the user to better understand where and how to integrate digital opportunities*

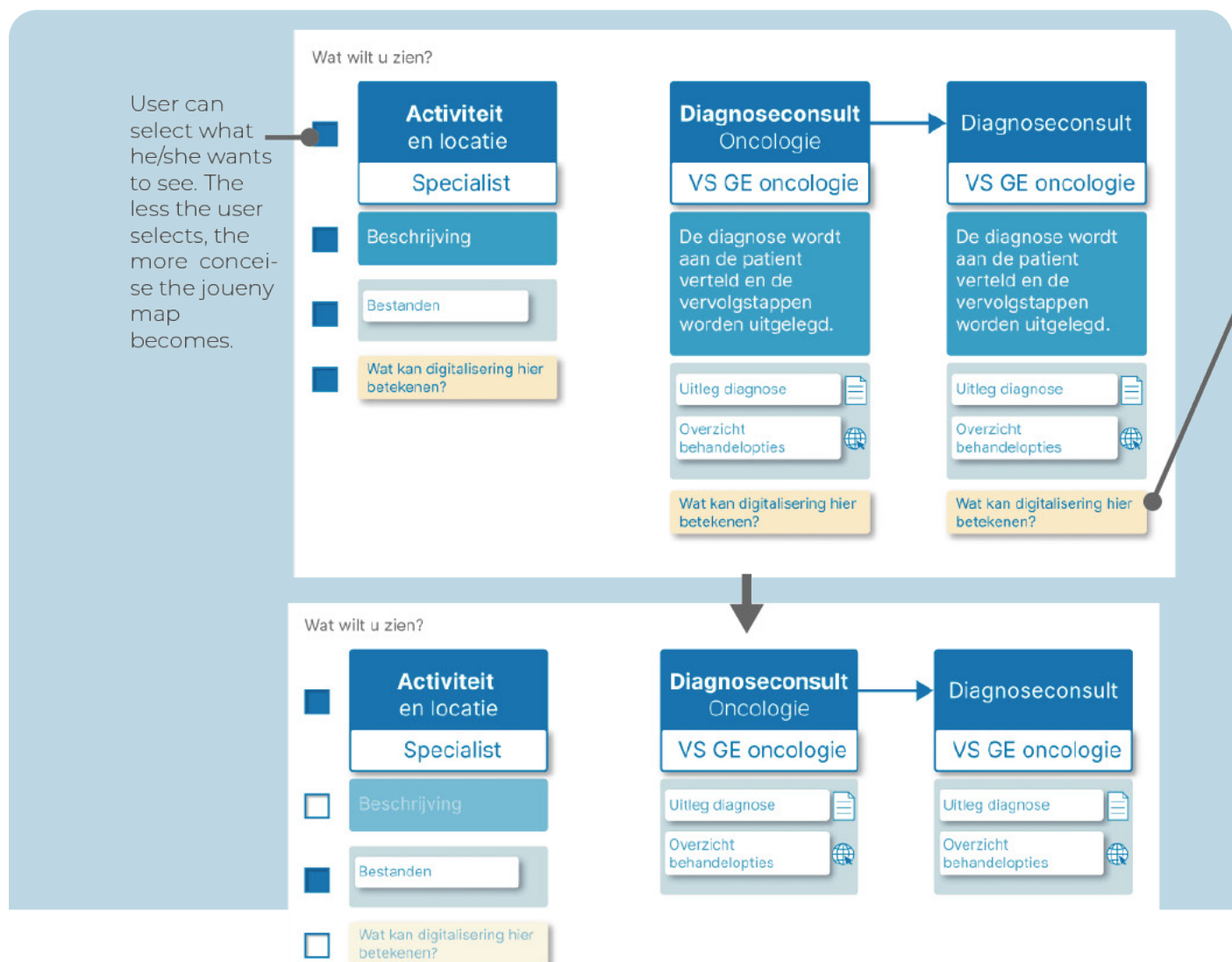
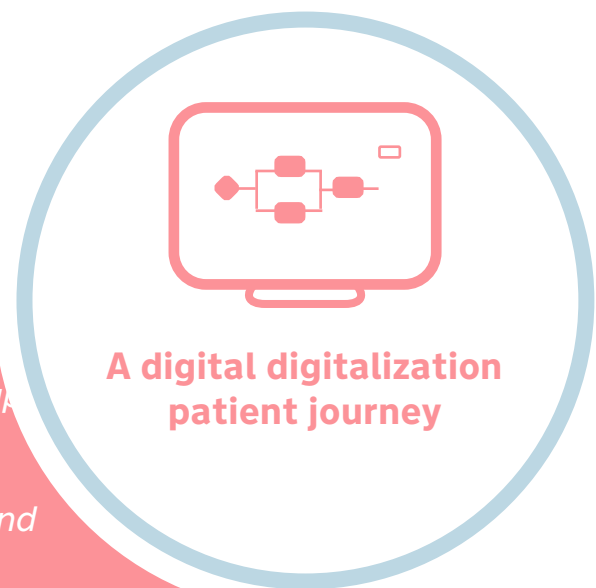
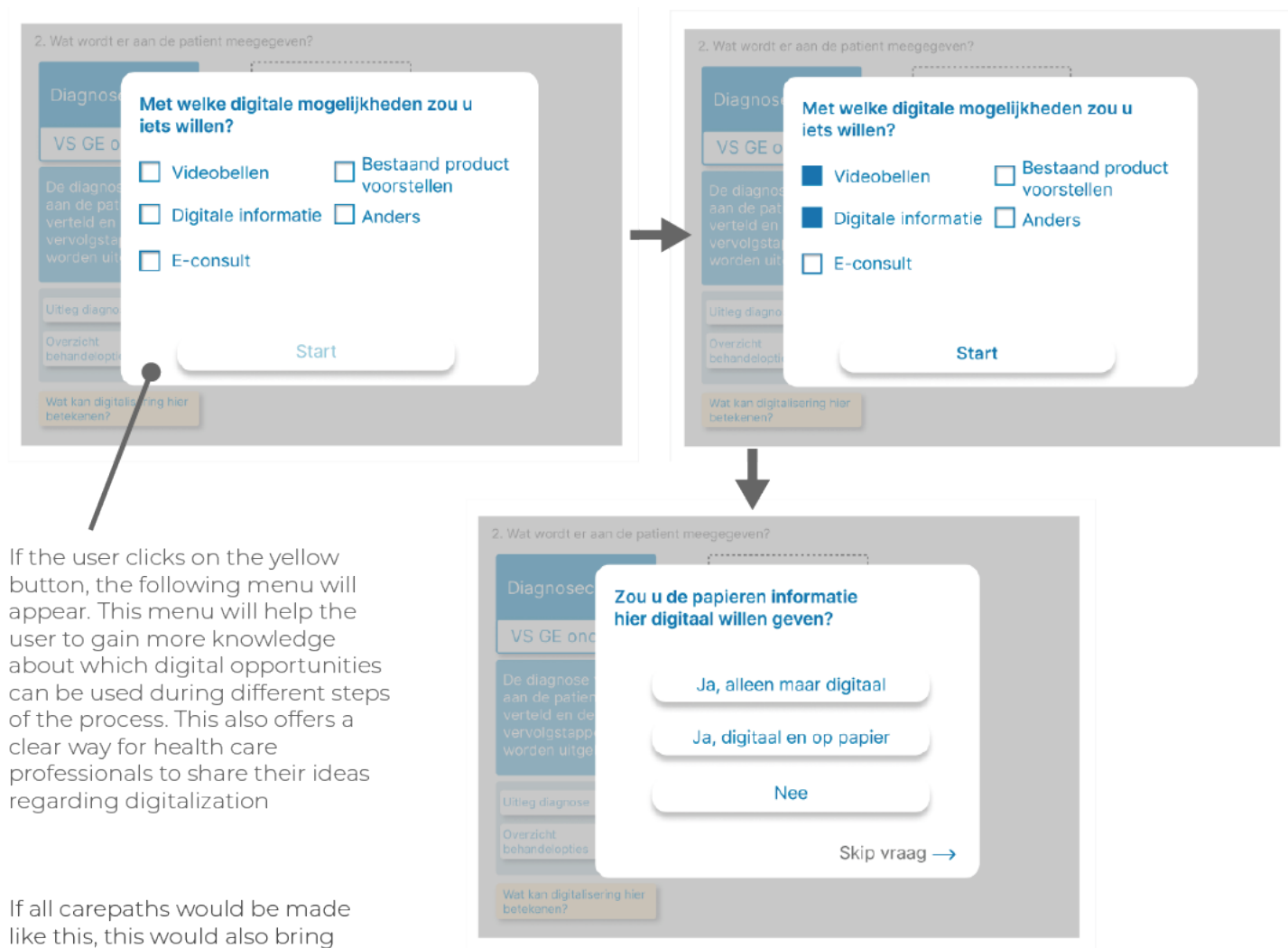


Figure 32. Concept idea 2



If the user clicks on the yellow button, the following menu will appear. This menu will help the user to gain more knowledge about which digital opportunities can be used during different steps of the process. This also offers a clear way for health care professionals to share their ideas regarding digitalization

If all carepaths would be made like this, this would also bring more uniformity in the hospital and its different departments.

Chapter 5 | Design goal



Before designing the first design concept, a decision had to be made: what is the most interesting direction to design for? The outcome of this decision was the base of the design goal, which is shown in this chapter. This chapter will also elaborate on the evaluation criteria created to achieve the most effective design.

5.1 Specifying the design direction

5.1.1 Two relevant design directions

Conducting, and later analysis, of all of the interviews led to two relevant design directions:

1

Redesigning the information provision with patients

- Primary user is the **colorectal cancer patient**
- Design will **directly influence** the **care process**
- **Specific** for one problem and type of user
- **New at the RdGG, but** not in the health care scene

2

Designing a digital journey mapping tool to organize the process of digitalization

- Primary users are **health care and organizational employees** of the RdGG
- Design will **indirectly influence** the **care process**
- **Applicable** for multiple departments
- **New at the RdGG, and** in the health care scene

5.1.2 Market analysis

Before starting to design concepts for these design directions, a market analysis was conducted to make sure the concept would be innovative.

First, applications created to support patients with cancer were explored. Figure 33 shows that there are already quite some applications

available for patients. These were analyzed and after a meeting with the founder of the Patient Journey App (which offers a different approach to information exchange in health care) it became clear that there is already a decent design as solution to Design direction 1 (Chapter 3.6).



Figure 33. Applications that can (potentially) support patients with cancer [44-51]

Secondly, available tools to create digital care pathways or patient journey maps were analyzed. Figure 34 shows an overview of tools available to map patient journeys or care pathways. This analysis revealed that there are multiple tools to create static patient journeys and several tools to create interactive patient journeys or care pathways.

offers 25 'ready to use' care pathways that are mainly designed for patients and ORION offers a program to build care pathways. The tool offered by ORION looks quite complex and time-consuming to learn.

Senza, e-Zorgpad and ORION offer interactive care pathways. Senza is a tool that can be used to create care pathways for patients, e-Zorgpad

The analysis shows that there is not yet an available tool that can be used to create care pathways with the main goal of digitalization, focussing on employees of the hospital as end-user.

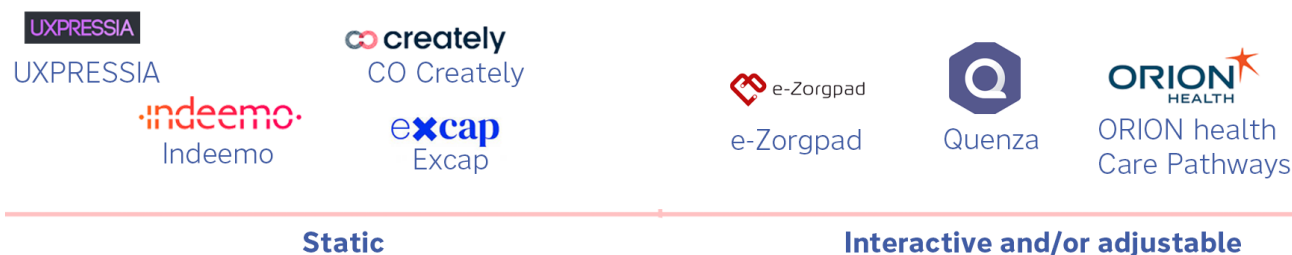


Figure 34. Digital tools/applications that help to create care pathways or patient journey maps [52-58]

5.1.3 Final decision

This discovery that the Patient Journey App already offers a decent solution to design direction 1 made Design direction 2 even more interesting. Why is this application not yet in use, when it offers an effective solution to a frequently mentioned problem during the interviews? Can a digital patient journey mapping tool help reveal these kind of digital opportunities?

for design direction 2, chances are high that a potential design for design direction 1 would eventually not really be implemented in the hospital. Hence, the decision was made to choose design direction 2.

In conclusion, without first designing a solution

5.2 Design goal and analogy

5.2.1 Design goal

Based on the design direction and outcomes of all analyses the following design goal was created:

*Design **an interactive journey mapping tool** for **care professionals and organizational employees** at the RdGG that helps to **better comprehend care and digitalization processes**, by offering **overview, knowledge and low threshold communication**.*

5.1.2 Analogy

To make the design goal more tangible and understand the envisioned interaction with the eventual design, an analogy is found (Figure 35):

Using a lego instruction booklet to build a lego hospital with a family member.

How does this analogy describe the envisioned interaction?

- The outcome might seem impressive or difficult, but **small steps guide you** to the end-result.

- You are provided with an **overview of all pieces** that are **part of the process**
- You can **see where you are in the process**
- Playing with a sibling can be fun and annoying at the same time, but overall it is **easy to communicate** and you are **not afraid to be honest**
- There is a **clear path** for you to follow, but there is **room for creative ideas**



Figure 35. Analogy of the design goal: using a lego intruction booklet to build a lego hospital with a family member

5.4 Evaluation criteria

The results of the analyses led to a list of evaluation criteria. These criteria were kept in mind during designing to be able to make a feasible, viable and desirable design.

- 1. The design should be user friendly and understand**
- 2. The design should be intuitive to use**
- 3. The design should be personalizable**
- 4. The design should motivate and inspire users to think about future possibilities**
- 5. The design should educate users on the topic of digitalization**
- 6. The design should encourage users to share their honest thoughts**

Key points

- There are multiple application available that are interesting for cancer patients, making it redundant to add a new application to the list.
- The fact that most of these application aren't used make design goal 2 even more interesting: can the process of digitalization be organized in such a way that it becomes easier to implement these applications in the care process?
- Design goal: *Design an interactive journey mapping tool for care professionals and organizational employees at the RdGG that helps to better comprehend care and digitalization processes, by offering overview, knowledge and low threshold communication.*
- Interacting with the design should feel like: using a lego instruction booklet to build a lego hospital with a family member (analogy)

Chapter 6 | Design concept

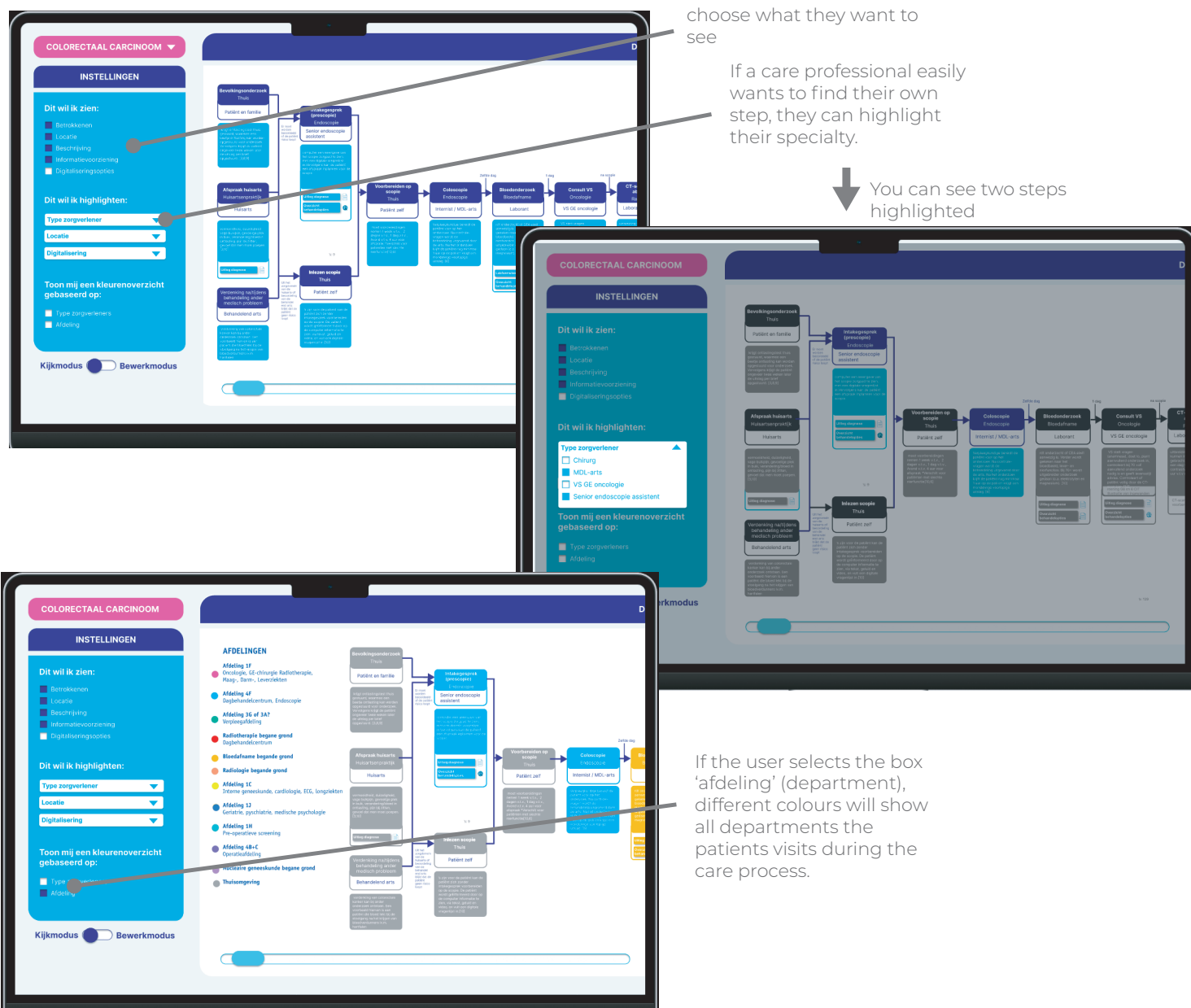


Discussing concept idea 2 with the CMIO of the RdGG, led to a very positive reaction, hence it was chosen to make a more elaborate version of this design, taking the evaluation criteria and interaction vision in mind. This chapter presents the first design concept.

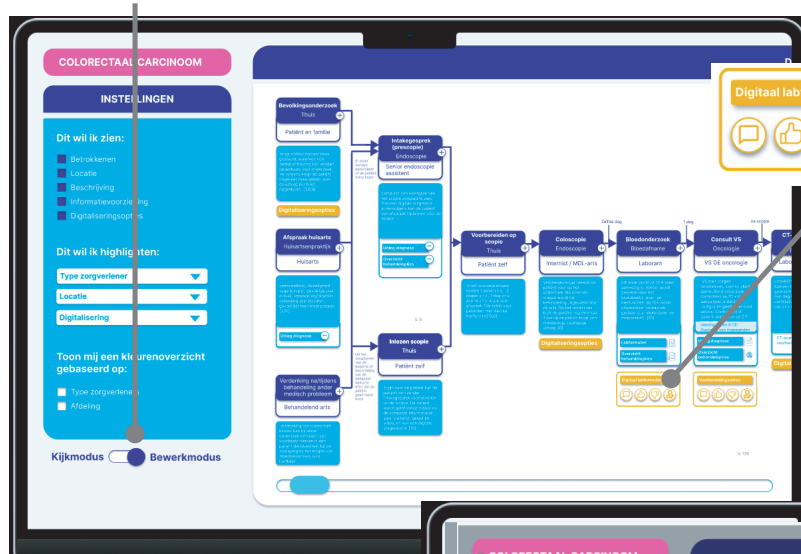
6.1 Design concept 1

6.1.1 Concept 1: design

Figure 36 shows concept 1.



The user can switch the program to edit-mode, to be able to build the care path



Organizational employees can add ideas for digital opportunities to the path. Care professionals can show what they think about the idea by reacting to the proposal.

Here the user can switch between departments/specialties.

When clicking on 'digitaliseringsoverzicht' (digitalization overview), this screen appears



Figure 36. Concept 1.

6.1.2 Concept 1: evaluation

To evaluate the design, an interactive version was shown to an alumni Industrial Design student who worked as Advisor Quality and Innovation on the digital transformation of another hospital. During this meeting, the focus was on evaluating the content of the design.

In addition, the interaction with the design was tested with a Design for Interaction student, by using a printed version of the design. The

student was asked to enact as if she was a care professional and was given small assignments to see if the product would be used as I expected. (Both persons signed an NDA prior to attending the meeting).

Lastly, the idea of the design was discussed with the Manager Quality & Safety of the RdGG.

Figure 38 shows suggestions for improvement based on the evaluation sessions.

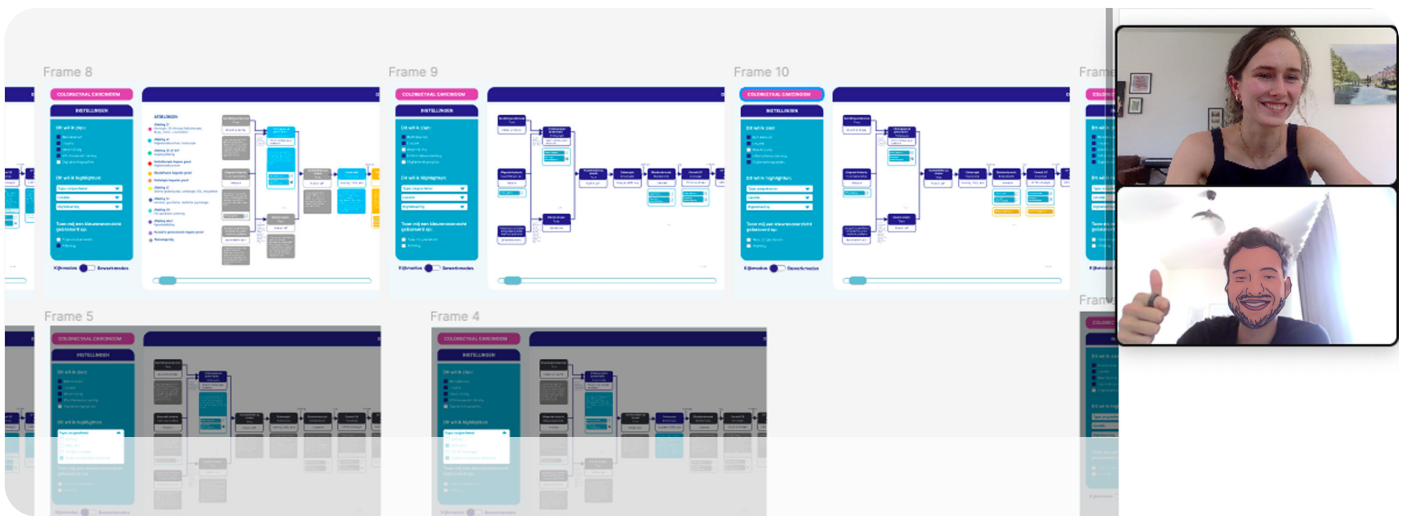


Figure 37. Evaluation of concept 1 with a former Advisor Quality and Innovation

The filter takes up a lot of screen space

It is not clear if one is creating a care pathway or a patient journey

Color overview based on healthcare professional is not seen as necessary

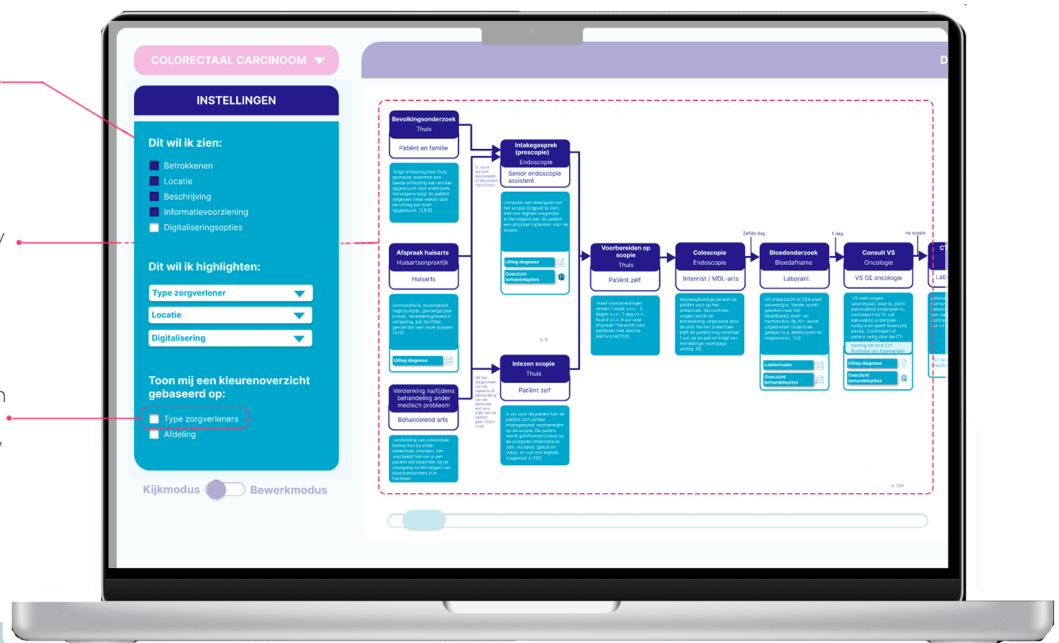


Figure 38. Suggestions for improvement of Concept 1

6.2 Design concept 2

6.2.1 Concept 2: design

Keeping the results from the evaluation of the previous subchapter in mind, a new version of the design was made. This version is shown in the figure below:

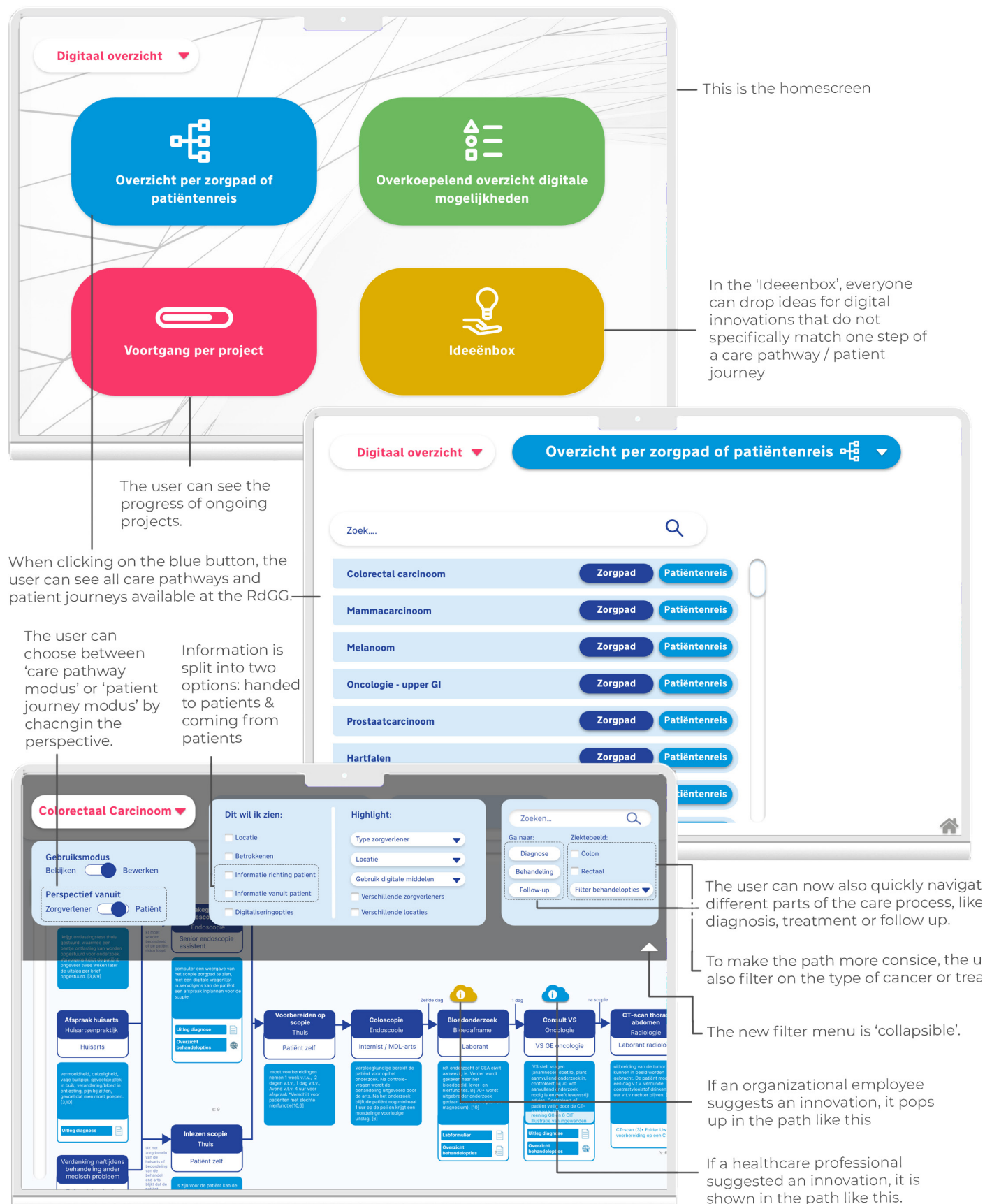


Figure 39. Concept 2

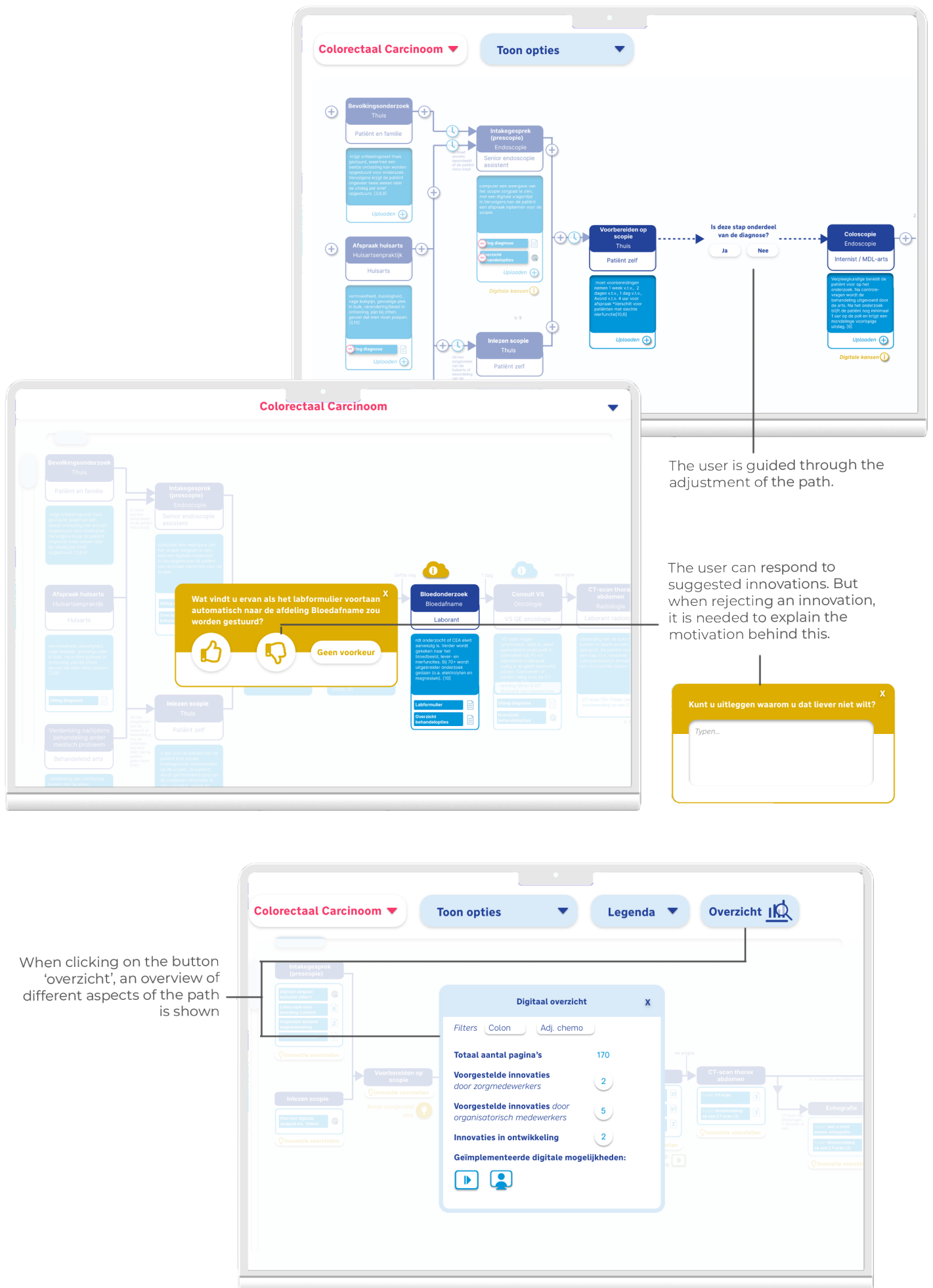
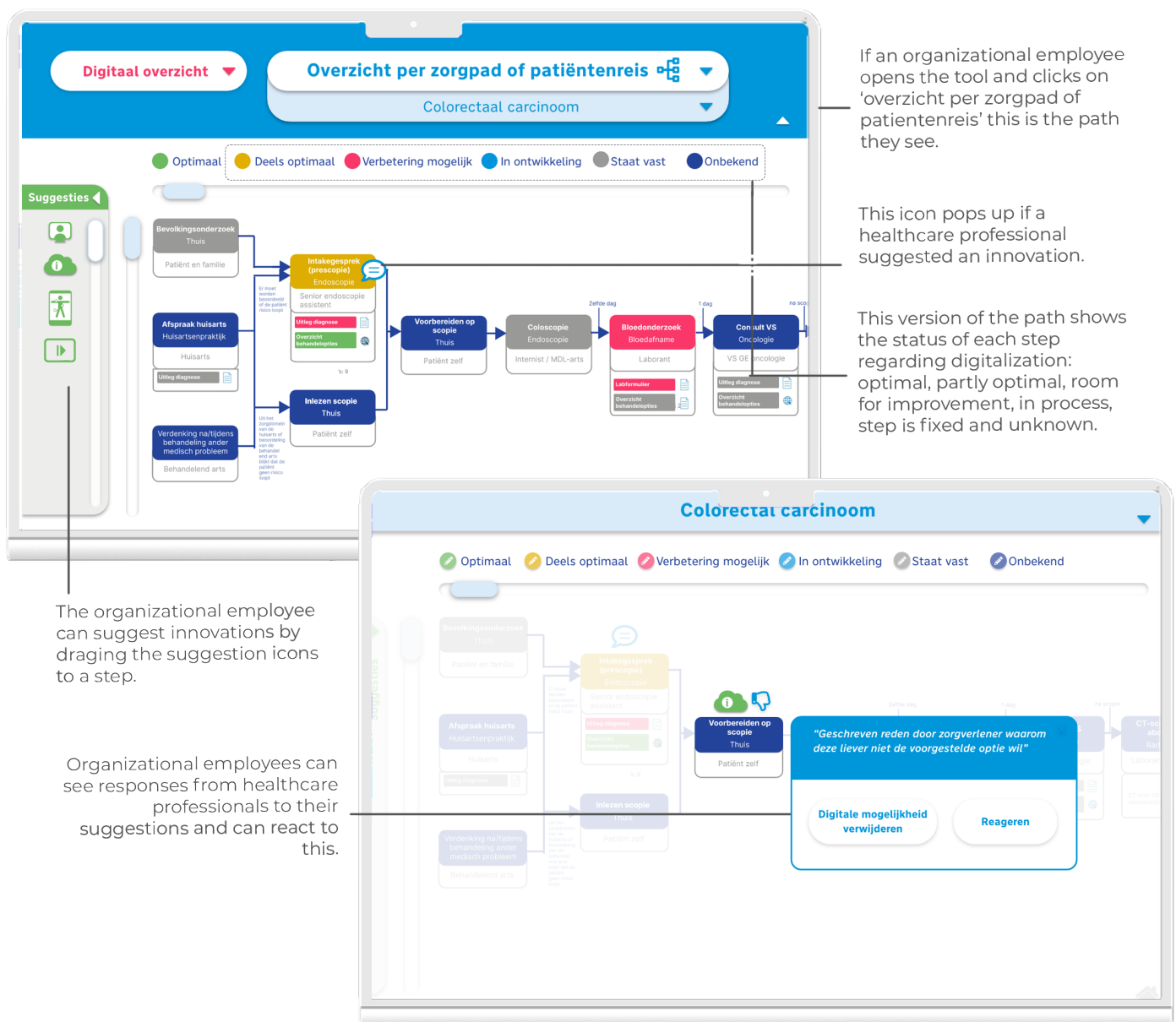
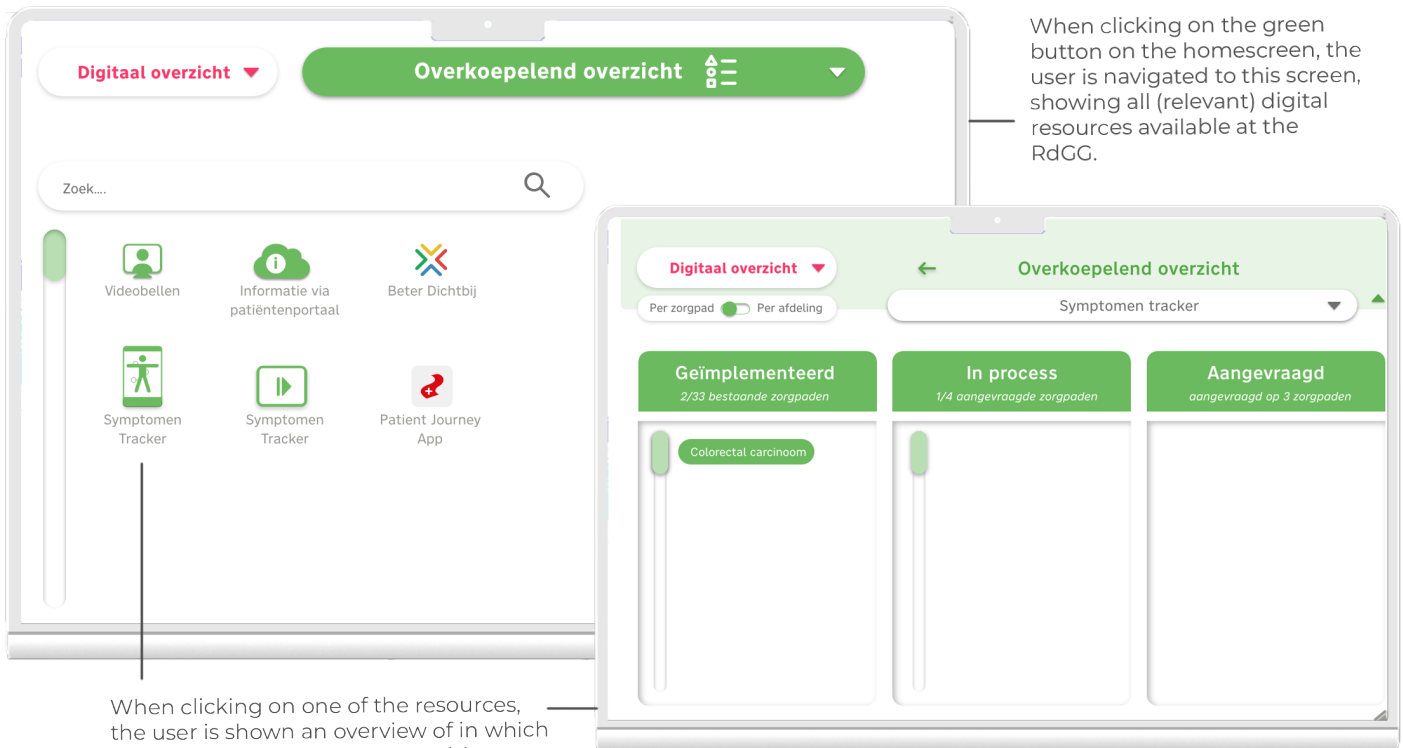


Figure 39. Concept 2



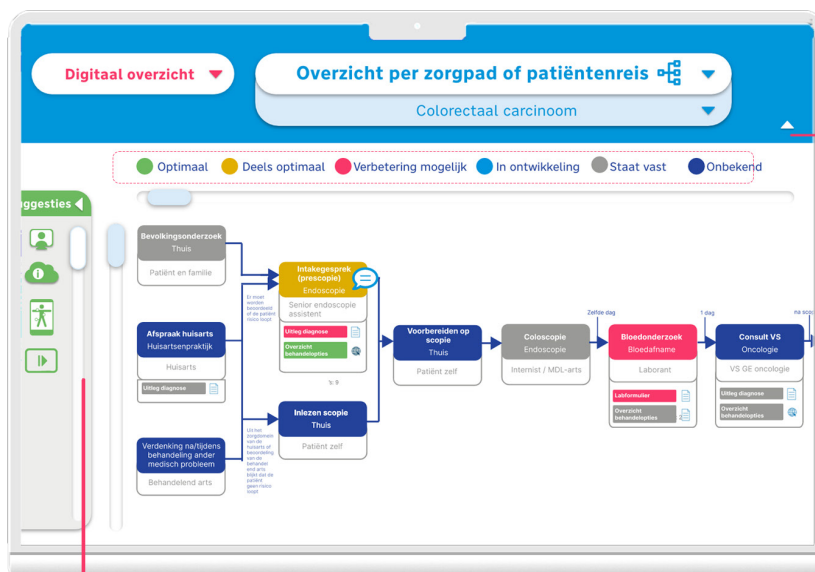
6.2.2 Concept 2: evaluation and co-creation

To improve and evaluate the design, two co-creation sessions were conducted with the CMIO of the RdGG. The different screens of the design were printed and the CMIO was asked how she would use the screens and what she would expect when tapping certain things on the screen. Next, ideas were exchanged and discussed on how to improve the design to make sure it really fits the workflows of the different potential users.

Figure 41 shows the main suggestions for improvement that arose from the co-creation sessions.



Figure 40. The co-creation session.

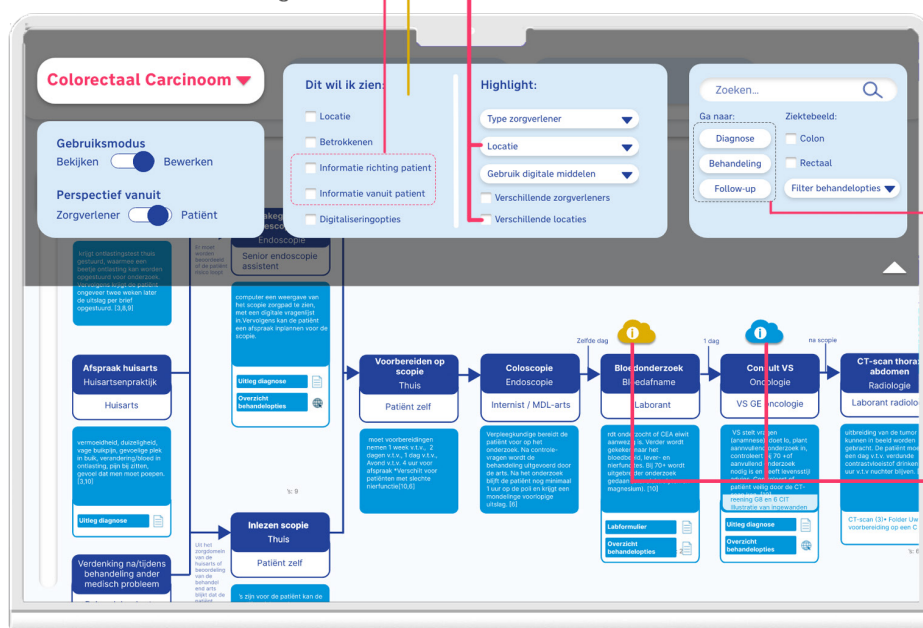


What if one wants to suggest one of these digital opportunities to multiple steps in the process?

Idea: add filter for 'beloop'

This is confusing, preferred to change it back to one kind of information exchange.

Difference between these two options is unclear



This button is not needed, this can be shown under 'overkoepelend overzicht digitale mogelijkheden'

This is very difficult to realize, since patients can for instance also get diagnoses during a treatment or follow up.

Two clouds as icons is confusing.

Figure 41. Suggestions for the improvement of Concept 2..

6.3 Design concept 3

The suggestions described in chapter 6.2.3 where used to improve design concept 2. Figure 42 shows the main changes.

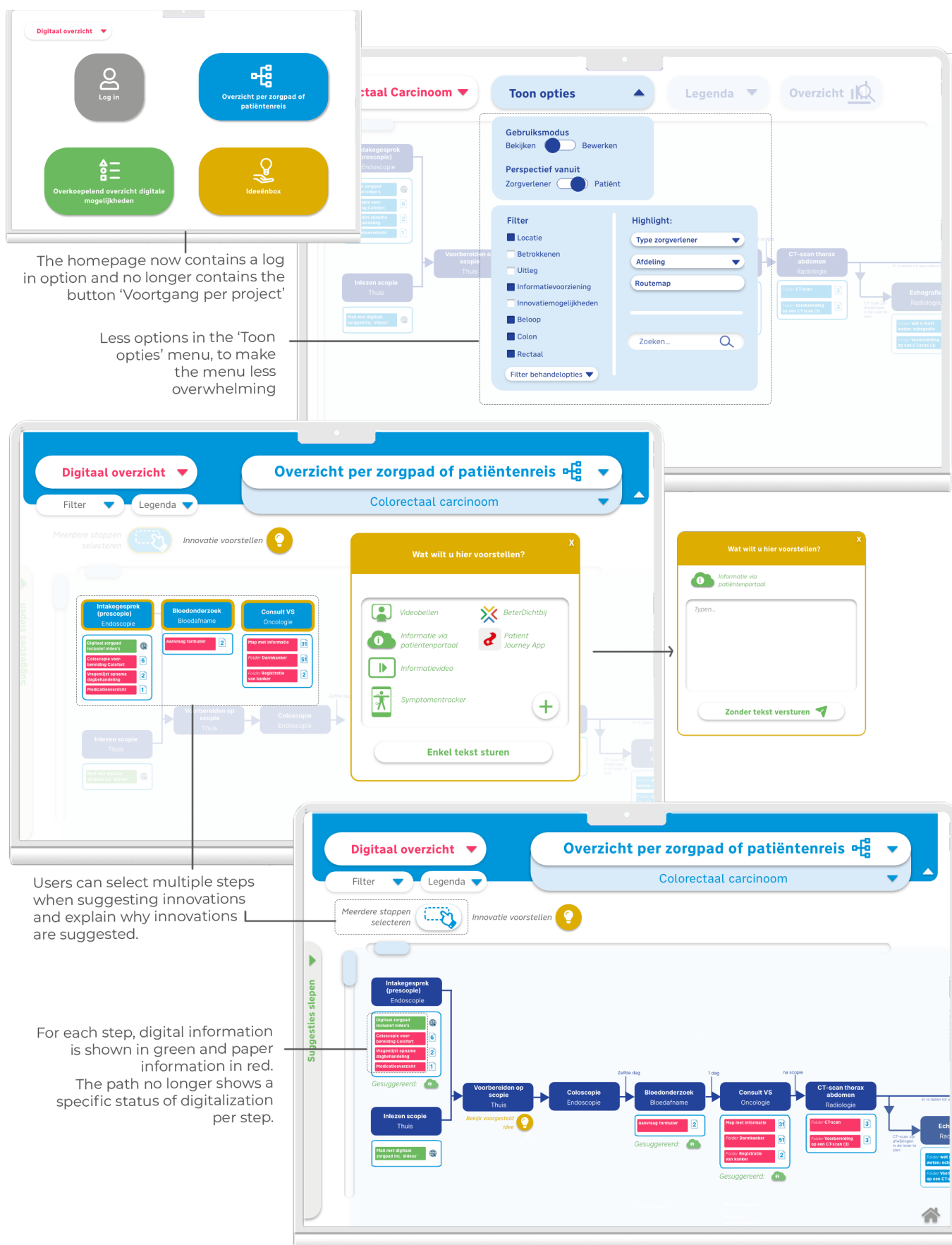


Figure 42. Concept 3.

Chapter 7 | Evaluating the concept



To align the design as closely as possible with daily practice and the organization of care processes, three co-creation focus groups were organized. These were divided in two online sessions with organizational employees within the RdGC and one live session with healthcare professionals.

7.1 Co-creation focus group: organizational employees

7.1.1 Set-up

The third concept was evaluated by means of two 90 minute co-creation focus groups with organizational employees. These sessions were organized to reflect on the usability and opportunities of the design with potential end-users to find the strengths and weaknesses of the current concept.

Figure 43 shows the job descriptions of the participants who took place in the focus groups.

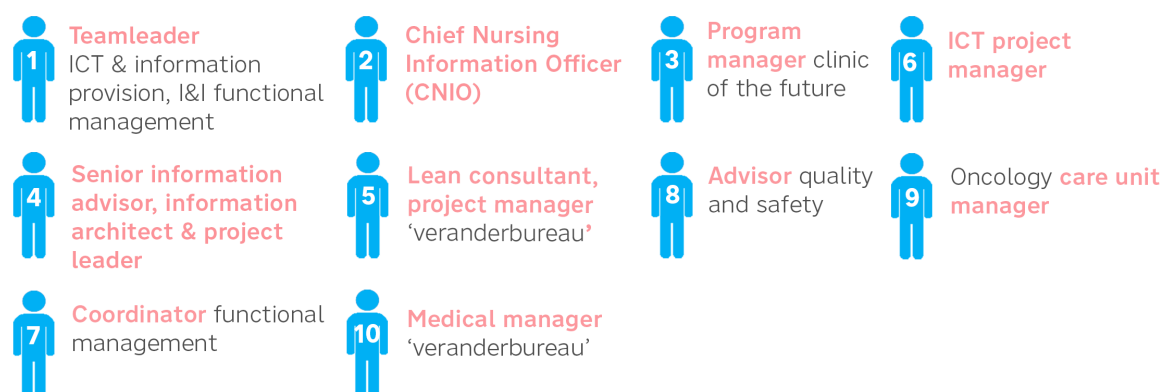


Figure 43. Job descriptions of organizational employees who participated in the focus groups

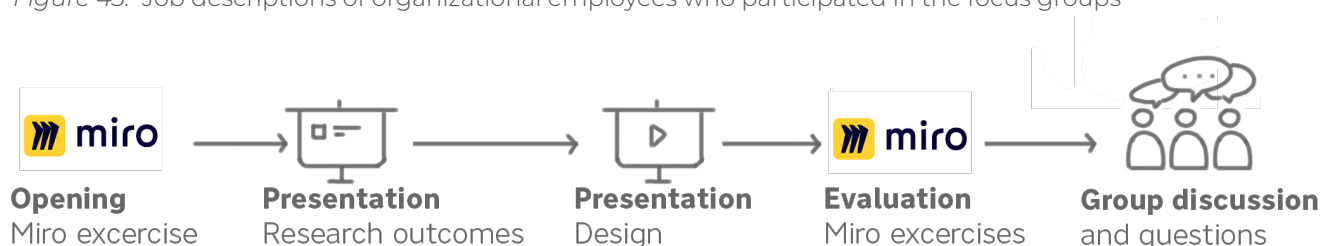


Figure 44. Set-up of the co-creation focus group with organizational employees

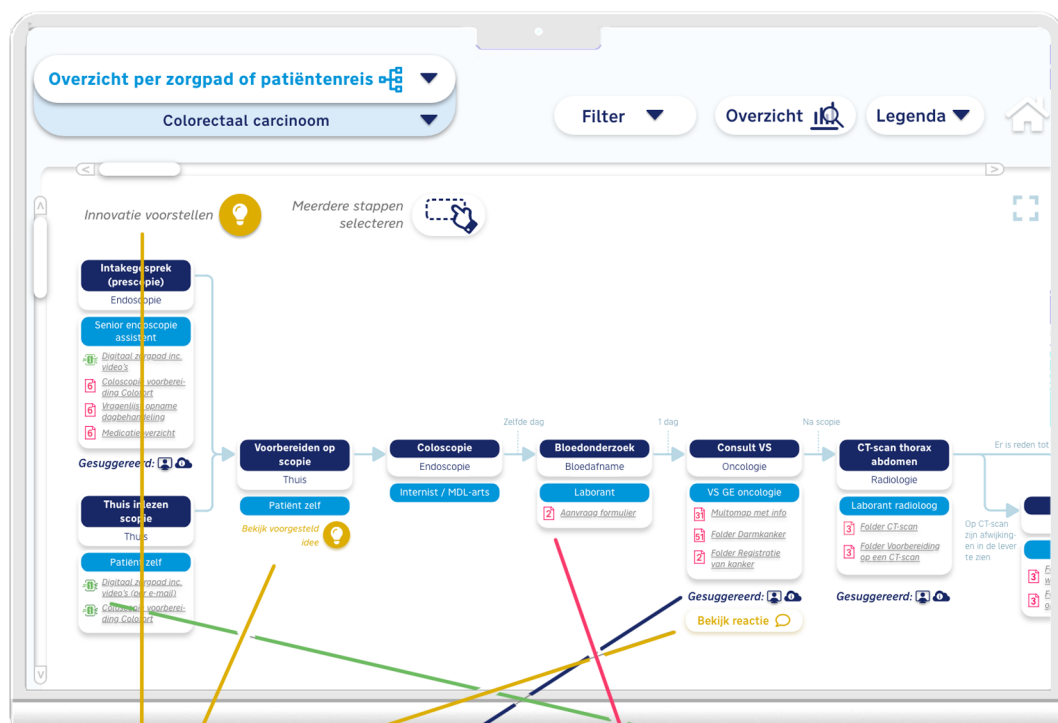
[illegible]

Figure x shows the most interesting ideas and insights that arised from the two sessions.

Figure 47. Most interesting ideas and insights derived from the co-creation sessions with organizational employees

7.2 Concept 4

Some of the ideas and insights shown in Figure 47 were translated into a new design concept, Concept 4. This concept is presented in Figure 48.



Less colours are used and the used colours are more consistent.

Yellow, for new ideas or responses

Dark blue, for actions that are already taken.

Red, for the use of paper.

Green, for digital resources that are already used or in process

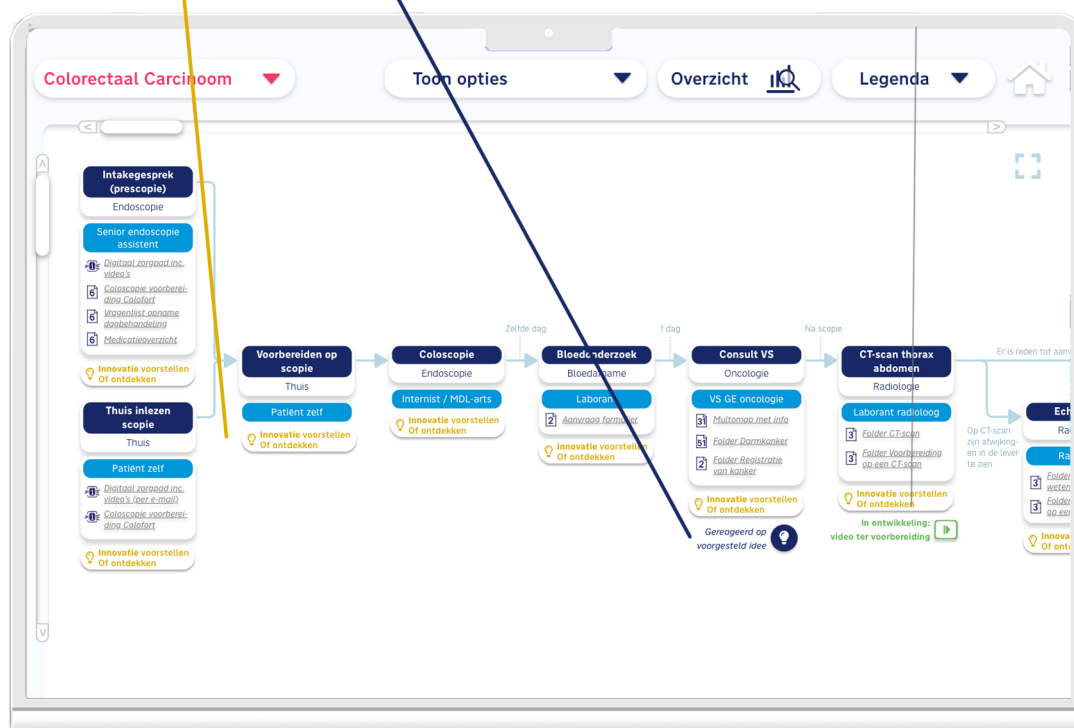
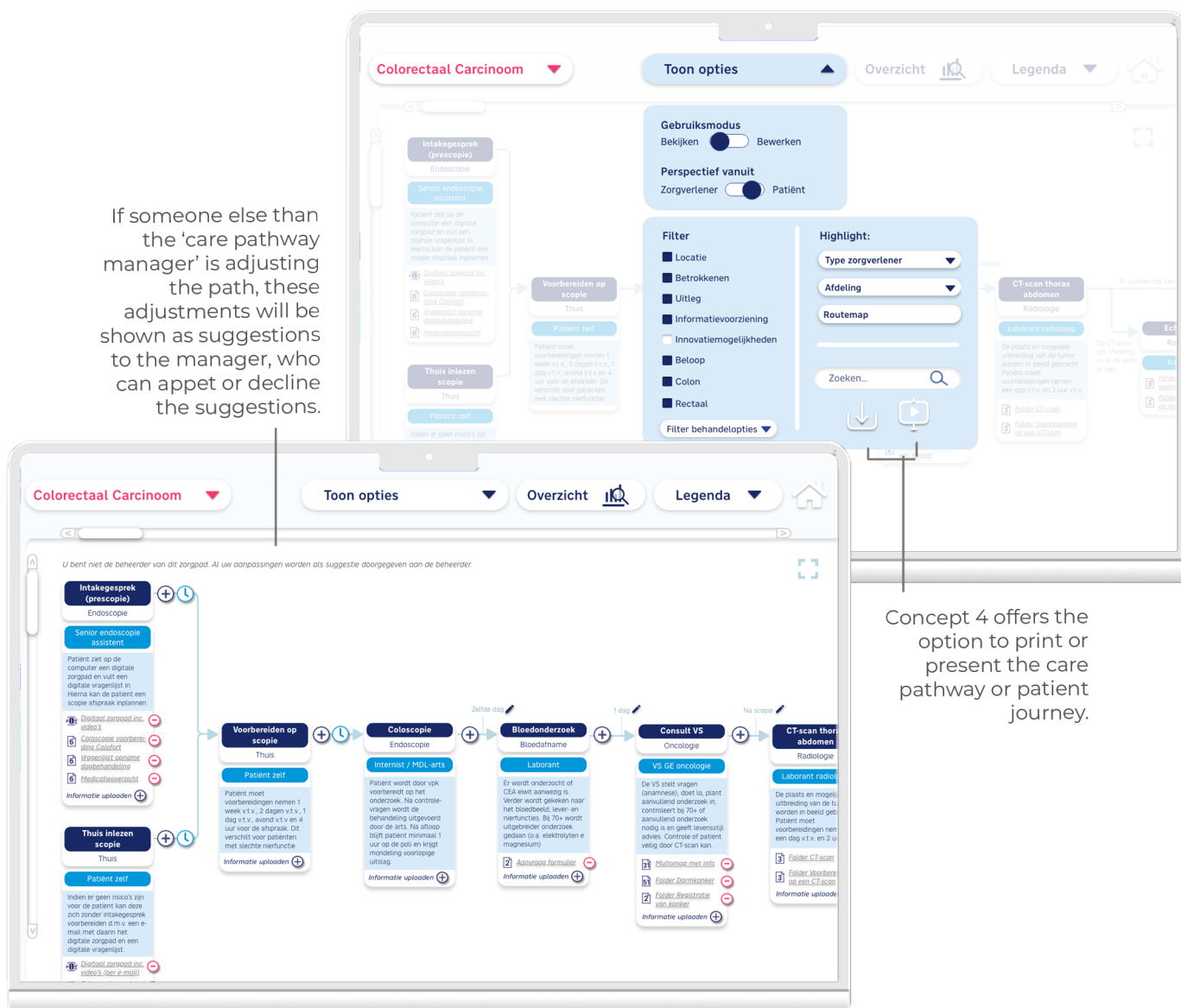


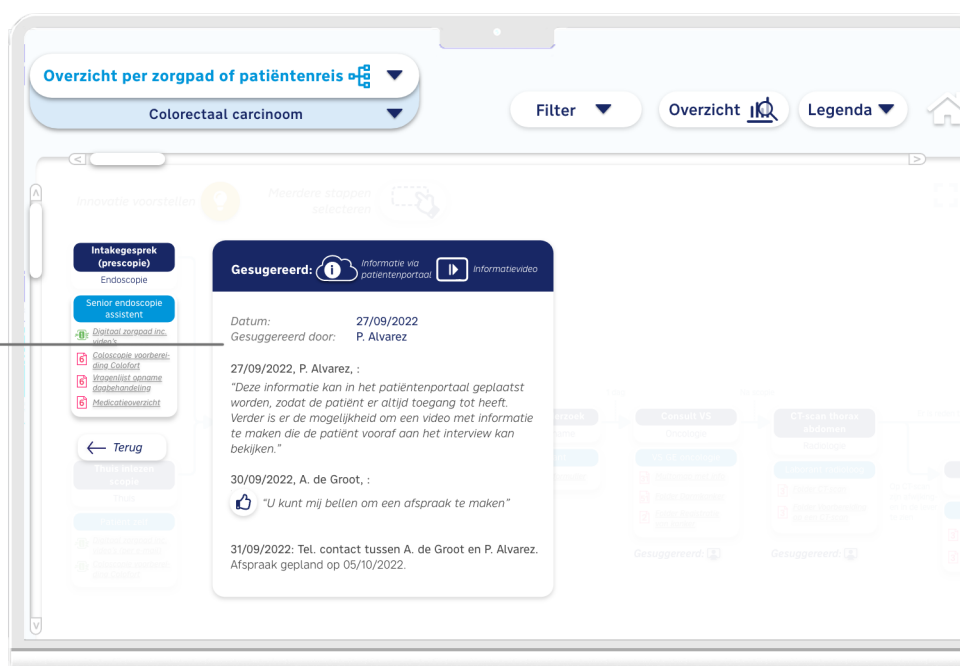
Figure 48. Concept 4.

If someone else than the 'care pathway manager' is adjusting the path, these adjustments will be shown as suggestions to the manager, who can accept or decline the suggestions.



Concept 4 offers the option to print or present the care pathway or patient journey.

User can read back everything that was communicated about digital innovation of a process step.



To ensure the design is tailored to fit the needs of all target users, another 75 minute co-creation focus group was organized for healthcare professionals. Figure 49 shows which of healthcare professionals participated. This was a live session with a slightly different set-up than the other focus groups, presented in Figure 50. The participants were divided in duo's and each duo got a laptop placed in front of them.

Afterwards, these steps were repeated with the other parts of Concept 4.

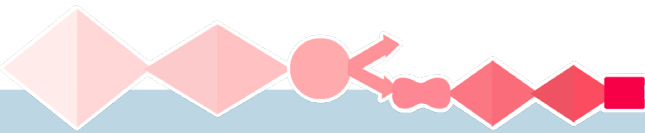


The diagram illustrates an iterative design process for a presentation, consisting of two cycles. The first cycle starts with a 'Presentation' (Research outcomes) represented by a screen icon, followed by 'Presentation Design' (screen icon with play button), 'Try-out & Evaluate' (Reading / filtering paths, represented by check, minus, and cross icons), 'Group discussion and questions' (three people icon with speech bubbles), and another 'Presentation Design' (screen icon with play button). A curved arrow connects the end of the first cycle to the start of the second cycle. The second cycle begins with 'Try-out & Evaluate' (Building paths, represented by check, minus, and cross icons), followed by 'Group discussion and questions' (three people icon with speech bubbles), 'Presentation Design' (screen icon with play button), another 'Try-out & Evaluate' (Innovation, represented by check, minus, and cross icons), and finally 'Group discussion and questions' (three people icon with speech bubbles).

Figure 50. Set-up of the co-creation focus group with healthcare professionals

Overall, the healthcare professionals had a positive reaction to the design. The discussions brought up the frustration about the current care pathways, once again highlighting the desire and eagerness to work with a new and improved format. When asked to share their honest opinion, they shared that they expected to use and keep using this design if it was available. Something that should be further researched is who carries the responsibility for creating and maintaining the care pathways / patient journeys. In addition, more research is needed into how the use of design will be implemented in current workflows of healthcare professionals. Something that was seen as important for the product to succeed is a connection to HiX.

Chapter 8 | Final Design



This chapter shows the final design created to achieve the design goal: GoMedFlow. The chapter shows the potential of GoMedFlow: how will it facilitate a digital transformation of the RdGG? Furthermore, it elaborates on how one can use the design. To find opportunities for future improvements and research, GoMedFlow was tested by several potential end-users.

8.1 Final design

Based on the outcomes of the focus group discussed in Ch. 7.3, the design was slightly adjusted. This led to the final design of GoMedFlow.

GoMedFlow is designed for two end-users: healthcare professionals and organizational employees. Both end-users will use a separate digital environment within the design, each of which is closely connected to the other. The two environments look alike, but are slightly different. The differences is in the usage goal. The main use for healthcare professionals is creating care

pathways or patient journeys and acquiring overview over care processes in which they are involved. Healthcare professionals will mostly look at process steps in which they are involved, or steps close to the previous or following steps in the patient's care path. Organizational employees on the other hand will mainly use the design to scroll to care processes, analyzing if the process can be digitalized.

GoMedFlow is designed to support the RdGG in the digitalization of care processes. The following page provides insight in how the design could achieve this.



Figure 51. Two environments within the design.

GoMedFlow

Moving towards a smart hospital

1. GoMedFlow provides overview of the current state and process of digitization

The design takes an inventory of which digital resources are currently used, which are in the process of being implemented and into which department or care processes they are (being) integrated.

GoMedFlow also helps to keep track of the wishes and needs of healthcare providers in regard to digitalization or innovation of the care processes in which they are involved.

2. GoMedFlow offers the possibility to efficiently form clear and uniform care pathways and patient journeys.

By virtue of experience, healthcare professionals have the most knowledge of care processes. Therefore, it makes sense that they can use this well-developed understanding to create care pathways or patient journeys. Using GoMedFlow, they no longer have to make appointments to create a care pathway or adjust a care pathway, but can do this independently. This also offers the opportunity to collaboratively work on care pathways with multiple healthcare professionals. The design guides them through the process, to make it as easy to use as possible.

The care pathways and patient journeys created with GoMedFlow are user friendly, personalizable and interactive.

3. GoMedFlow supports the RdGG to effectively implement digital possibilities in healthcare processes.

Digital possibilities can now be implemented at specific moments in a care process, in order to prevent interference with care processes or workflows. The interactive nature of the designed care pathways and patient journeys provide the foundation that allows users to identify areas of improvement, risks, bottlenecks and effectively communicate what changes or investments are required.

4. GoMedFlow builds a bridge between healthcare professionals and organizational employees.

The design offers a new, easy way of sharing thoughts and ideas. It provides a simple way to collect ideas concerning digitalization and educates healthcare professionals on (the use of) digital opportunities. GoMedFlow provides transparency in attitudes of healthcare professionals and organizational employees with regard to digitalization. It allows people to empathize with and better understand the work processes and methods of one another, reducing the chances for miscommunication. Summarized in one sentence, GoMedFlow creates a common language for change.

The combination of these opportunities leads to an efficient deployment of people and resources in the future, something that is much needed

Figure 52. shows how GoMedFlow can be used.

These screens are designed for healthcare professionals

These screens are designed for organizational employees.

This is the homescreen. Here the user can log in.



If users have ideas for digitalization that are not just useful for one step/aspect of a care process, but for the whole path or multiple paths they can share them in the 'Ideeënbox'.



when logging in, the design recognizes if one is a organizational employee or healthcare professional. Furthermore, the design can see if the user is manager of a certain care pathway / patient journey.

Clicking on 'zorgpaden en patiëntenreizen' leads the user to this screen, showing all care pathways and patient journeys available at the RdGG.

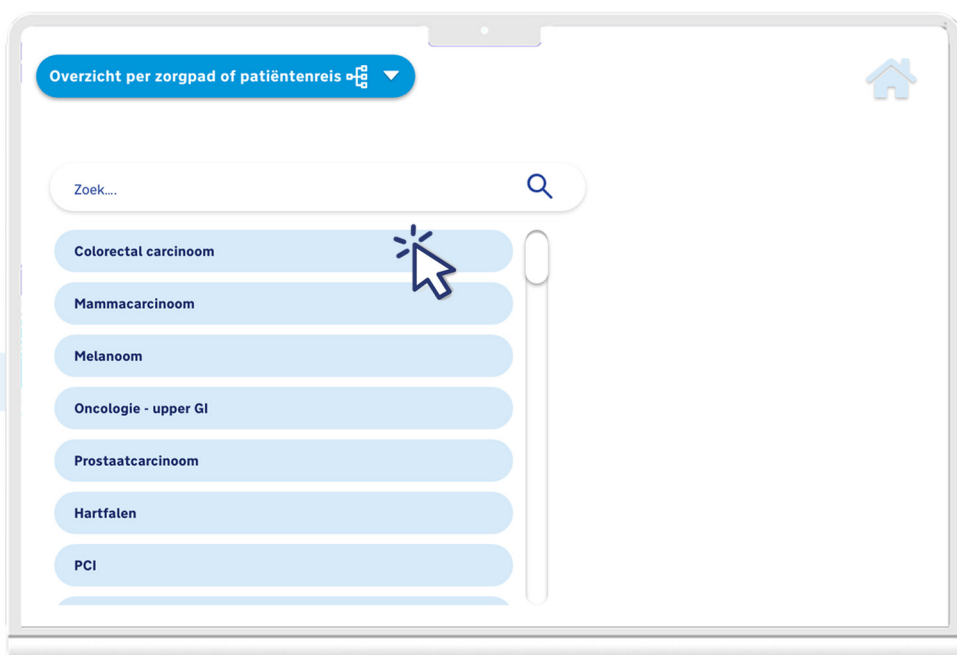
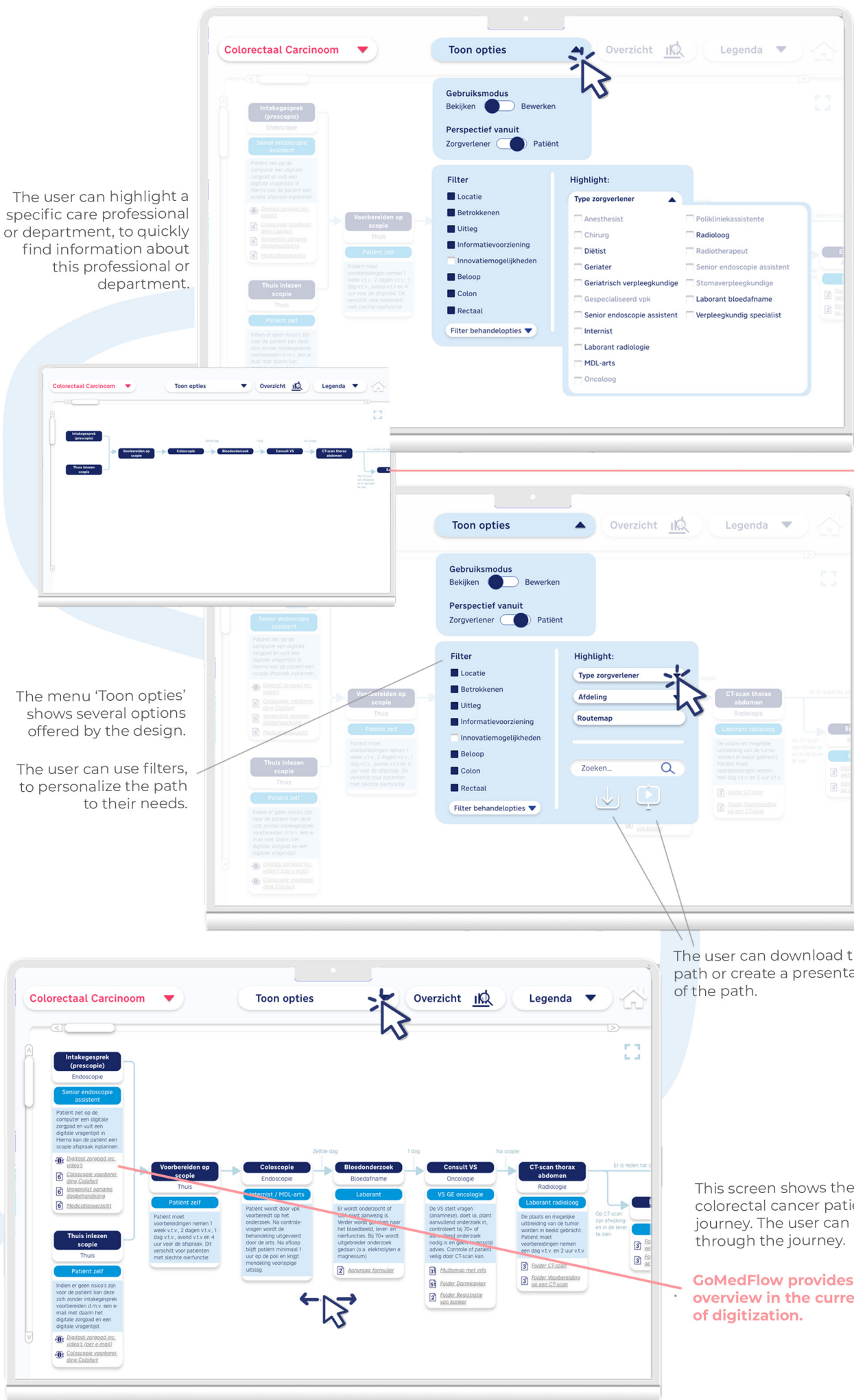


Figure 52. How to use GoMedFlow.

The user can highlight a specific care professional or department, to quickly find information about this professional or department.

The menu 'Toon opties' shows several options offered by the design.

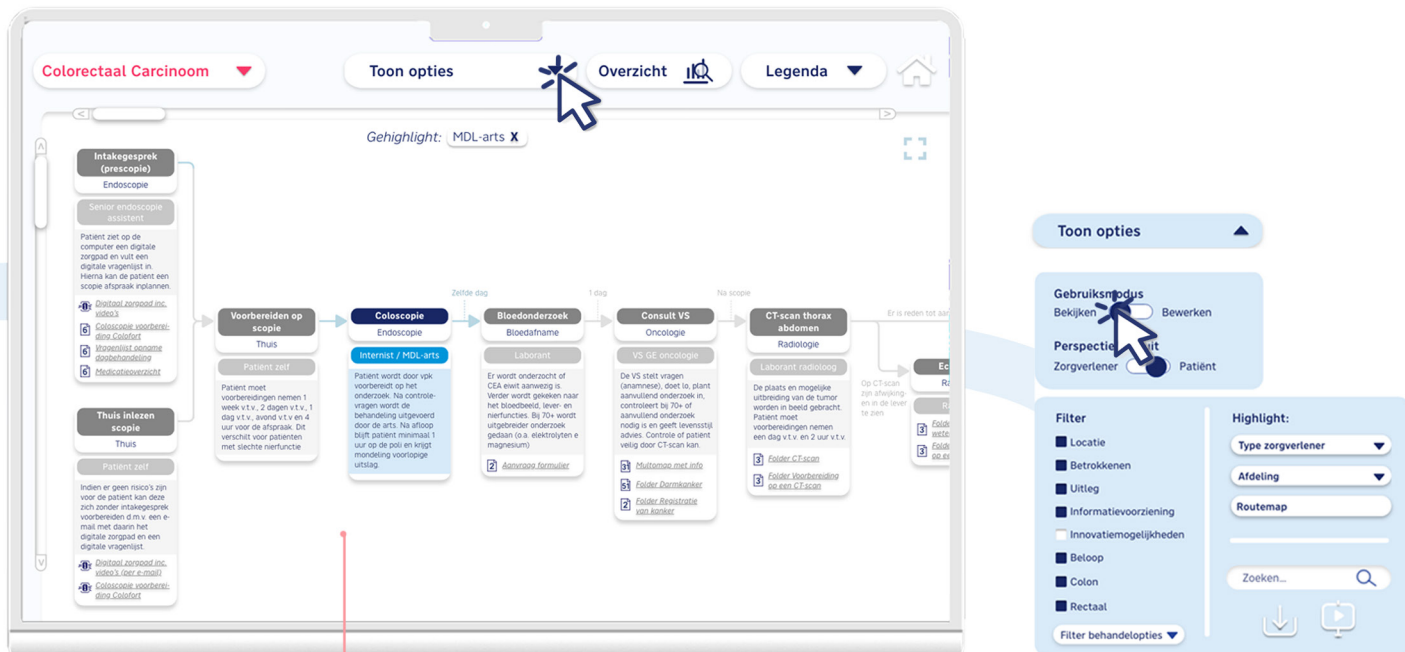
The user can use filters, to personalize the path to their needs.



The user can download the path or create a presentation of the path.

This screen shows the colorectal cancer patient journey. The user can scroll through the journey.

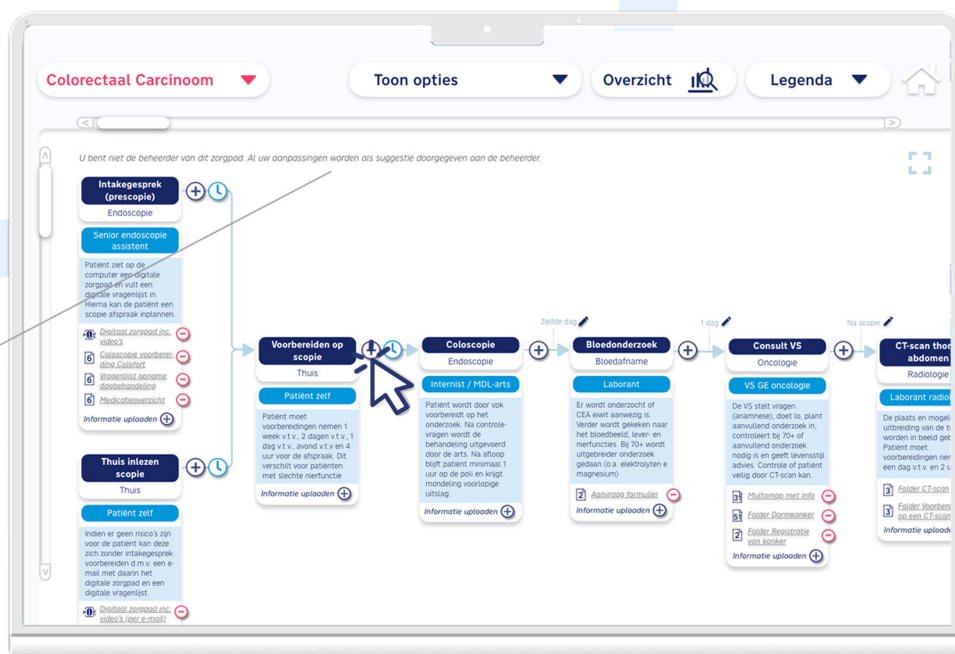
GoMedFlow provides overview in the current state of digitization.



This offers users the opportunity to personalize the path, making it easier to read or use the path.

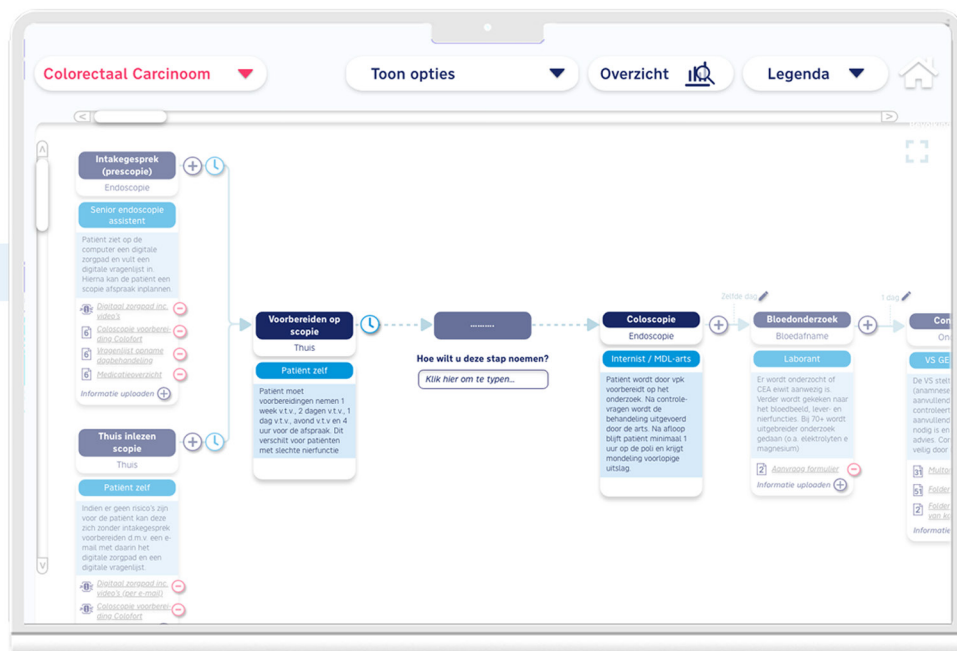
If the user wants to create a new care pathway or patient journey, they can change the usermode to 'gebruiksmodus'.

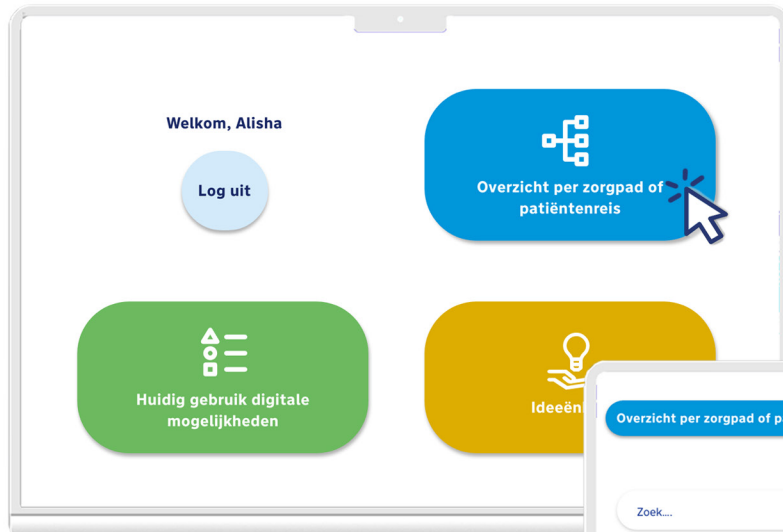
If the design does not recognize the user as manager of the care pathway or patient journey, all changes made by the user will be shown as suggestions. The manager of the path can accept or decline this suggestions.



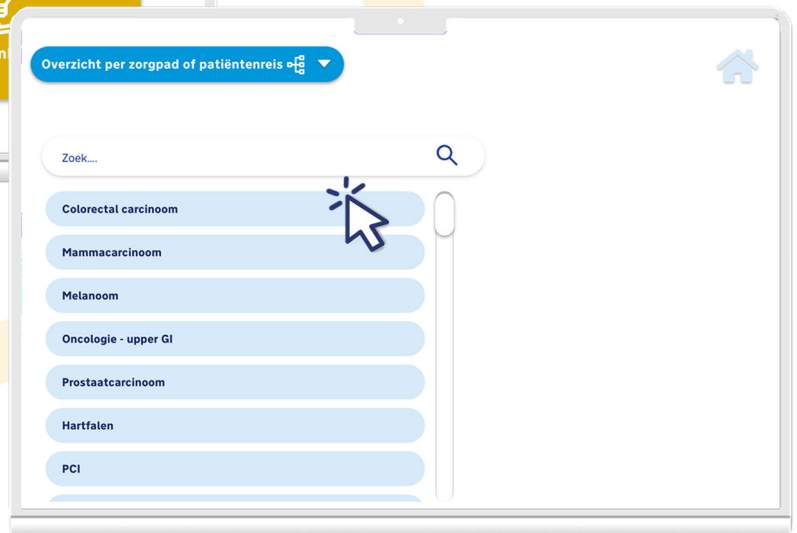
The user is guided through the process of adjusting or building a path.

GoMedFlow offers the possibility to efficiently form clear and uniform care pathways and patient journeys.

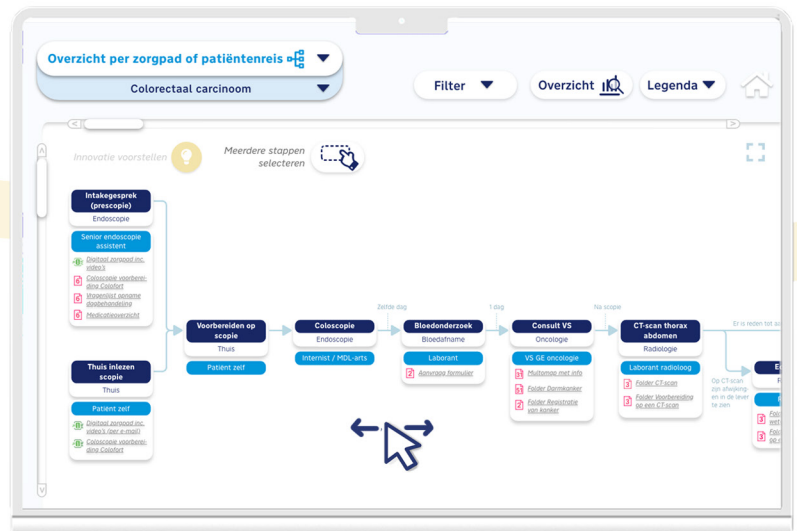




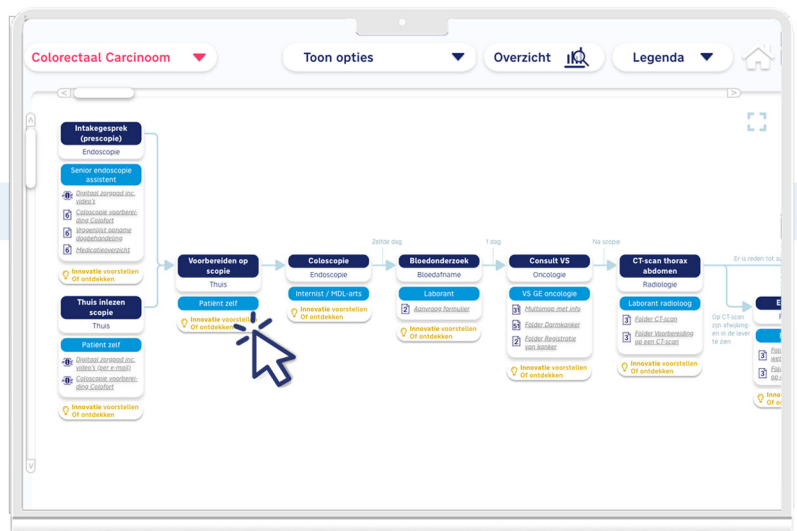
Clicking on 'zorgpaden en patiëntenreizen' leads the user to this screen, showing all care pathways and patient journeys available at the RdGG.



This screen shows the colorectal cancer patient journey (seen by organizational employees). The user can scroll through the journey.

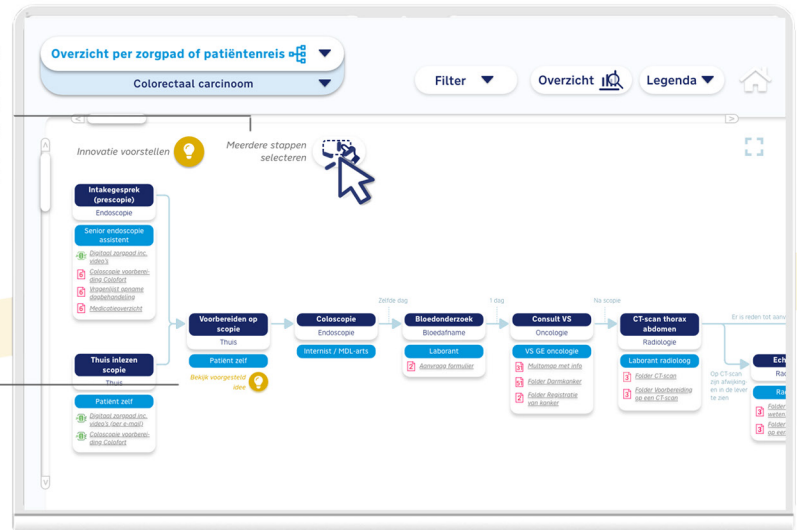


The user can also add opportunities for improvement to the path.

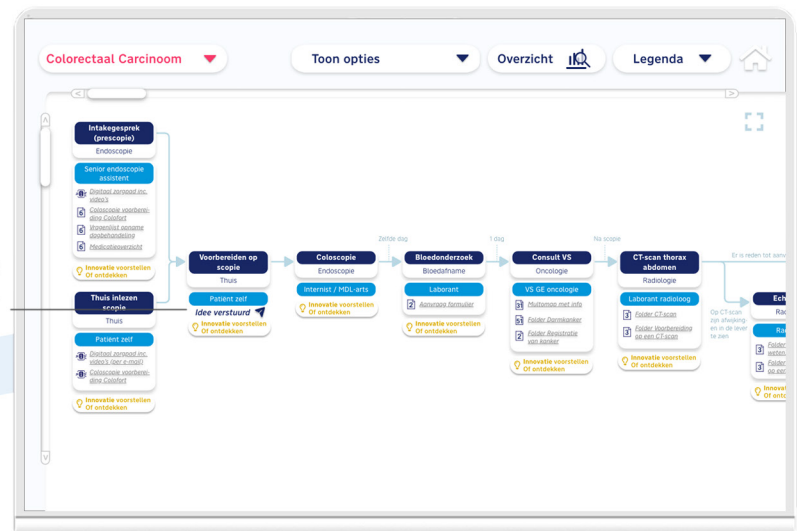


If the user wants to suggest an innovation that is applicable for multiple steps of the care proces, they can tap 'meerdere stappen selecteren'.

If a healthcare professional shares an idea, this pops up in the carepath



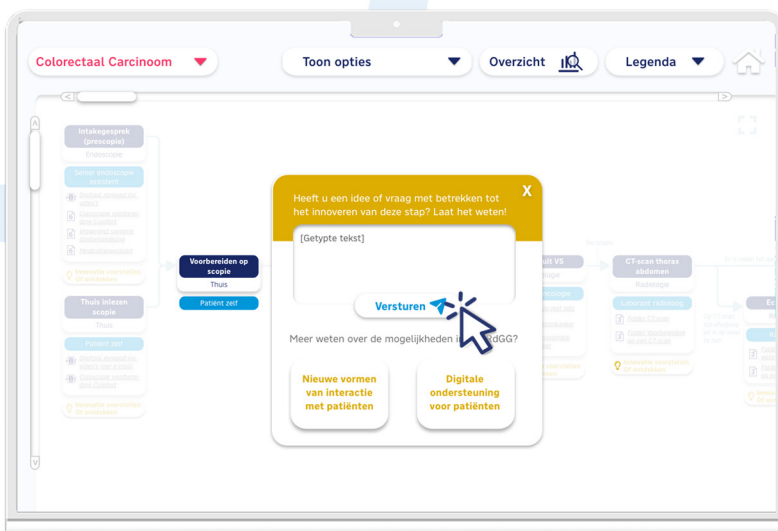
All users can see the suggestion that was made.



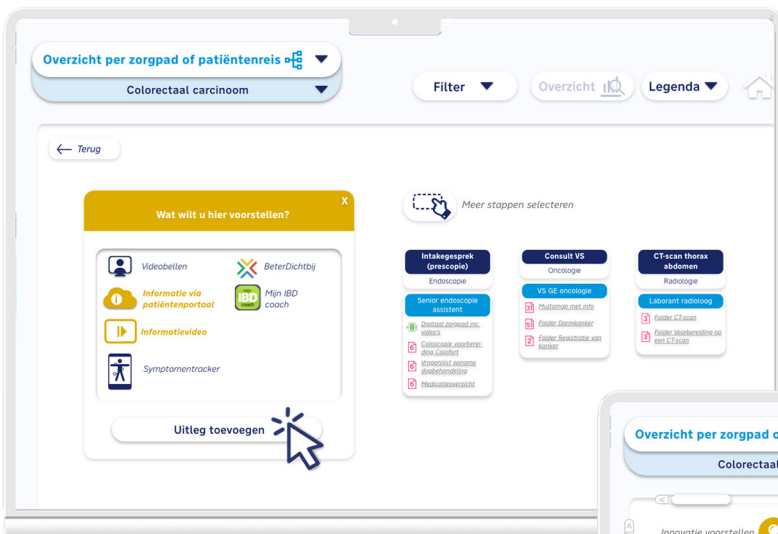
If the user clicks on 'versturen', the idea is shared with organizational employees.

Healthcare professionals can share ideas to innovate certain steps of the care process or ask questions about possibilities for digitalization.

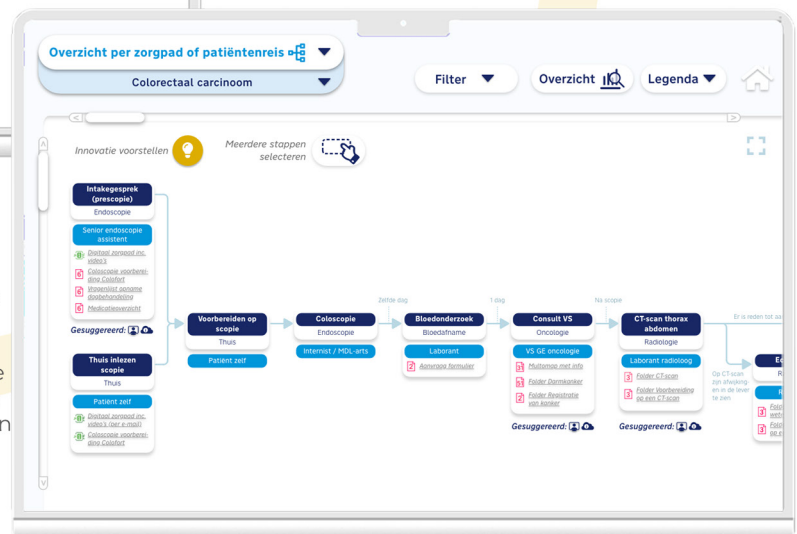
The design offers a new, easy way of sharing thoughts and ideas and the opportunity to educate oneself on the use and availability of digital resources



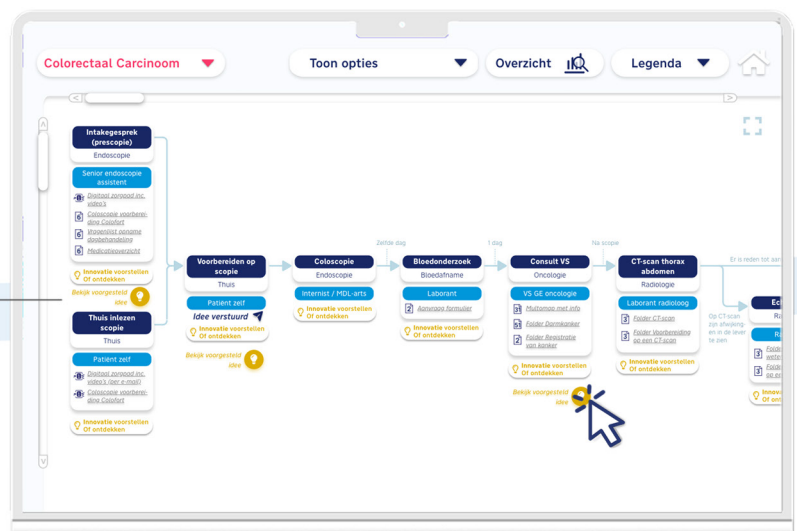
GoMedFlow offers the possibility to implement digital possibilities at specific moments in a care process, to prevent interference with care processes or workflows.

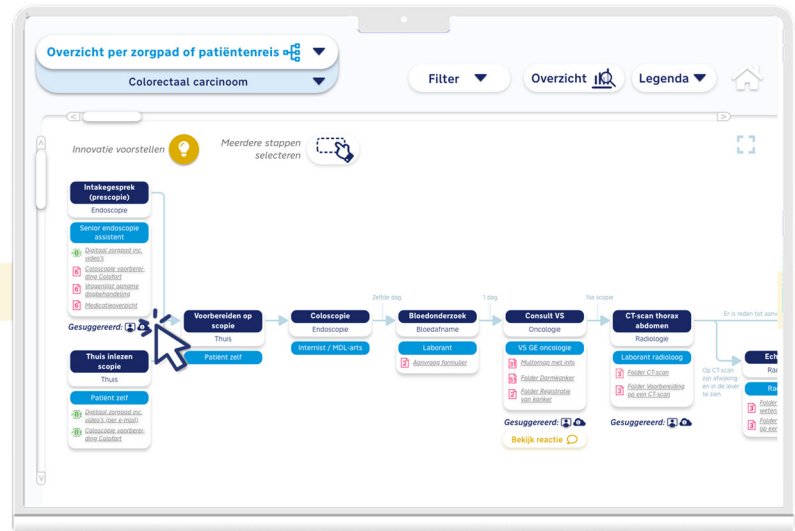


The user can explain why they suggest the use of a digital resource. If a certain argument against the use of this resource is expected, the user can address/tackle this



If a organizational employee sees opportunity for improvement and shares an idea, this pops up in the path of the healthcare professional.

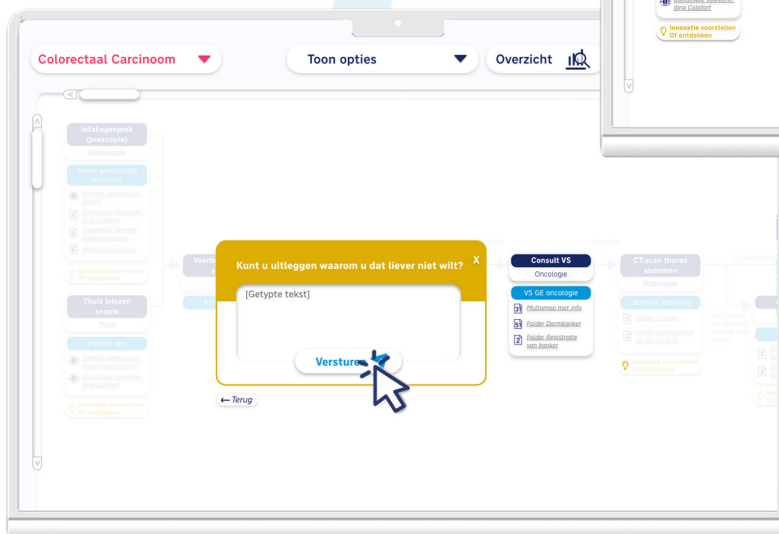
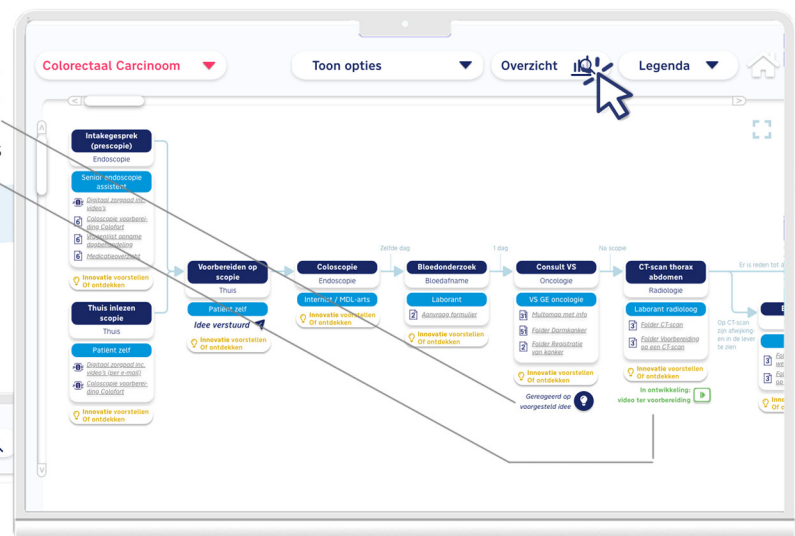




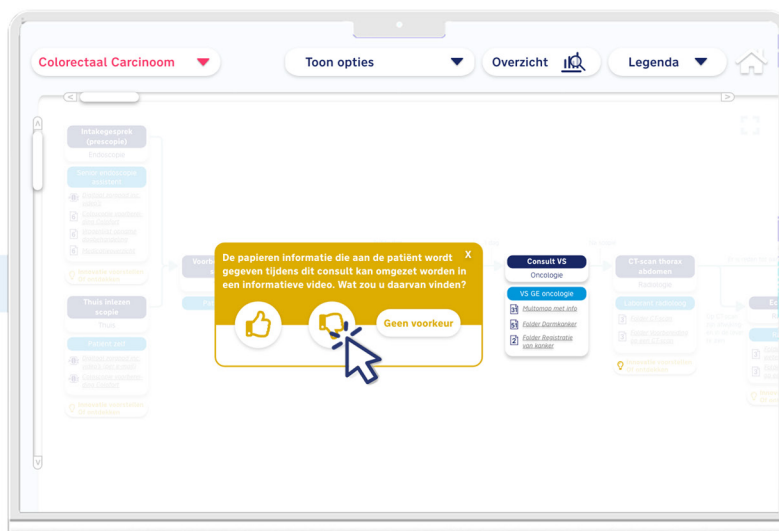
The path shows that a user responded to a suggestion for digital innovation

It also shows digitalization projects that are in process

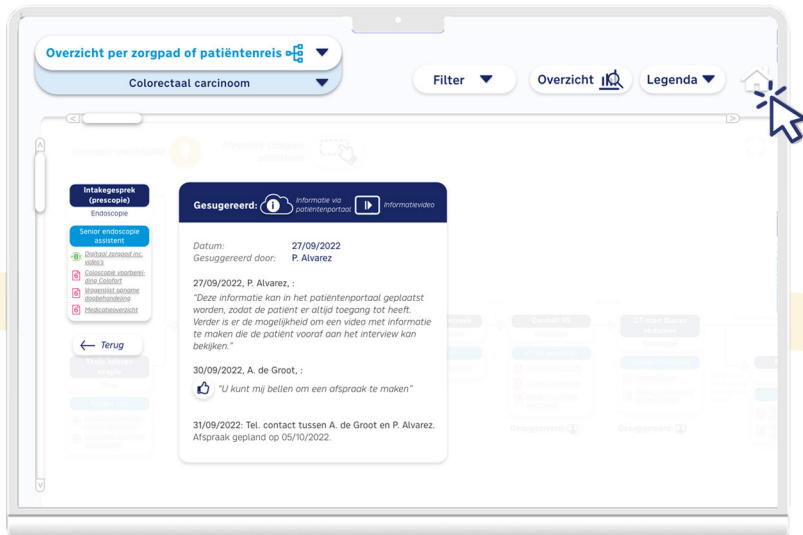
GoMedFlow provides transparency in perspectives of healthcare professionals and organizational employees in regard to digitalisation. It helps people to empathize with work processes and working methods of one another, putting a stop to miscommunication.



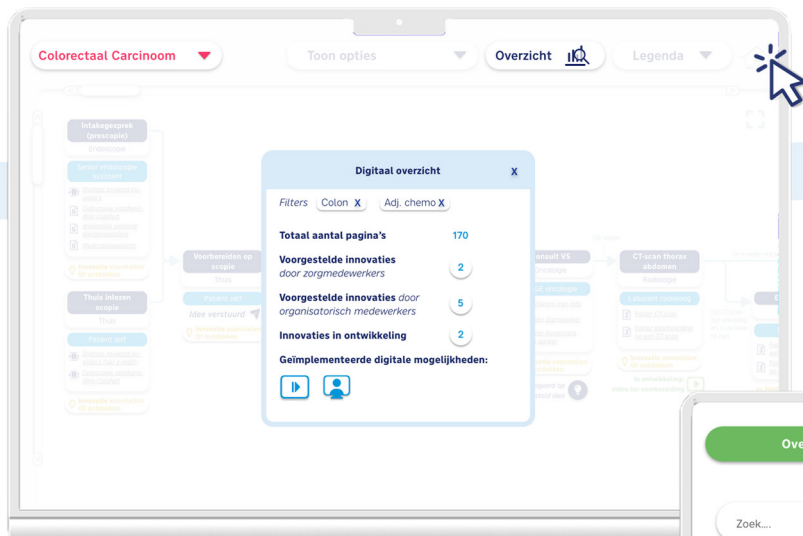
If the user prefers not to implement the suggested digital opportunity, they have to explain why. If the reason is for instance lack of knowledge about the use, the organizational employee can respond to this by sending information, or making an appointment to explain it.



The user can respond to this suggestion

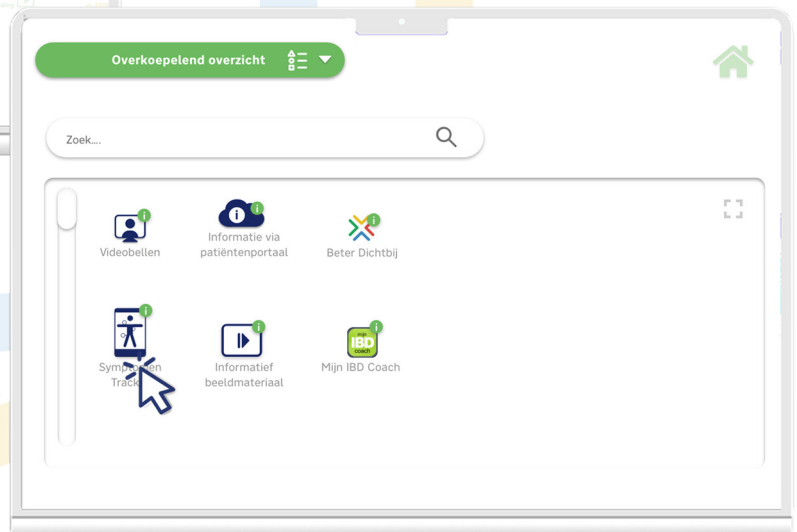


The user can see an overview of all communication that took place about a certain step.



The design can create an overview with information based on the whole care process.

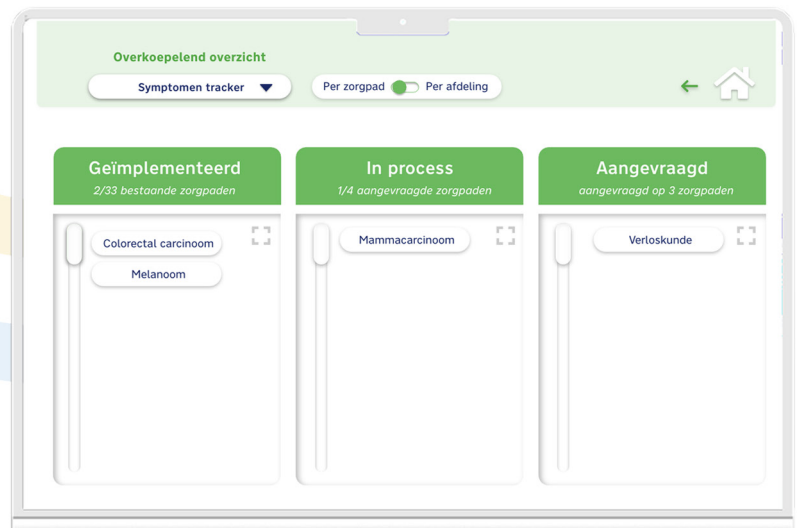
Here the user can see all digital resources that are available at the RdGG. If the user clicks on the green information icon, they can find user manuals and for instance read about the advantages of using this resource.



Clicking on a resource leads to an overview of where this resource is requested, in process or implemented.

Seeing that digital resources are already used in other departments can inspire care professionals. Or if they see that another department or care pathway wants to implement the same innovation as themselves, they can start a collaboration.

GoMedFlow provides overview in the current state and process of digitization.



8.2 Testing the final design

8.2.1 User tests

GoMedFlow was tested with potential users, to find possibilities for future improvement or research. Most sessions were one-on-one sessions of 45 minutes. The following participants helped to evaluate the design:

The user tests led to interesting new insights. Chapter 9 translates these insights into future possibilities for improving and developing the concept.

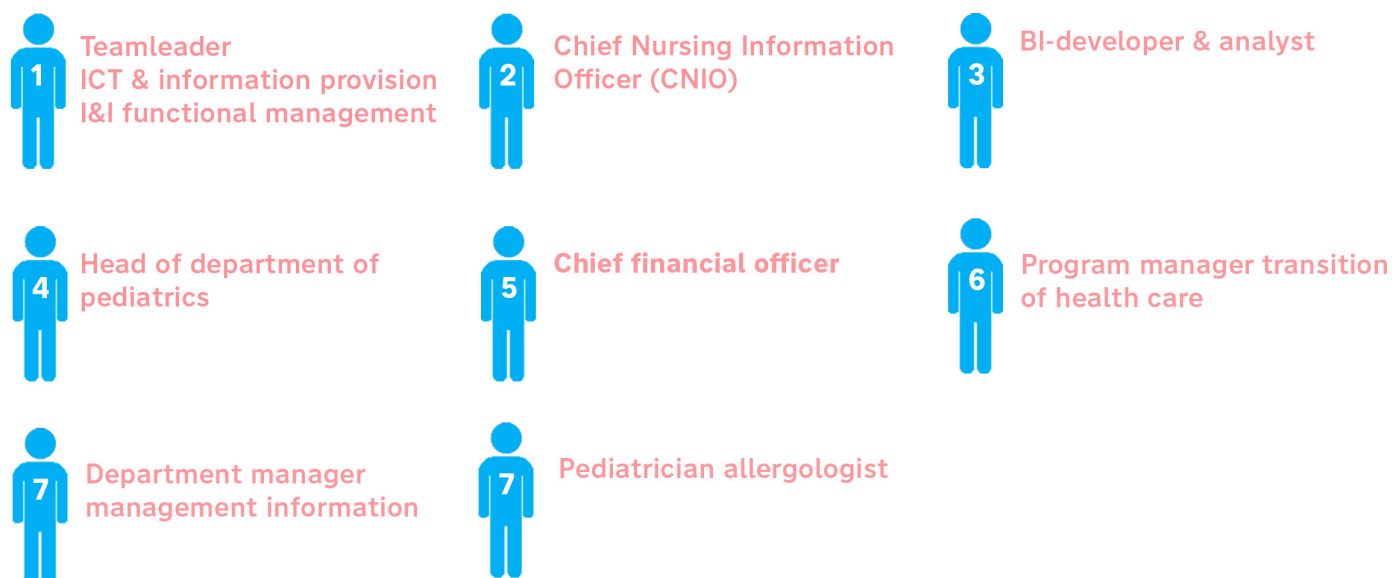
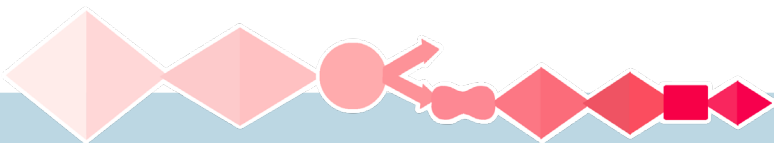


Figure 53. Participants who helped to evaluate the design.



Figure 54. Foto of one of the user tests

Chapter 9 | What next?



This chapter describes a future perspective: what is needed to successfully produce and implement GoMedFlow.

9.1 Future research

The focus groups and user tests led to a list of future research directions.

Patient perspective

The patient is currently no end user of GoMedFlow. As a future step, it would be interesting to find out if the patient journey maps that are created with the design could be translated in a version for patients. Outcomes of the interviews with patients showed a need for certainty and overview of the care process. A patient journey can help them with this. It would be interesting if the healthcare professional could decide on which steps of the process patients should see, selecting these steps and sending patients a digital version of the patient journey map.

Creation of care pathways

The current version of GoMedFlow shows one patient journey map, but but lacks a care pathway. Further study is needed to find the best way to visualize care pathways in GoMedFlow. One challenge that can be researched is how to frame care pathways or patient journeys, think for instance of deciding on which patient specific treatment courses can be added to the journey. Additional investigation that could be interesting is exploring if patient journey maps and care pathways can be combined into one path, seeing as they visualize the same process.

Alignment with existing workflows

More research is needed to discover the best way to implement the design in current workflows. Research on when the design will be used and by whom. It is also important to find out if the design aligns with existing workflows, or if it will disrupt these workflows. In addition, it should be found out if GoMedFlow will help employees to save time or if it increases their workload and who will be responsible for keeping the program up to date.

9.2 Steps needed to further develop the concept

Technical development for the software

It is necessary to obtain more information on how such a design could be changed into a real, working program. Starting a collaboration with an expert in the development of software programs or with external partners could help to achieve this. 'Building' the design has to be done outside of the RdGG, since the RdGG does not technically develop software programs.

More co-creation sessions

More co-creation sessions are needed to further align the design with wants and needs

of end-users. These co-creation sessions can cover the following topics:

- 1) What is needed to align the use GoMedFlow to current workflows? What are success factors for implementation?
- 2) Which organizational employees and healthcare professionals will benefit most from using the GoMedFlow?
- 3) What are ideal moments to use GoMedFlow?
- 4) Who keeps care pathways up to date?

Creating more care pathways and patient journeys

More care pathways and patient journeys should be created to find out if the current format of GoMedFlow is also applicable to other care processes besides colorectal cancer. Creating these care pathways also offers the opportunity to test the design: it would be ideal to create this in collaboration with healthcare professionals, letting them use a demo version of GoMedFlow. This can help to find out if the design is really that userfriendly.

Connecting GoMedFlow with HiX, Zenya and other software

During the focus groups, participant stated that connecting the design with HiX and Zenya is crucial for a successful implementation of the design. Therefore, there is call for research on this topic. A possibility could be to discuss options with employees working for Hix and Zenya.

Testing different function within the program

Not all functions within the program could be tested during the project. This is needed to further evaluate the feasibility of the design. For example: can the care pathway or patient journey really be converted into a pdf file so it can be printed? What if it is a very extensive journey?

Analysis of economic benefits

Lastly, an analysis of economic benefits is needed. Especially because resources at the RdGG are limited. Does the investment of time, money and energy needed to further develop GoMedFlow eventually really lead to an efficient deployment of people and resources?

9.3 Ideas for new functions

The results of the focus groups and user tests also led to a collection of potential additional usage-functions that could be added to the design. These are shown in Figure 55. Even though adding a lot of functions can seem appealing, it is important to ensure the program is still user friendly. The design should stay lean and mean.



Showing successes of digital implementations on the homepage, to inspire the user



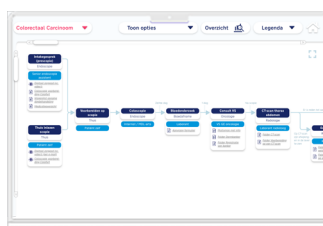
Using the design for quality checks



Attaching protocols and guidelines to care pathways



Creating a rewarding system, to reward pro-active users



Adding an option to merge certain steps into one - creating 'main steps' that can be expended to see the 'substeps'.



Checking at which steps specific patients are 'located' in the care pathway, by clicking on a link in HiX.

Process mining

Making use of process mining to validate the care pathways and patient journeys created with the design.

Figure 54. Ideas for additional usage-functions.

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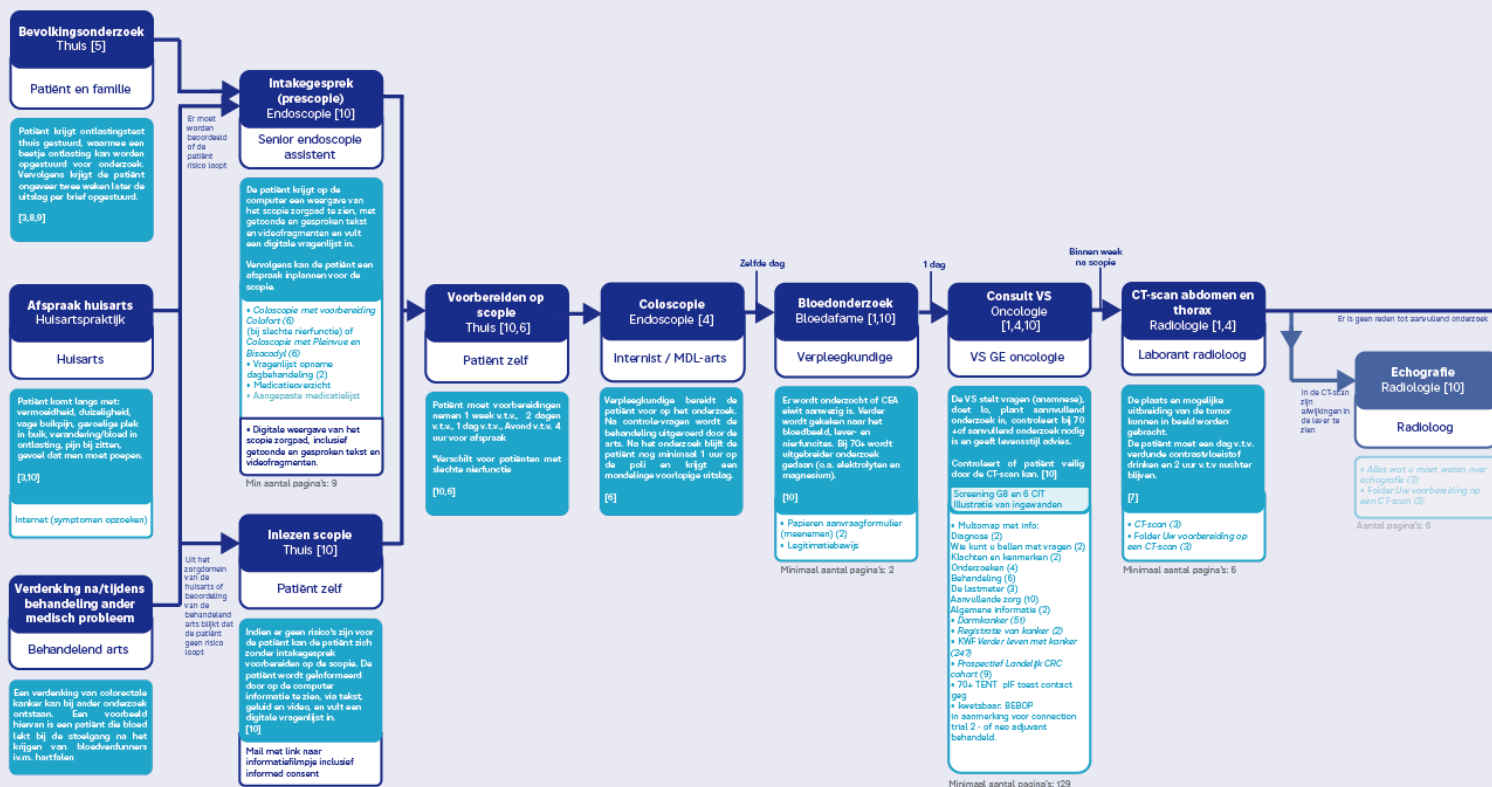
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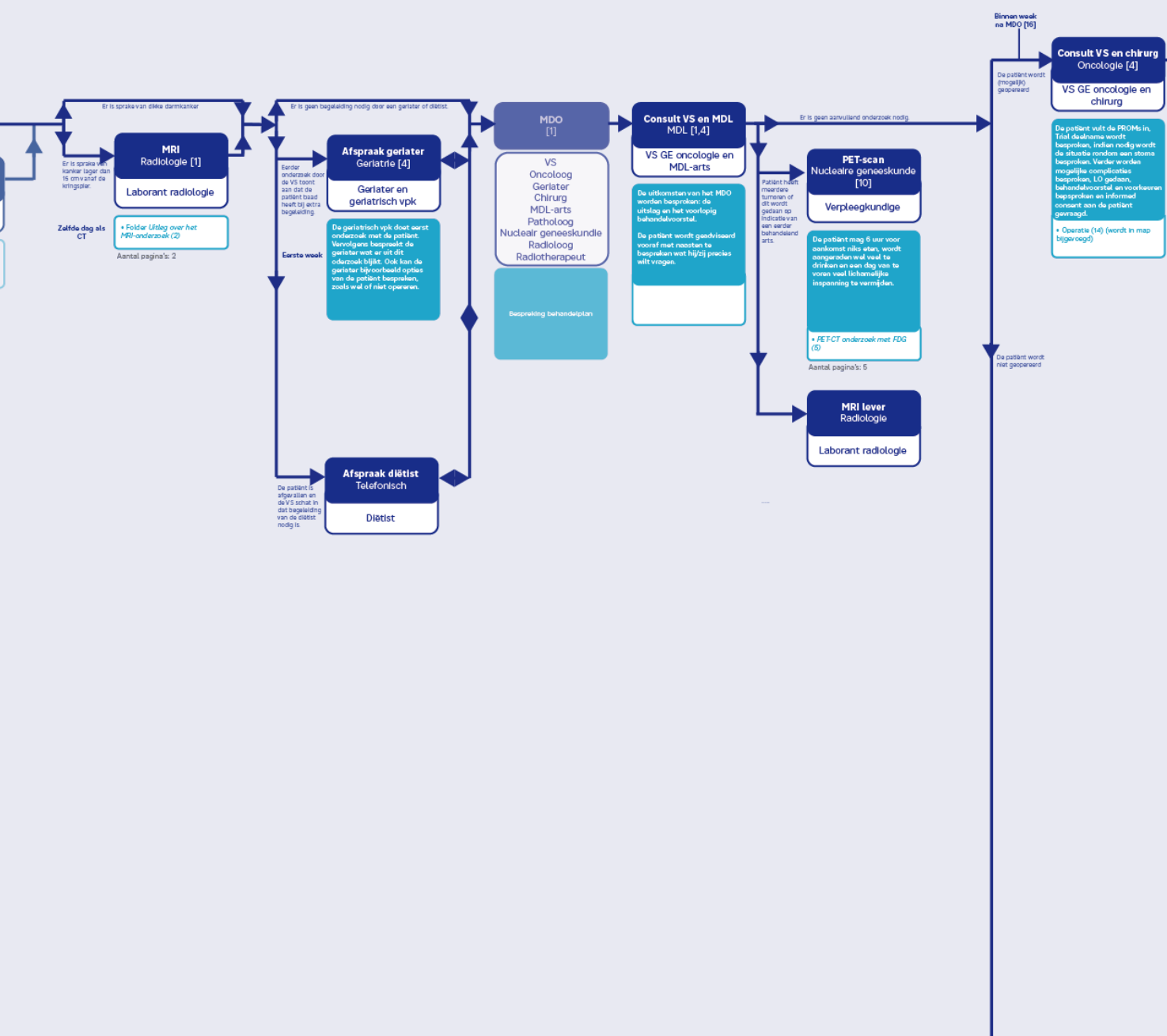
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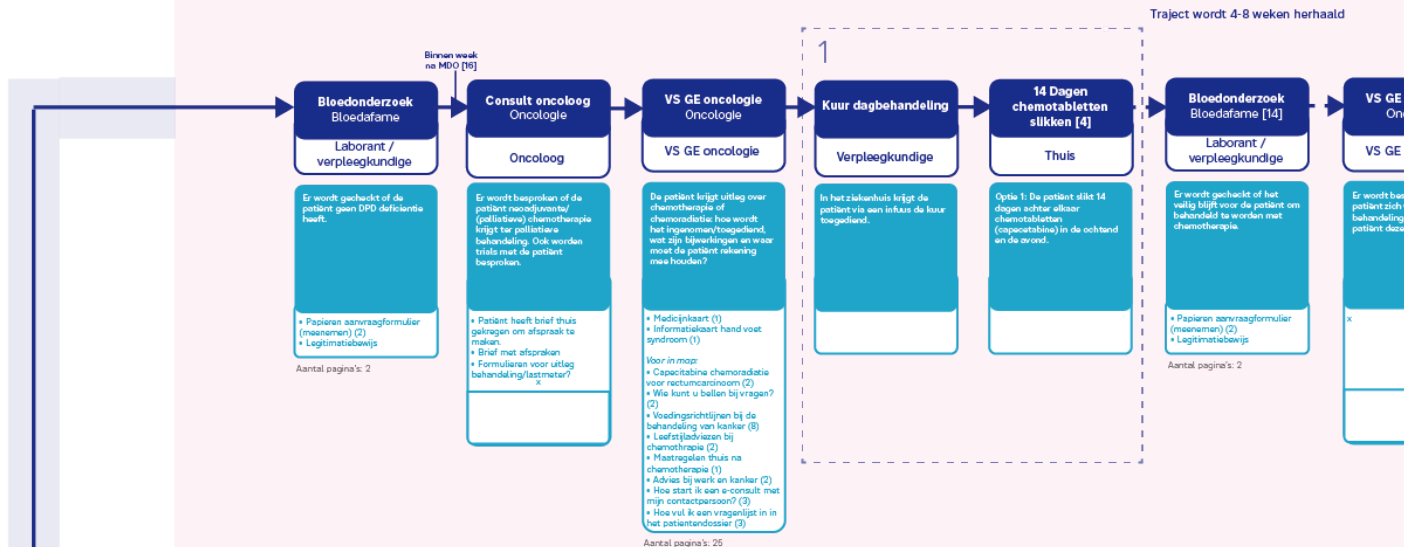
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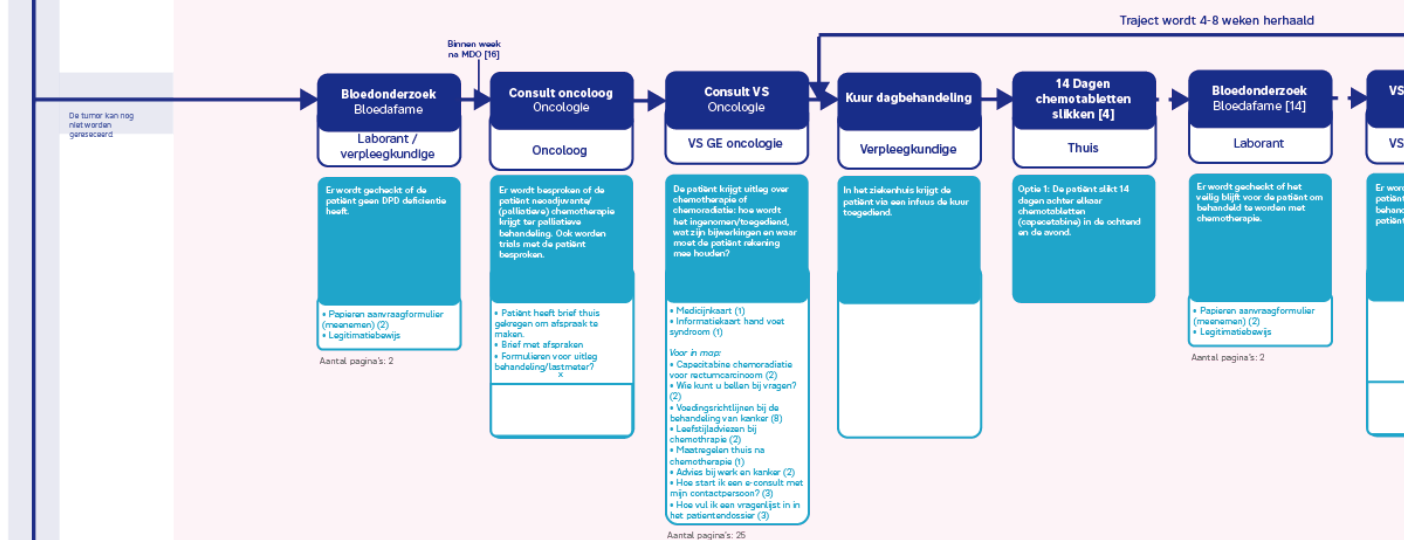
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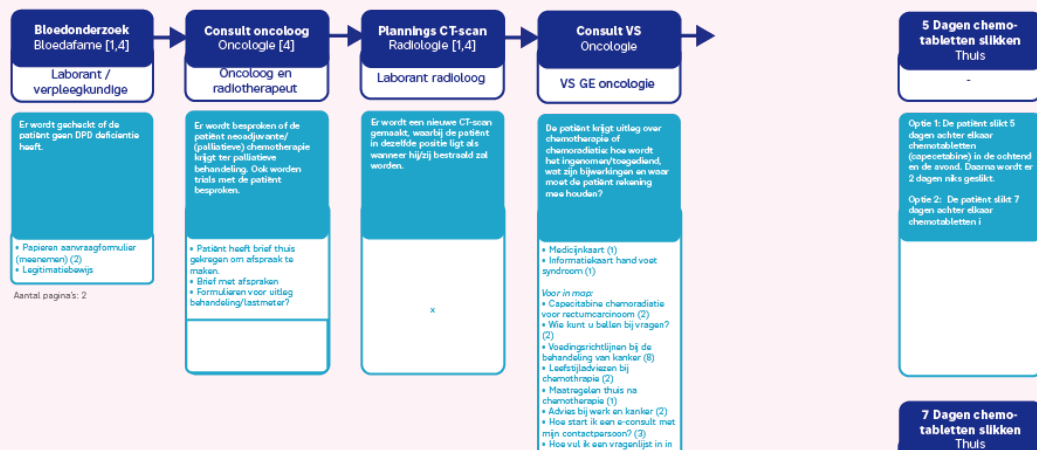
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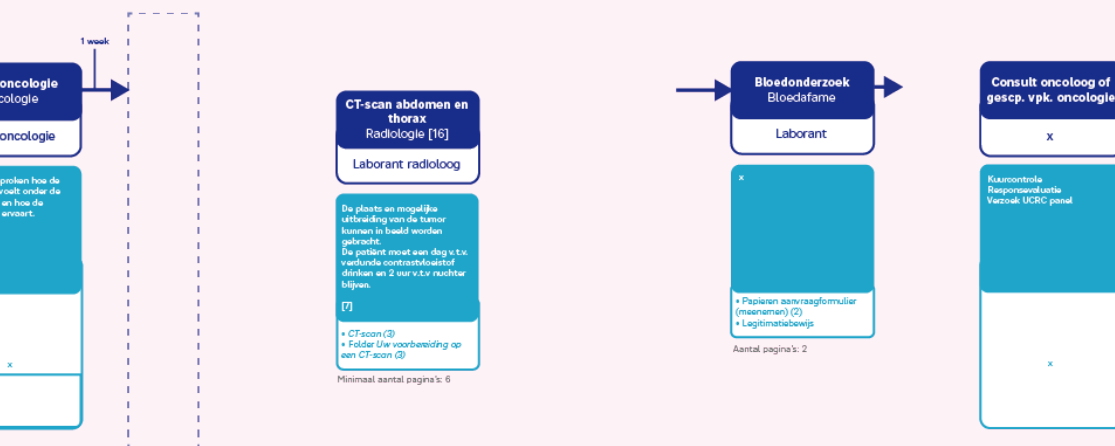
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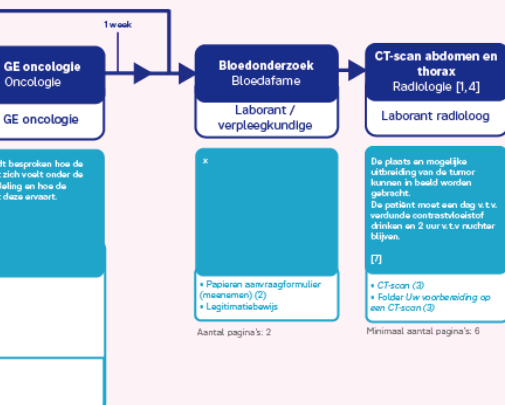
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ADJUVANT COLON



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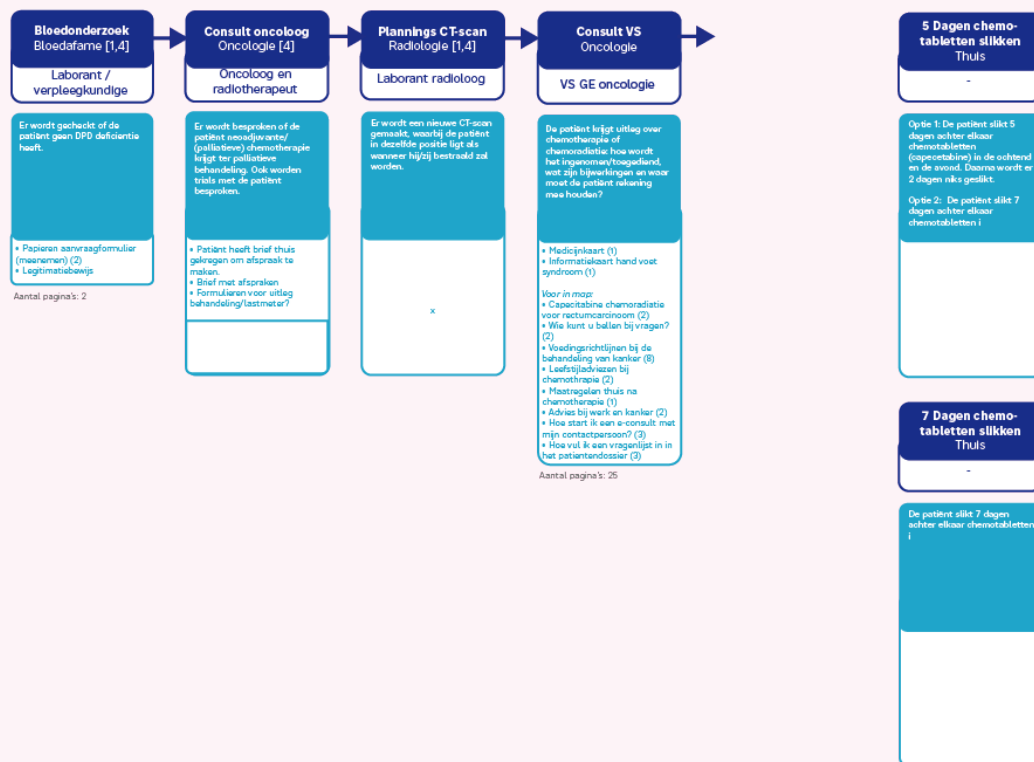


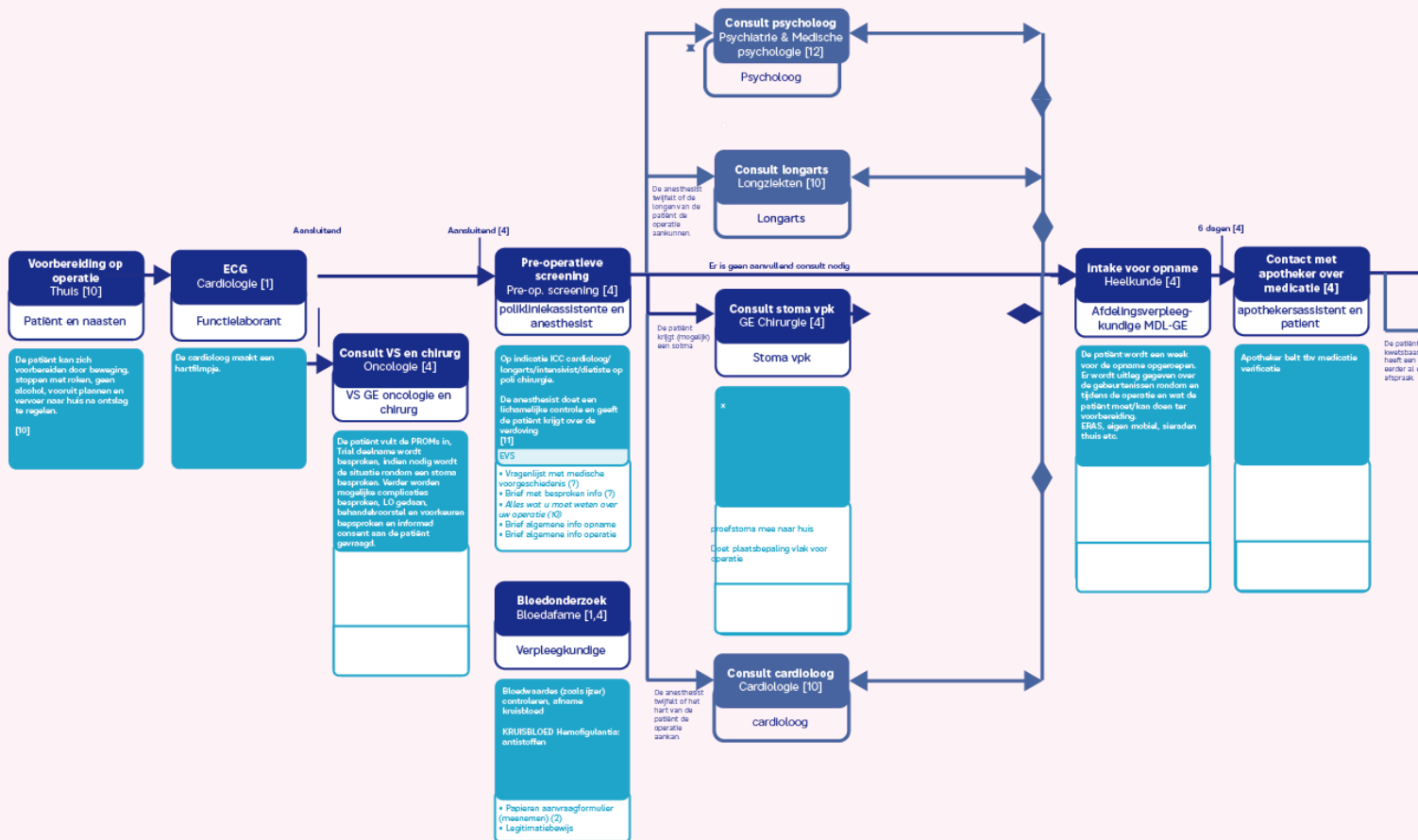
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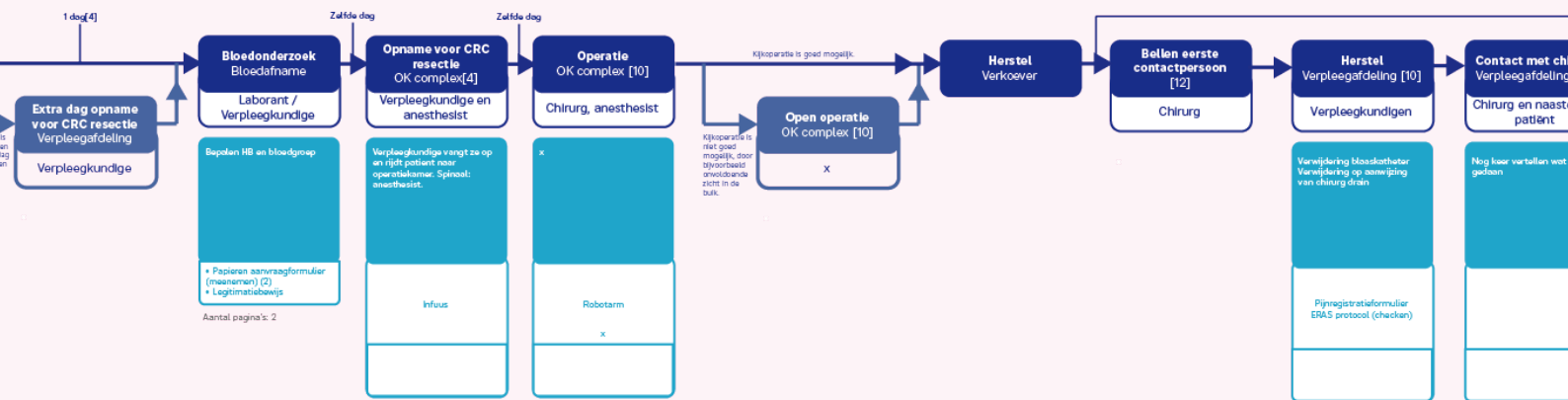
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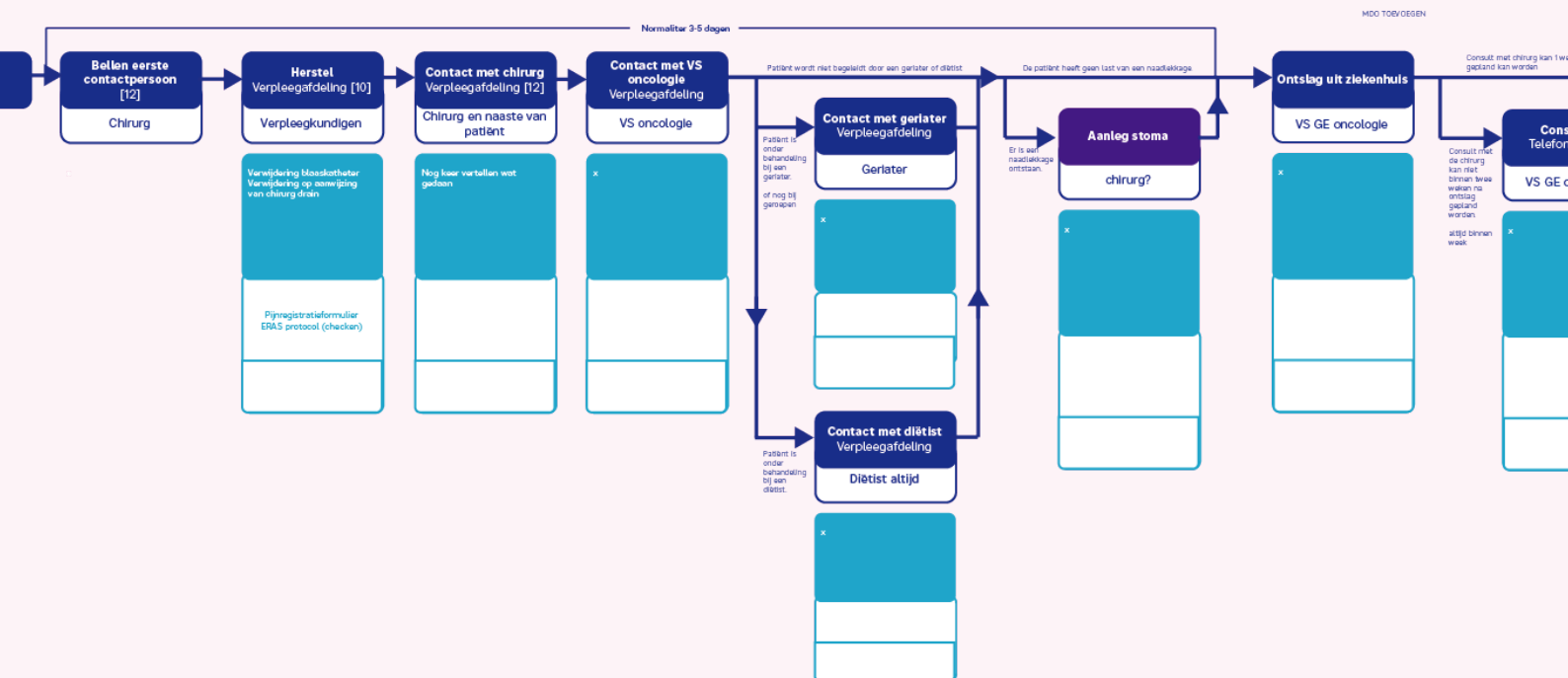


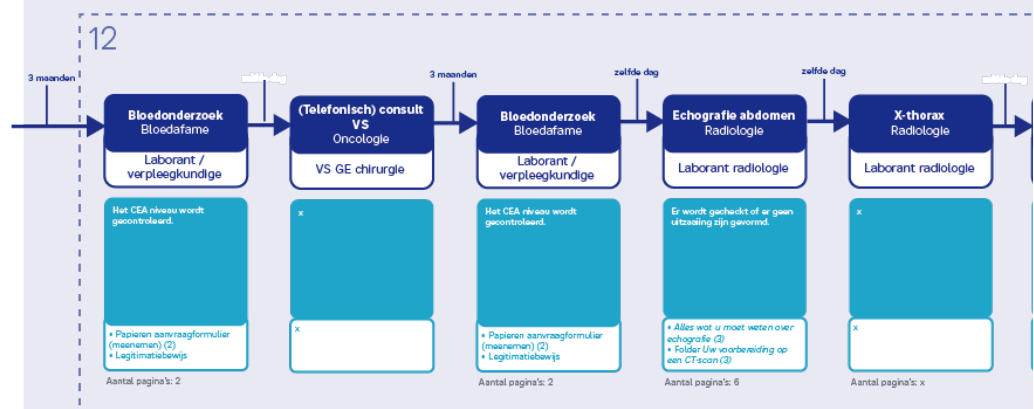
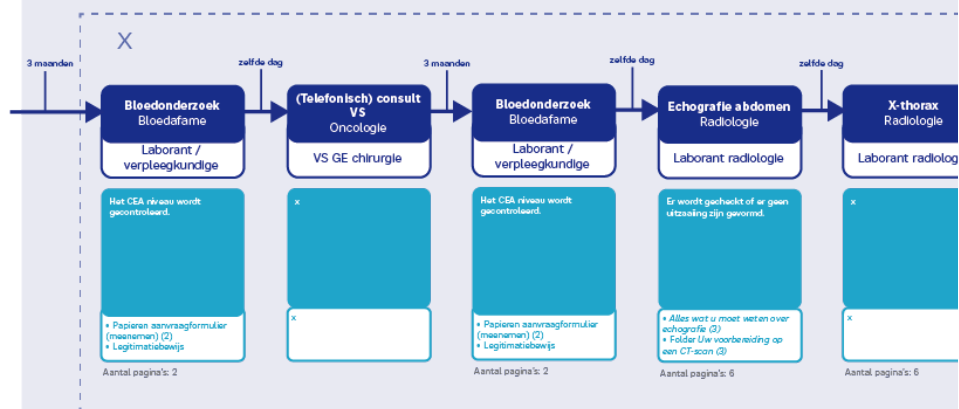
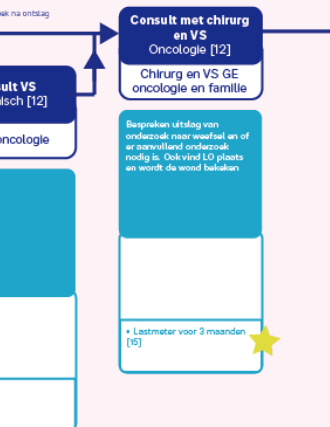


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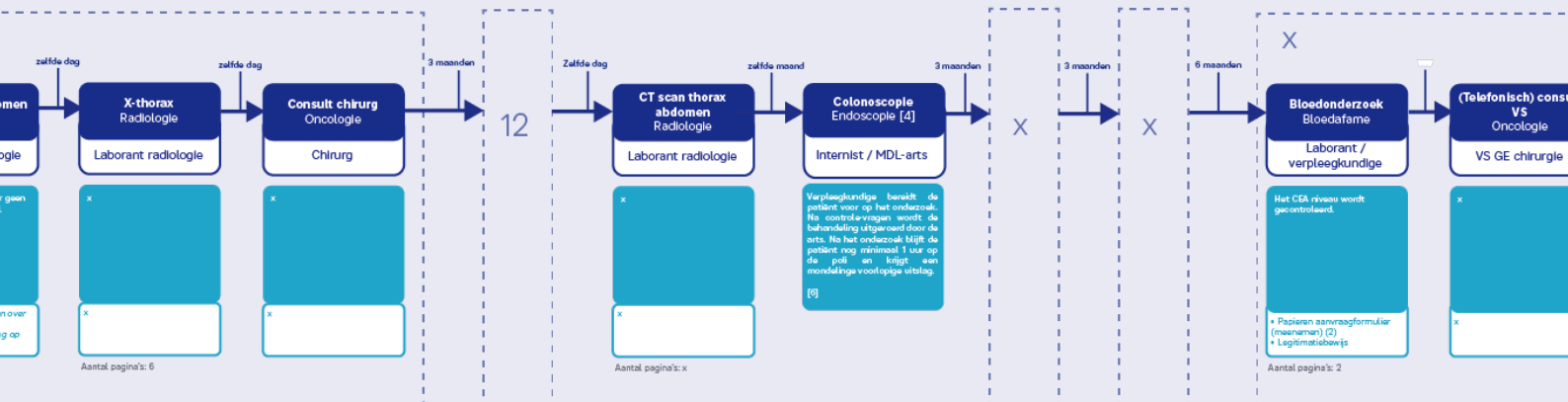
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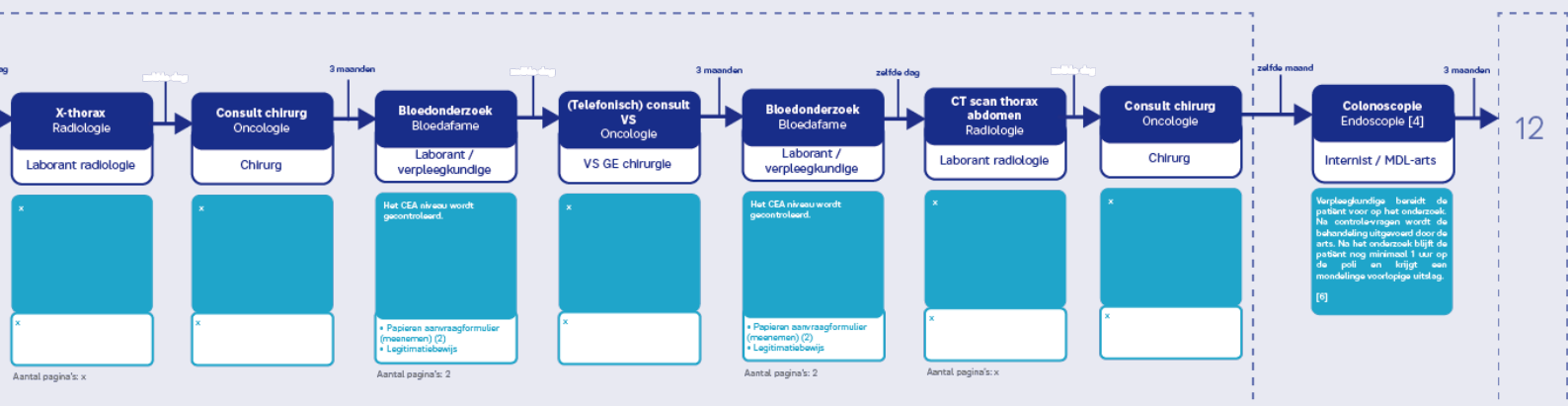


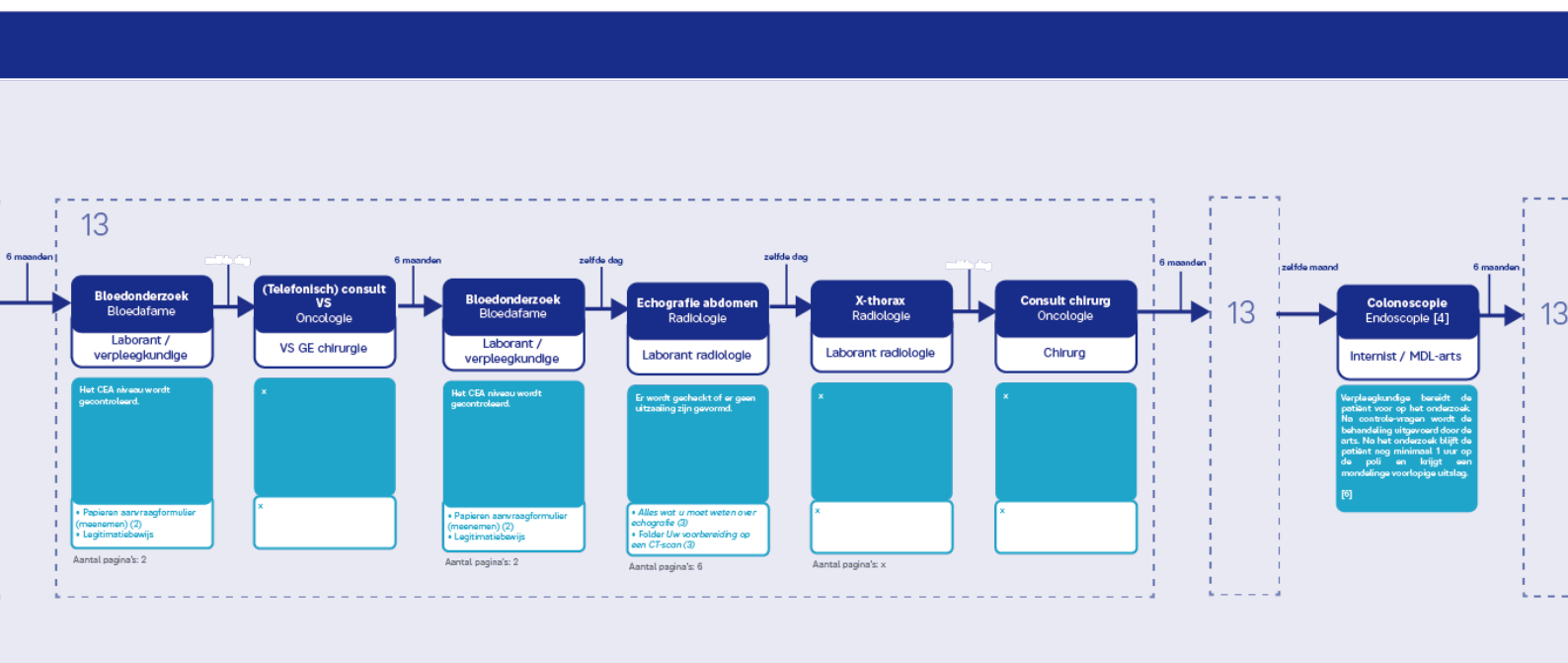
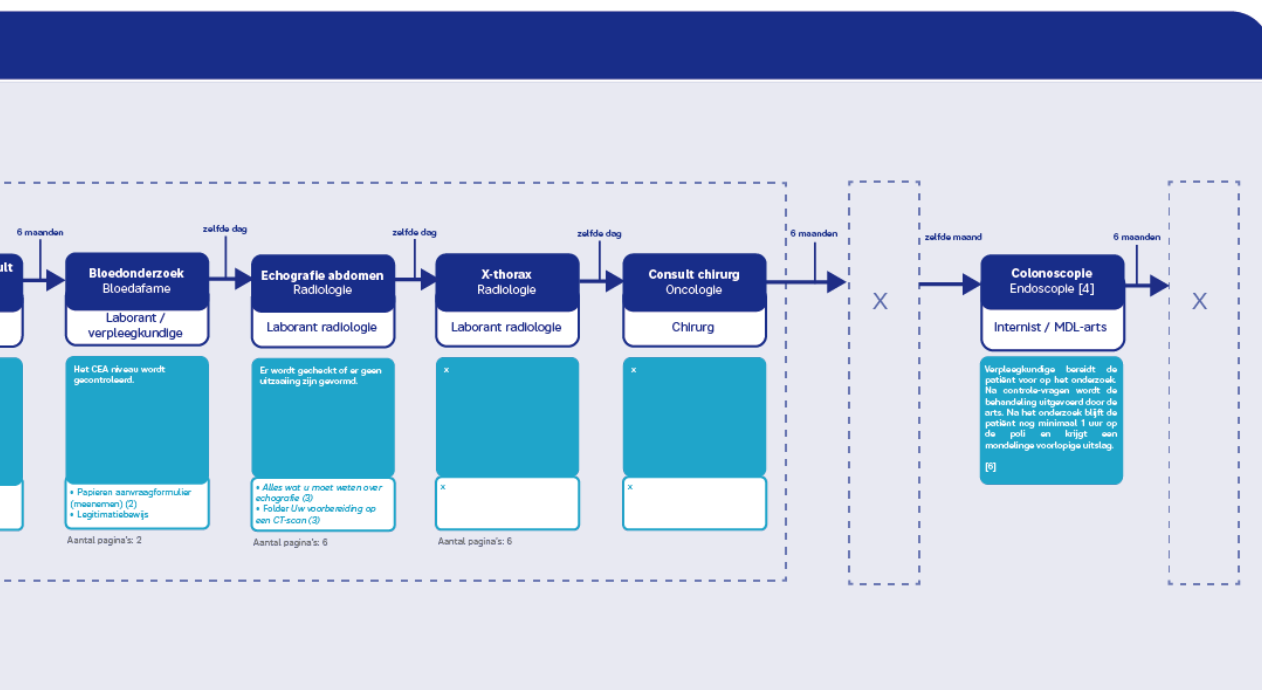


FOLLOW-UP COLON



FOLLOW-UP RECTUM







Waarom wordt dit onderzoek uitgevoerd?

Bij de diagnose darmkanker komt veel kijken. U krijgt veel informatie, ziet veel verschillende zorgverleners en komt vaak naar het ziekenhuis op en neer. In dit onderzoek wordt gekeken of de inzet van digitale mogelijkheden de zorg voor patiënten met darmkanker zou kunnen verbeteren. Hierbij wordt gefocust op de uitwisseling van informatie en het contact tussen patiënten en zorgverleners. Dit onderzoek is een samenwerking tussen het Reinier de Graaf Gasthuis en de Technische Universiteit Delft.

Wat houdt dit onderzoek voor u in?

Besluit u na het lezen van de informatiebrief om mee te doen aan dit onderzoek en heeft u het toestemmingsformulier ondertekend? Dan wordt er een interview ingepland van 30 minuten. U kunt kiezen of u het interview telefonisch, via Zoom of in het RdGG wilt laten plaatsvinden. Als u voor het RdGG kiest kan het interview gepland worden voor of na een van uw afspraken, zodat u niet extra hoeft te reizen.

In het gesprek zullen de volgende onderwerpen besproken worden:

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

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

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

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

C.1 Healthcare professionals

Houding

3. **Nadelen** (werkproces en **werkplezier**)
4. **Vertellen collega's** wel eens over **nadelen** of **voordelen** van digitalisering?
5. **Hoe zorgverleners** aankijken tegen digitalisering? (**Verschil** tussen vpk, gesp. vpk, VS, specialist).
6. **Hoe patiënten** aankijken tegen digitalisering?
7. **Nadelen voor de patient** als er meer gedigitaliseerd wordt?

20 minuten

Realiseren digitalisering

8. **Veel zorgverleners** met **ideeen** voor bijvoorbeeld digitale oplossingen **rondlopen**? **Doen** die daar iets mee? **Waarom wel / niet**?
9. **Stel** dat je **vandaag iets bedenkt** dat je wil digitaliseren, hoe zou je dan proberen om dat te realiseren? **Vertrouwen** in dat idee (snel) uitgewerkt wordt? **Waarom**?
10. Wat **kan** in de **weg staan** van realiseren van zo'n digitaal product of idee in het ziekenhuis?

Zorgpaden 30 minuten

11. **Doel zorgpaden** op afdeling?
12. **Gebruikt u** de zorgpaden wel eens ergens voor?
13. Zou u **iets willen veranderen aan de zorgpaden**?

Tijd over: buddy

Houding

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4. **Vertellen collega's** wel eens over **nadelen** of **voordelen** van digitalisering?
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11. **Doel zorgpaden** op afdeling?
12. **Gebruikt u** de zorgpaden wel eens ergens voor?
13. Zou u **iets willen veranderen aan de zorgpaden**?

Tijd over: buddy

C.2 Organizational employees

Werkervaring

1. Op wat voor manieren houdt u zich bezig met digitalisering in het RdGG?
2. Hoe ervaart u het om in de zorgsector aan digitalisering te werken?

Belemmerende factoren

3. Waar denk je aan als ik je vraag waar je tegenloopt tijdens het werk?
4. Voorbeeld van een digitaal project in de zorg dat vast liep of mislukte?
5. Verdere zaken die digitalisering in de zorg in de weg zouden kunnen staan?

Verwachting over houding

6. Hoe schat u in dat patiënten aankijken tegen digitalisering?
7. Hoe schat u in dat zorgverleners aankijken tegen digitalisering?

Zorgverleners met ideeën

8. Denkt u dat er veel zorgverleners met ideeën voor digitalisering rondlopen?
9. Denkt u dat deze zorgverleners deze ideeën ergens kwijt kunnen?
10. Denk je dat er verbetering mogelijk is in de communicatie tussen zorgverleners en ICT?
11. Wat denk je dat zorgverleners ervan zou kunnen weerhouden om met hun ideeën op iemand af te stappen?
12. In de meeting met VS'en over digitalisering werd hiërarchie benoemd. In hoeverre denk je dat dit tegenwerkt of juist helpt bij digitalisering?

Zorgpaden

13. Wat weet u van zorgpaden op de verschillende afdelingen?

Stimulerende factoren

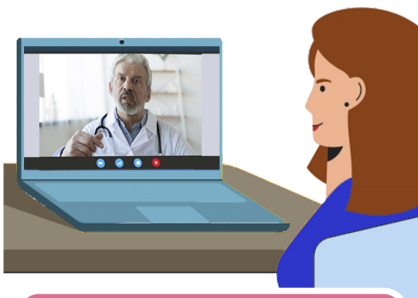
14. Als er nu geld zou vrijkomen voor digitalisering, in wat voor project zou u dat investeren?
15. Welke stappen zou u nemen in het ziekenhuis om ervoor te zorgen dat deze app succesvol wordt gebruikt door zorgverleners?
16. Is er iets waar u op zou letten bij het ontwerpen van de app?
(Als geen idee; makkelijke taal, simpel houden, zorgen dat het met hix communiceert, veiligheid)

Appendix D |

Posters used during interviews with patients

D.1 Poster 1

Voorbeelden van digitale hulpmiddelen



Videobellen



Informatie per e-mail



Chemotherapie



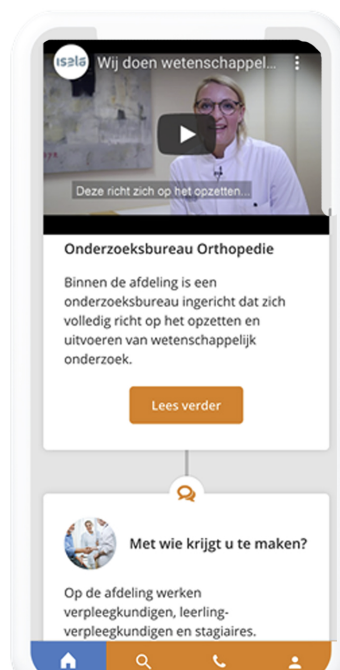
Filmpjes met informatie voor de afspraak



Chatten met uw zorgverlener



Aanmeldzuil



App met informatie en herinneringen



Online bijwerkingen bijhouden

D.2 Poster 2

Diagnose



Darmonderzoek

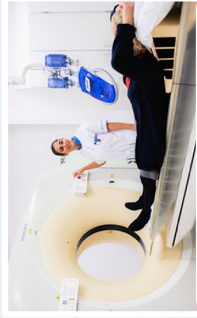


Diagnosegesprek



Informatie

Onderzoek



CT-scan

Aanvullend onderzoek



Bloedonderzoek

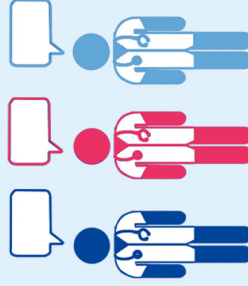


Informatie

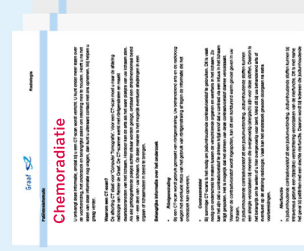
Behandelplan



Uitleg over de behandeling

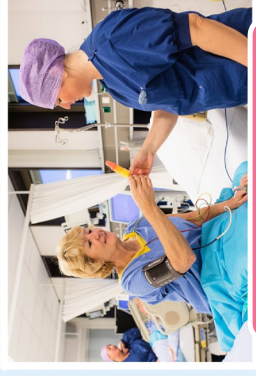


Informatie van
verschillende zorgverleners



Nieuwe informatie

Behandeling



Operatie

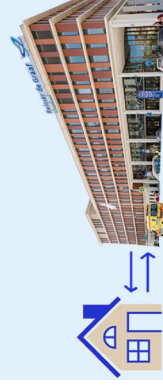


Herstel



Chemotherapie

Bijwerkingen



Veel in het ziekenhuis

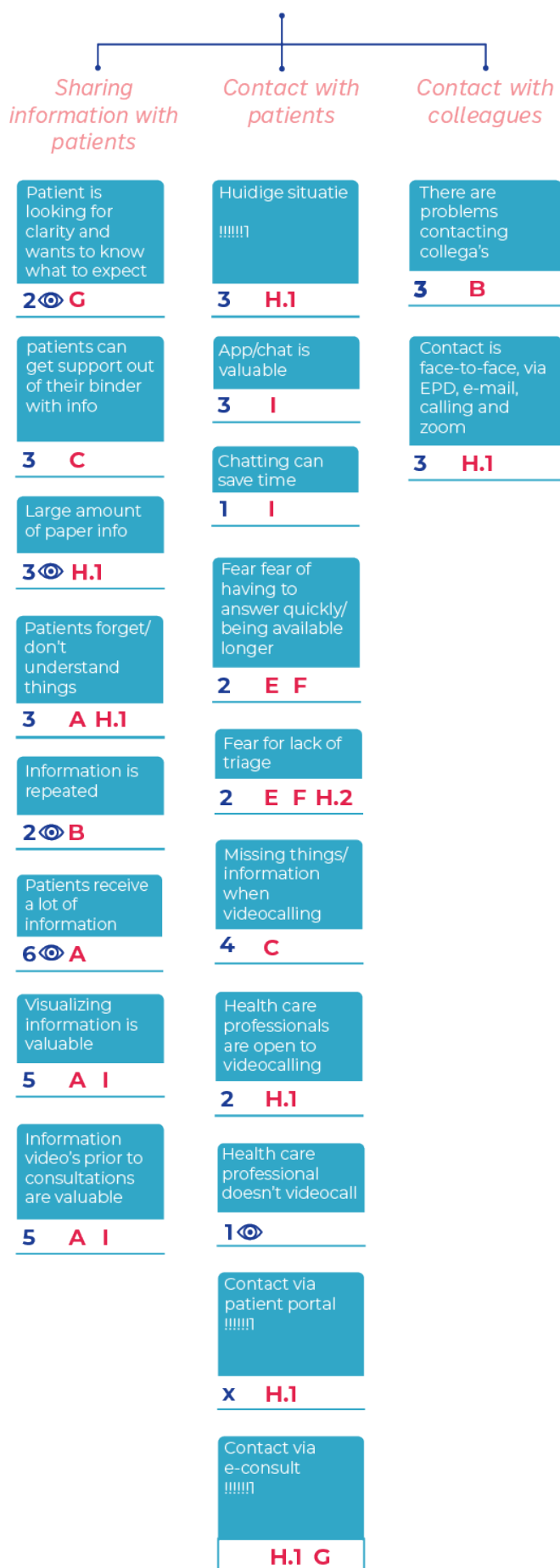
Follow-up

Appendix E |

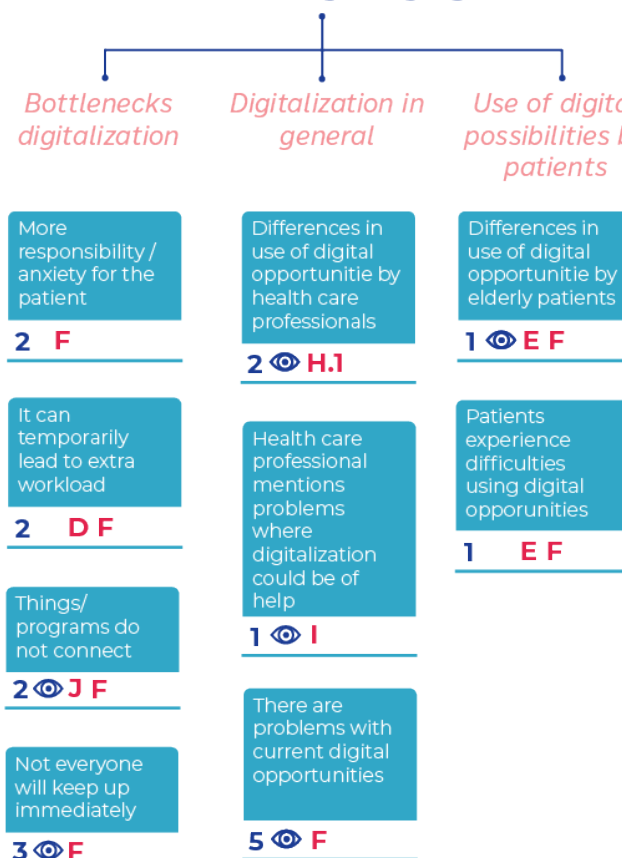
Analysis of the interviews with care professionals

E.1 First analysis

Interactions between health care professionals and with patients



Current situation regarding digitalization



Thoughts on digitalization

Processes and organizing

al
by

Attitude towards
digitalization

Wishes regarding
digitalization

Care paths

Realizing projects
regarding
digitalization

Organization and
culture

Humanity is
important and
required

5 E C

Fear of being
replaced by
technology

2 E

Lack of
knowledge
about digital
opportunities

3 F G

Positive attitude
towards
digitalization

4 H.2

Health care
professionals
expect some
colleagues to
be sceptic

5 E

Health care
professionals
are open to
digital info

4 H.2

Health care
professionals
expect some
colleagues to
be open to
digitalization

3 H.2

Negative
attitude towards
digitalization

4 G

Reduces job
satisfaction!!!!

2 E F

Health care
professional
want to stay in
control

1 E

A smoother
process, with
connected
components

3 J

Videos with info
are valuable

2 I

Monitoring at
home can be
valuable

2 I

Creating more
overview

1 B I

More patient
tailored care

2 B I

Creating care
paths is an
ongoing process
that takes a lot
of time

2 D

They can be
unclear / difficult
to read

3 B

Implementation
of projects can
be slow and
arduous

4 D G J

Health care
professionals get
demotivated

4 G H.2

Health care
professionals
don't (know how
to) share ideas

5 F G

Not much faith
in ideas
actually getting
developed.

2 F H.2

Projects take
time and energy

3 D

Health care
professionals
have ideas for
digitalization

3 I

Difficulties with
uniformity, with
maintaining an
overview and
with
management of
files

5 B J

Difference in
values between
health care
professionals
and
organizational
employees

1 G H.2

Legenda

Blue
number



Amount of health care professionals who said things about
the statement

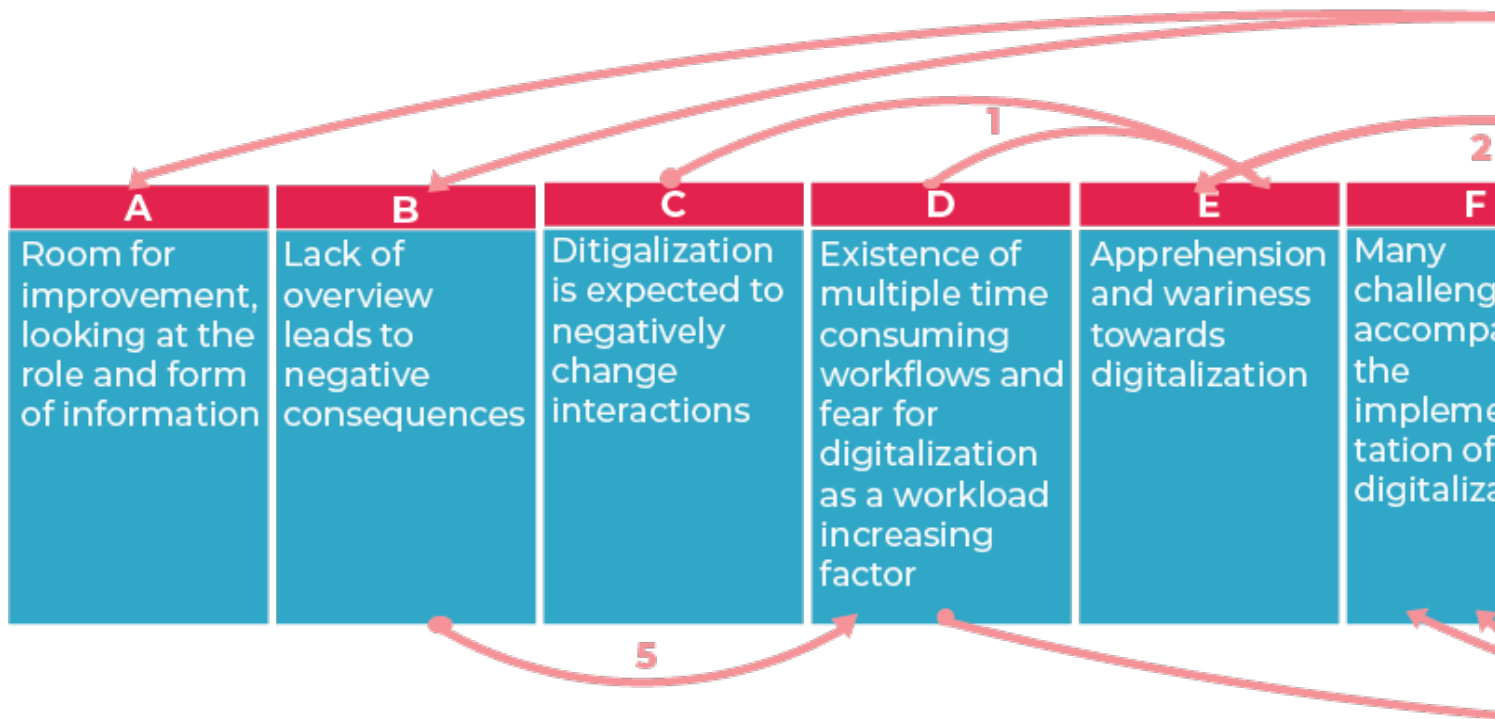
Seen during observations

Pink letter

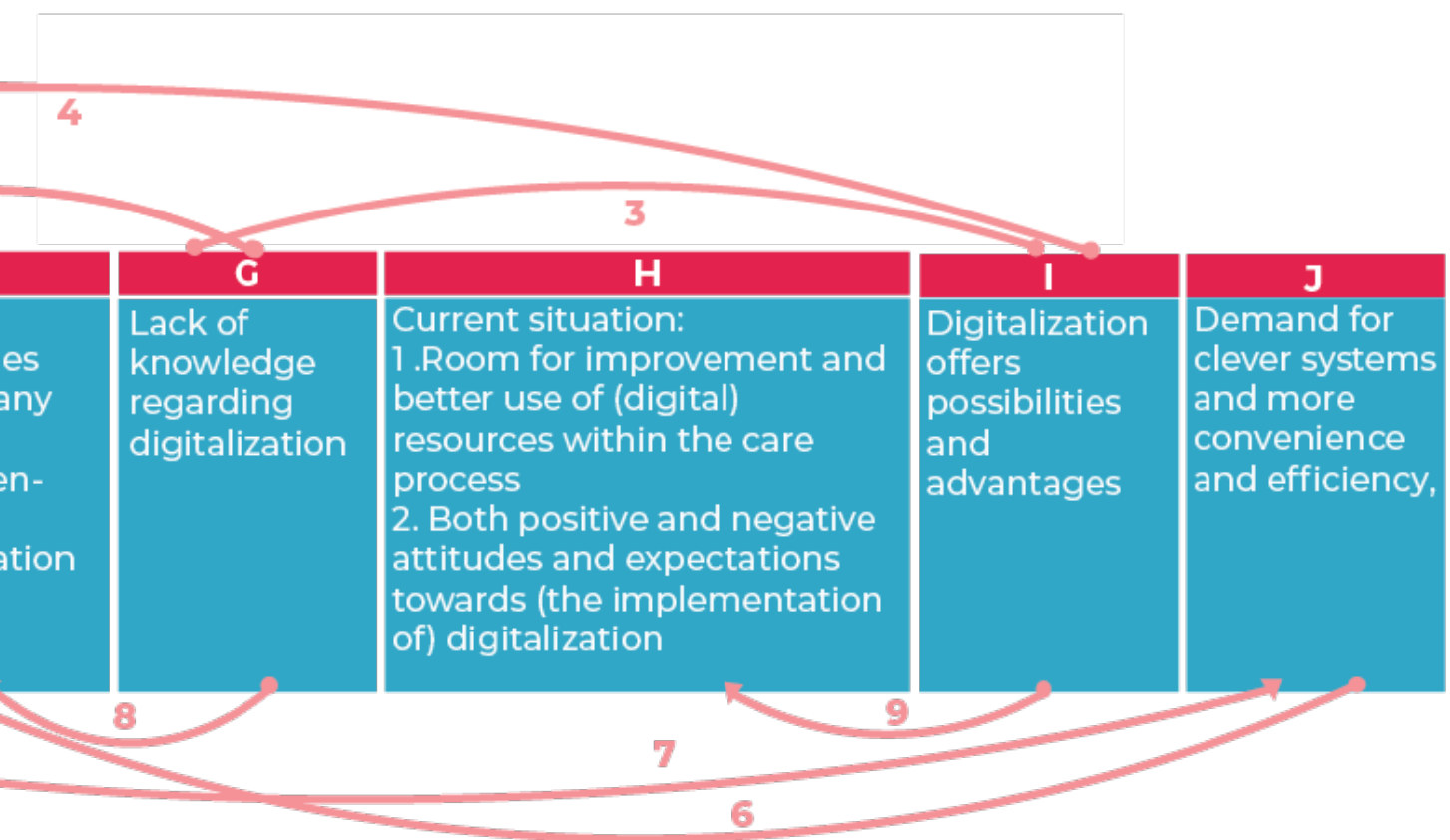
Statement is classified under one of the following categories:

- A Room for improvement, looking at the role and form of information
- B Lack of overview leads to negative consequences
- C Digitalization is expected to negatively change interactions
- D Existence of multiple time consuming workflows and fear for digitalization as a workload increasing factor
- E Apprehension and wariness towards digitalization
- F Many challenges accompany the implementation of digitalization
- G Lack of knowledge regarding digitalization
- H.1 Current situation: Room for improvement and better use of (digital) resources within the care process
- H.2 Current situation: Both positive and negative attitudes and expectations towards (the implementation of) digitalization
- I Digitalization offers possibilities and advantages
- J Demand for clever systems and more convenience and efficiency,

E.2 Second analysis



1. Expectations of negative change of interactions, and fear for digitalization as a workload increasing factor
2. A lack of knowledge increases feelings of apprehension and wariness towards digitalization
3. There is a lack of knowledge about the possibilities and advantages offered by digitalization
4. Digitalization offers possibilities and advantages that could mitigate the lack of overview
5. The lack of overview leads to time consuming workflows
6. The demand for clever, convenient and efficient systems should be taken into account
7. The existence of time consuming workflows creates a demand for clever systems and solutions
8. The lack of knowledge regarding digitalization should be taken into account when planning
9. Digitalization offers possibilities to make better use of (digital) resources within the company

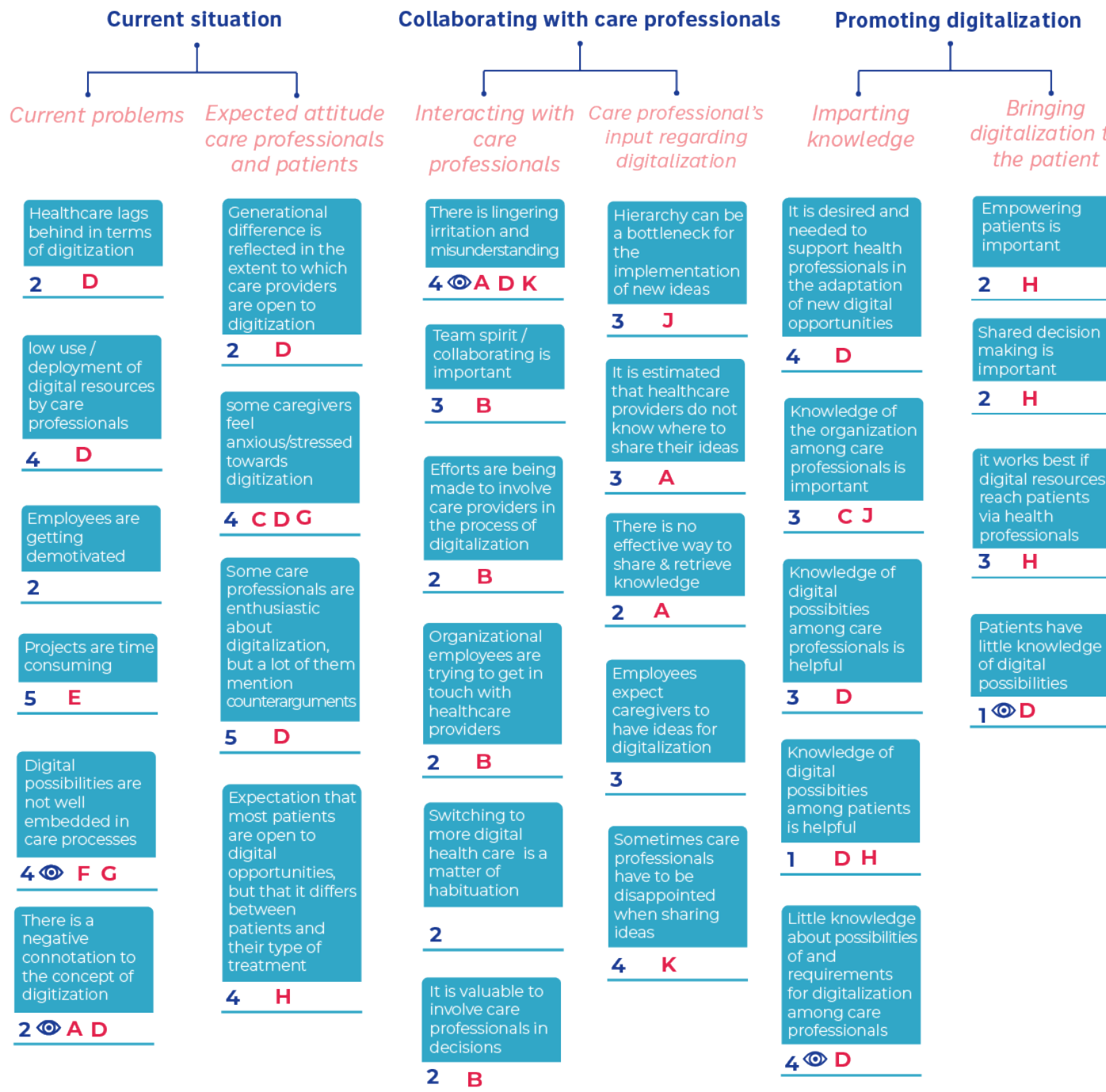


workload increasing factor lead to apprehension and wariness
 digitalization
 digitalization
 review and improve the current role and form of information
 count when implementing digitalization
 and more convenience and efficiency.
 n implementing digitalization
 care process

Appendix F |

Analysis of the interviews with organizational employees

F.1 First analysis



Legenda

Blue number Amount of organizational employees who said things about the statement



Seen during observations

Pink letter

Statement is classified under one of the following categories:

- A** There are problems in the communication between care professionals and organizational employees
- B** There is a need for more interaction with care professionals
- C** There is need for more overview in the process of digitalization
- D** More knowledge about digitalization is needed among care professionals and patients
- E** The limited capacity and amount of time have to be used in a smart and efficient way
- F** Digitalization will change the care process
- G** There is need for more overview in and understanding of care processes
- H** It is valuable to involve patients in decisions about the use of digital opportunities during their treatment
- I** There is lack of uniformity in the use of digital opportunities and carepaths among care professionals
- J** Digitalization is impeded by a complicated organizational structure and existing informal hierarchy

Implementing digitalization

Bottlenecks

Organizational structure impedes digitalization

4  J

There are difficulties in establishing contact with healthcare providers

3 A

low change readiness / difficult to change

5  D

External parties hinder digitalization

3

Difficult to embed digital possibilities in Chipsoft

1

It is difficult that digital resources will not be equally used by every patient

3 D

Care providers want digital resources that specifically match their care process

2 K

High work pressure among care professionals leads to a lack of time and energy to learn / implement new things

5  E

There are limited capacity and finances to digitalize

5 E

Important for new projects

It works best if projects are based on ideas/ requests from care professionals

3 K

Resources must be widely applicable/ important to make use of what is available

3 C E

Resources must be able to link to existing systems in order to fit the care process

4

Resources must be equipped with good security and privacy

2

Resources must be of added value for patient and care provider

1 H

The choice of a digital product should be based on a problem, not on it being a new product

2 K

Consequences of digitalization

Digitalization leads to changing responsibilities

2  J F

Replacement of healthcare is an aspect of digitalization

1 F

Process overview and organization

Creating overview and uniformity

There are various initiatives to try to keep an overview and collect knowledge about wishes of care professionals

1 B

There are differences between care professionals and departments

4  D

Care pathways are useful in digitization

3 C F G

Difficulties keeping overview in the digitalization and care processes

lack of overview in digitalization and care processes

3  C G

There is a need for more overview in the digitization process

3  C

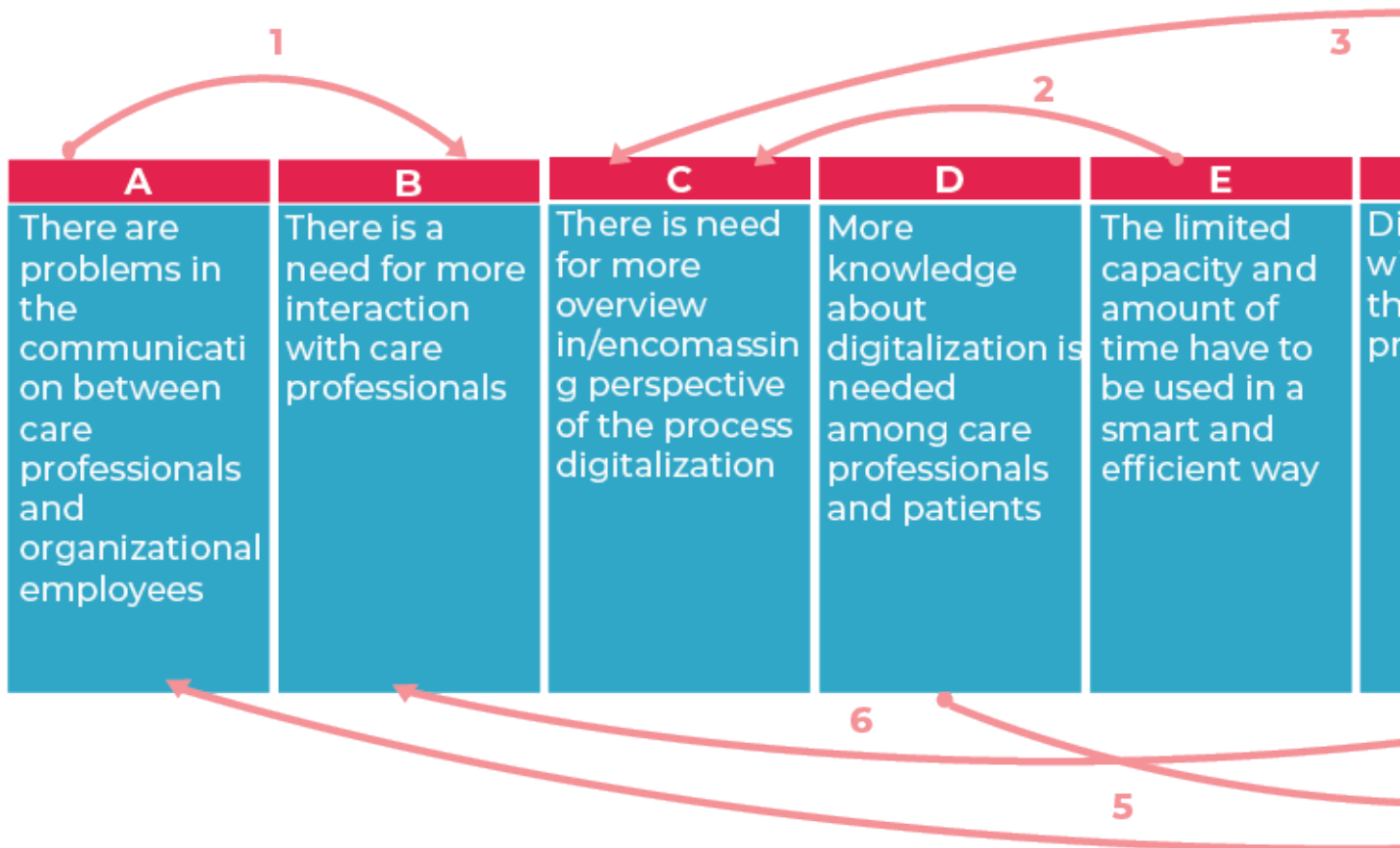
Uncertainty about the definition of a care path

1 I

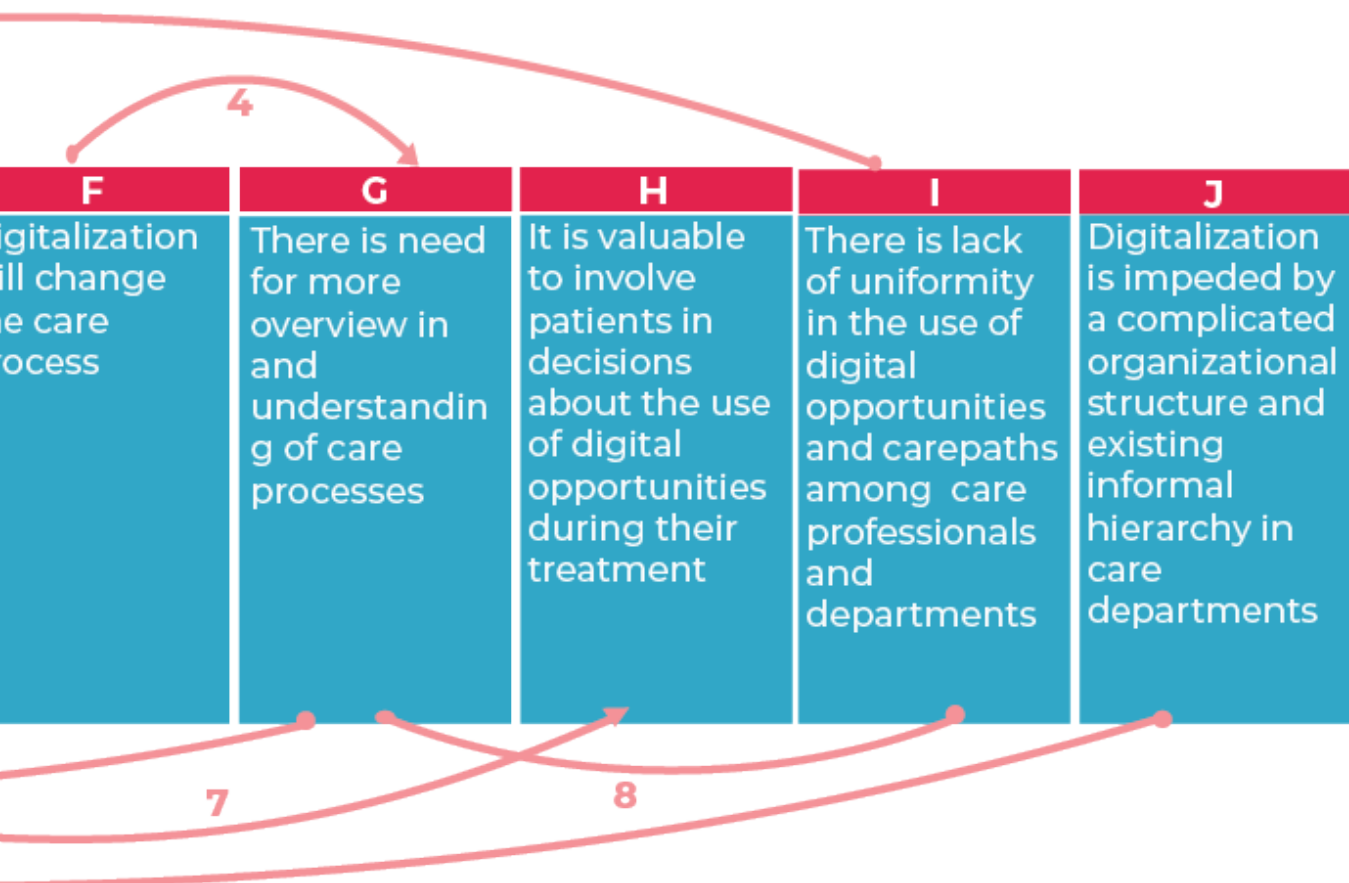
Lack of care pathways and adequate tool to build them

3 G

E.2 Second analysis



- 1.** More frequent interaction with care professionals can lead to better communication
- 2.** To use the limited capacity and amount of time efficiently, more encompassing perspective is needed
- 3.** Lack of uniformity in the use of digital opportunities and carepaths can lead to problems in communication
- 4.** Knowledge of care processes is needed to digitalise these processes with care professionals and patients
- 5.** The complicated organizational structure can lead to problems in communication
- 6.** More interaction with care professionals can help to create a better understanding of the process
- 7.** Since patients lack knowledge of possible digital resources, it is valuable to provide them with information
- 8.** More uniformity in care paths can help to create a better understanding of the process



communication between organizational employees and care professionals. F-G
 passing perspective of the digitalization process is needed.
 make it difficult to create clear overview in the digitalization process
 without interrupting the workflows during these processes.
 communication between care professionals and organizational employees
 understanding of care processes
 to involve them in decisions about the use of these resources.
 of care processes and therefore for

Appendix G |

Analysis of the interviews with patients

Digital resources			
Current use of digital resources	Attitude towards digital opportunities	Information provision	Interacting with care professionals
Self check-in kiosks are appreciated 5 B	Patients are enthusiastic about receiving digital reminders 5 D	Patients are content with the amount of information they receive 4 E	Patients prefer calling with care professionals over chatting (in some situations) 3
Patients are unfamiliar with the patient portal or do not use it. 4 A	Patients are interested in monitoring symptoms at home 5 D	Patients are oke with receiving (some) information via e-mail 3	Patients hesitate to call care professionals or to ask questions 2
Patients use digital devices at home, like Ipads or computers 5	Patients are open to or enthusiastic about videocalling instead of (certain) consultations 4 C D	Patients have difficulties remembering information 4 E	Patients prefer videocalls over normal calls 3
Patients do not know they can send e-consults 5 A	Patients would like to interact with care professionals via chat or e-mail 4 D	Patients like paper information 4	Patients prefer live consultations in person over videoconsultations 4 C
Patients are enthusiastic about the endoscopy information video 2 B C		Patients would like to receive some information digitally 4	
		Patients likes to know what to expect 4	
		Patients don't feel the need for information video's 4 C	
		Patients would like more informational video's 4 C	

Legenda

Blue number Amount of organizational employees who said things about the statement

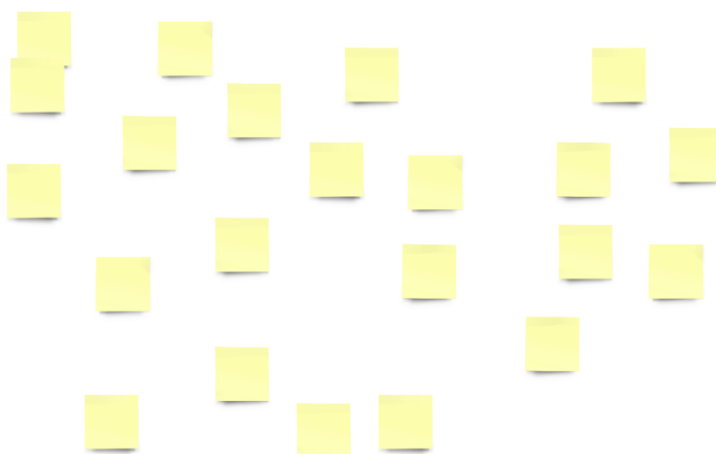
Pink letter Statement is classified under one of the following categories:

- A** Lack of knowledge about current digital resources available in the RdGG shows the need to educate patients on these opportunities.
- B** Once patients are familiar with digital resources, they are enthusiastic about these options
- C** Patients contradict themselves, showing it might be difficult for them to find out what they actually like/prefer
- D** Patients seem to be open to digital opportunities in the RdGG.

Appendix H | 'Miro exercises' created for the co-creation focus groups with organizational employees

Dit staat in de weg van digitalisering in de zorg / hier loop ik tegenaan:

1.

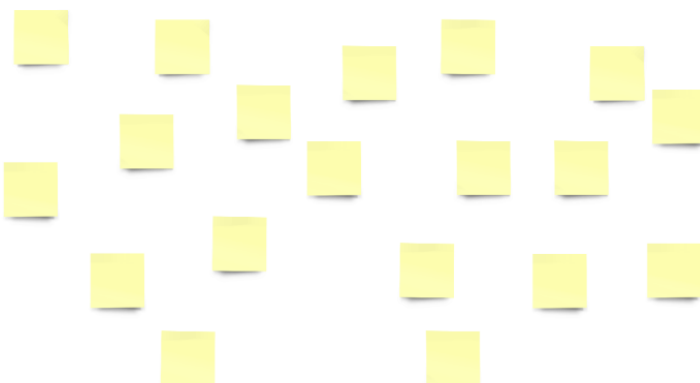


Sleep een duimpje naar een kaartje als je iets herkent



Dit kan helpen bij digitalisering in de zorg / dit zou ik fijn vinden:

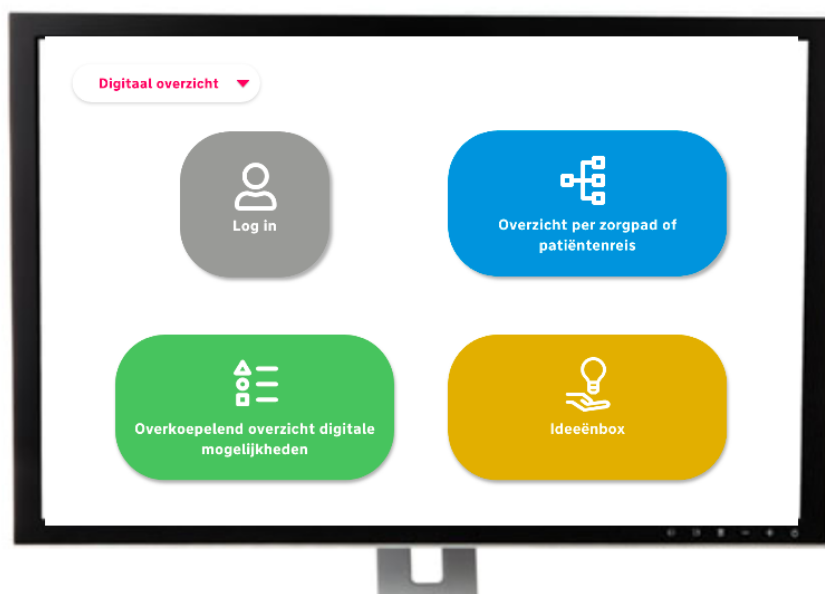
2.



Sleep een duimpje naar een kaartje als je iets herkent



3.



Als ik op de blauwe knop druk verwacht ik het volgende te zien en kunnen:

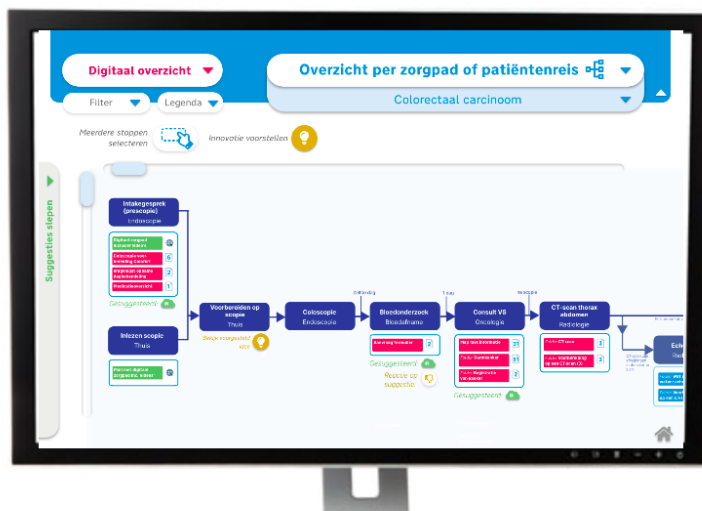


Als ik op de blauwe knop druk verwacht ik het volgende te zien en kunnen:



Als ik op de gele knop druk verwacht ik het volgende te zien en kunnen:

4.



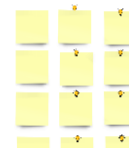
Dit vind ik goed



Hier zie ik een probleem

Dit begrijp ik niet/

Dit zou ik anders doen



Idee/suggestie

5.



Dit vind ik goed



Hier zie ik een probleem/

Dit begrijp ik niet/

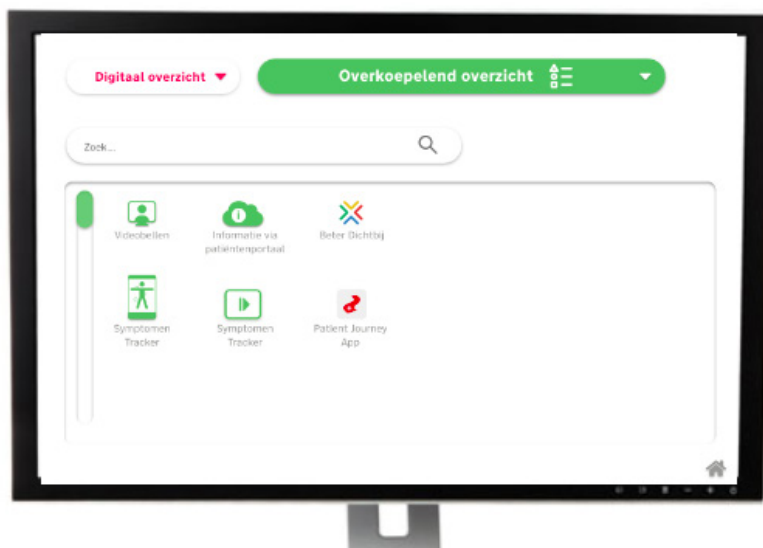
Dit zou ik anders doen

6.



Idee/suggestie

7.



Dit vind ik goed

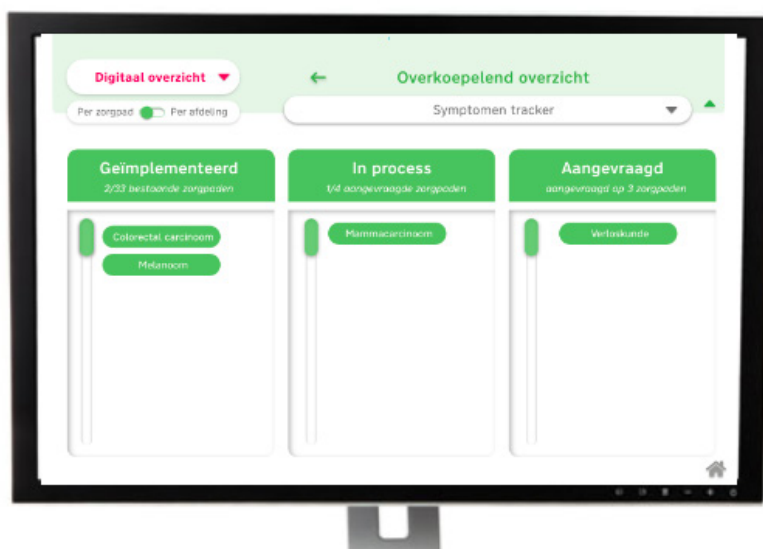


Hier zie ik een probleem/

Dit begrijp ik niet/

Dit zou ik anders doen

8.



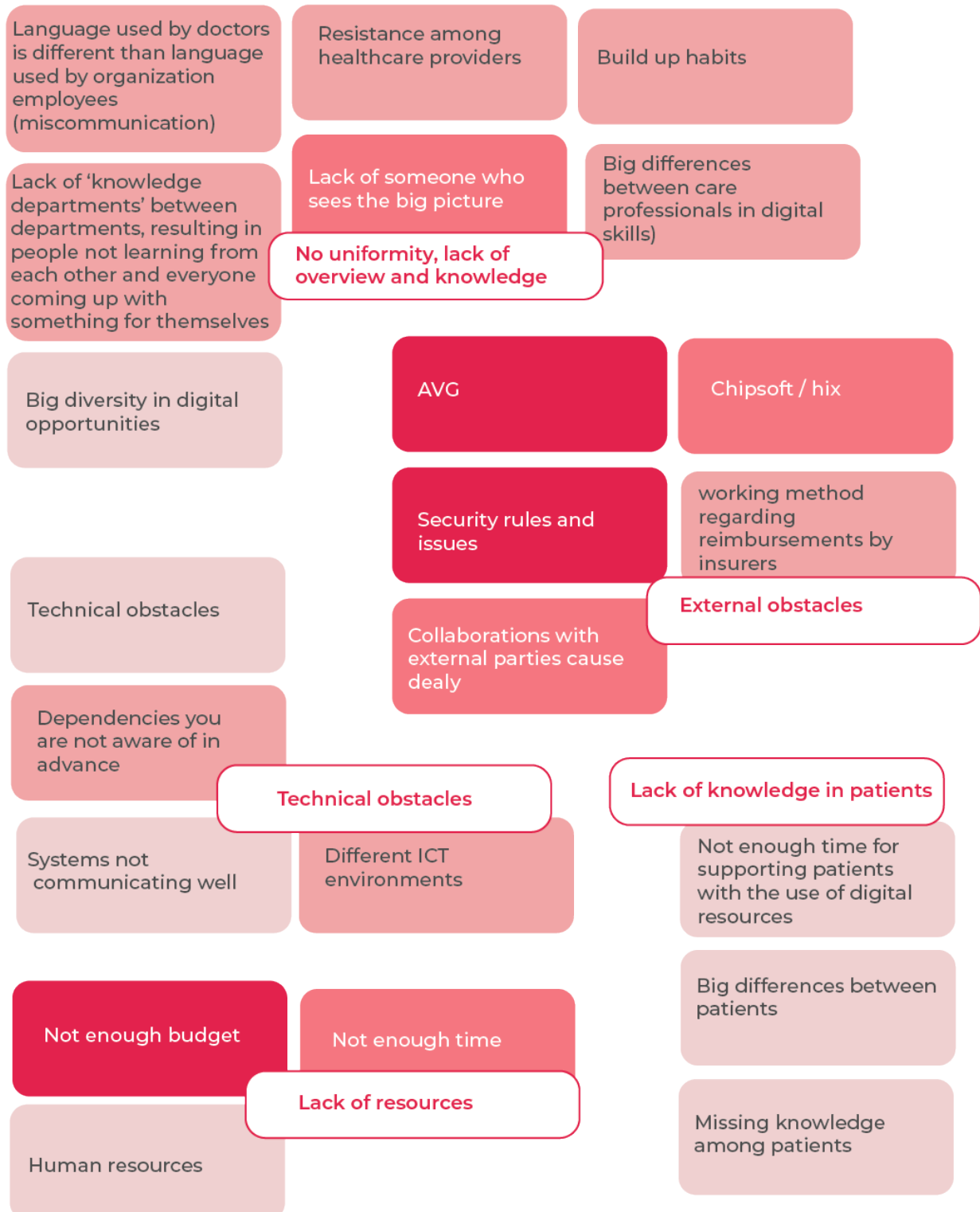
Idee/suggestie

Appendix I |

Focus groups with organizational employees

E.1: results of first exercise

Digitalization in healthcare is hindered by/ I run into the following:



Legenda

- Mentioned by one participant
- Mentioned by two participants
- Mentioned by three participants
- Mentioned by four or more participants

This can contribute to digitalization in healthcare/ I would like to see this:

Extra time during consultations for explaining digital resources

More patients who ask care professionals for digital opportunities

Better finances

Training users in their digital skills

Account holder I&I in the consultation room

Financial resources such as grants

Educating/supporting patients and care professionals

Finances

Servicedesk for patients

Clear vision within the hospital

Standardization and more uniformity

method that is used hospital-wide

Standardization of ICT

working together with partners, uniting forces

External aspects

Clearer priorities (also in governance)

National agreements

1 point of contact within the organization

Improved communication

Overview of all projects and what is being done

Sit down with all parties quicker and more efficiently

Central coordination, clear who is responsible for what

Overview and focus

A project planning

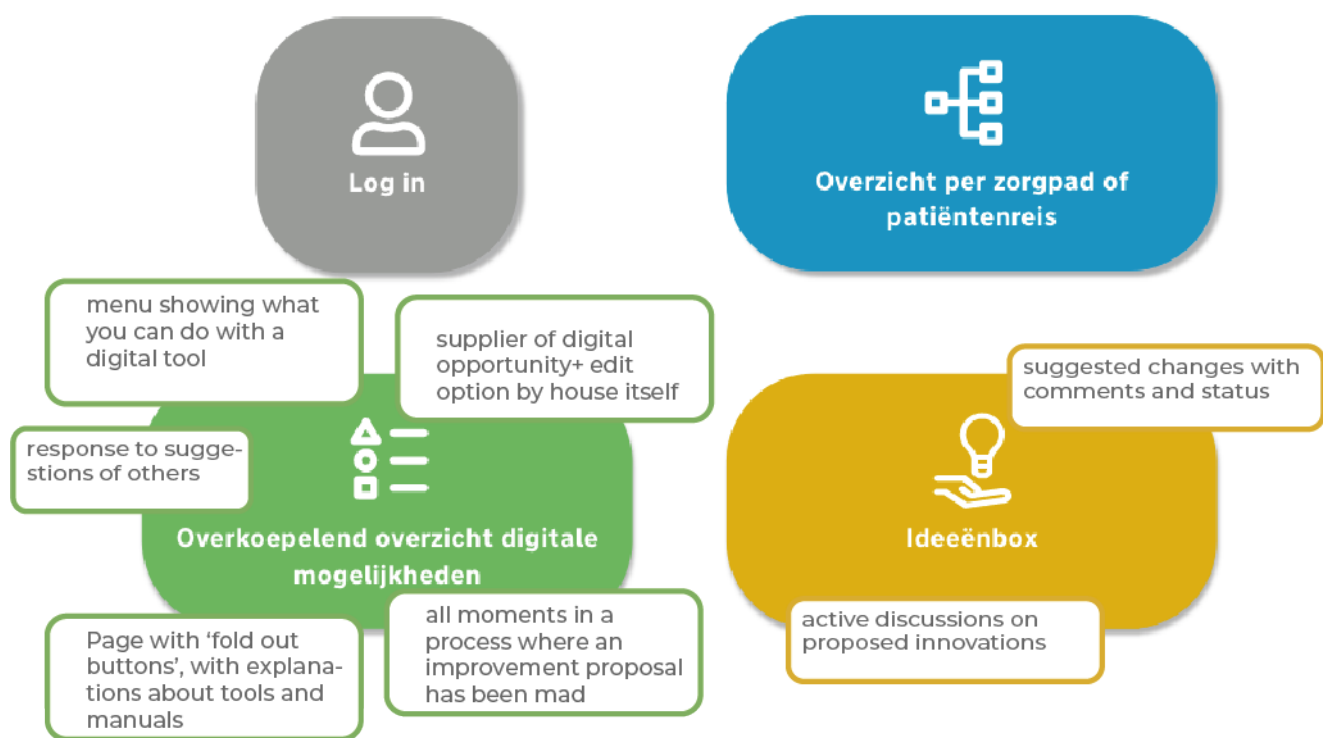
Creating a focus

More easy cross-linking systems

Specific ideas

Working with an as little amount of paper forms as possible

not only based on cost savings, but on quality of care

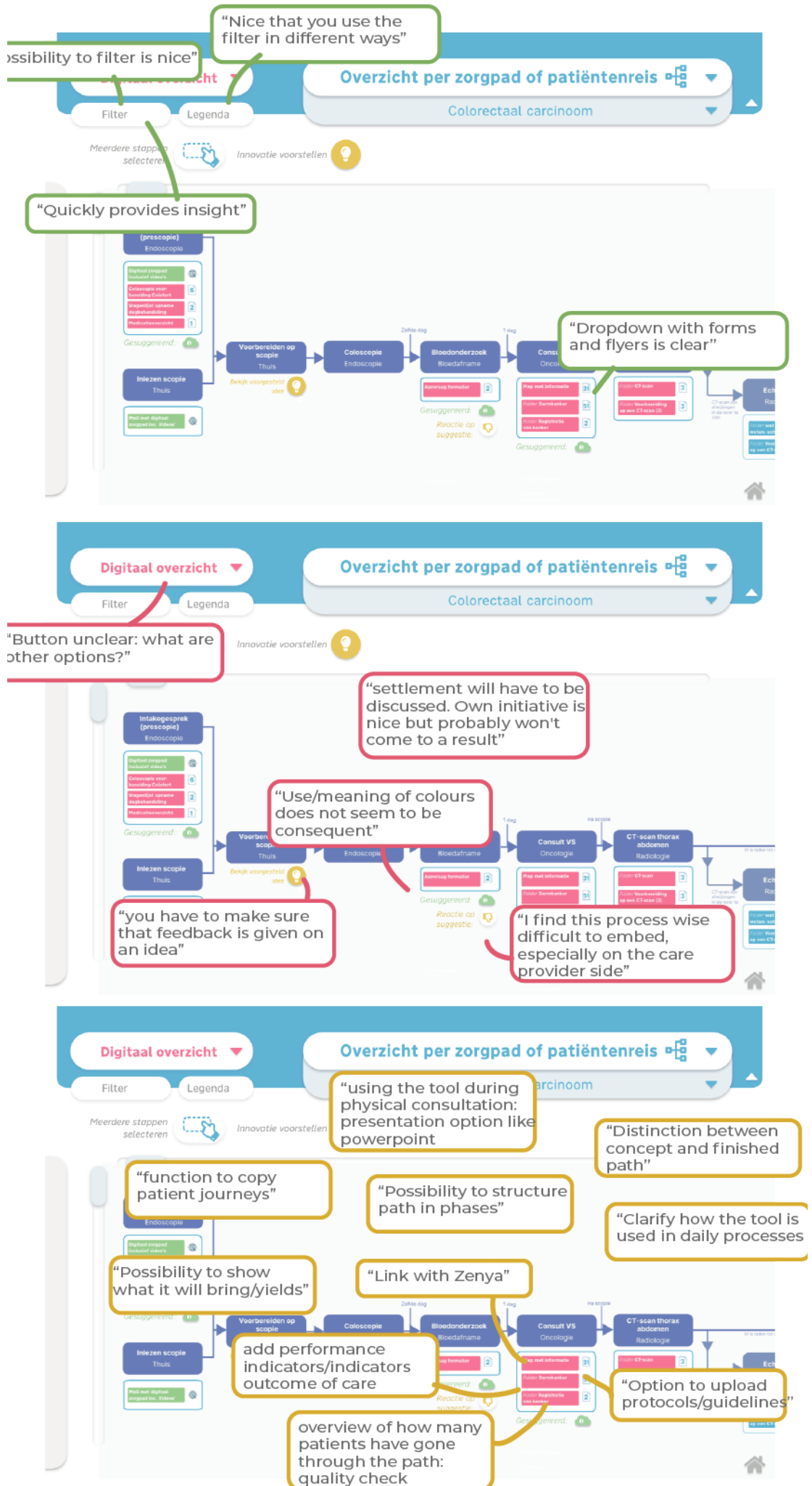


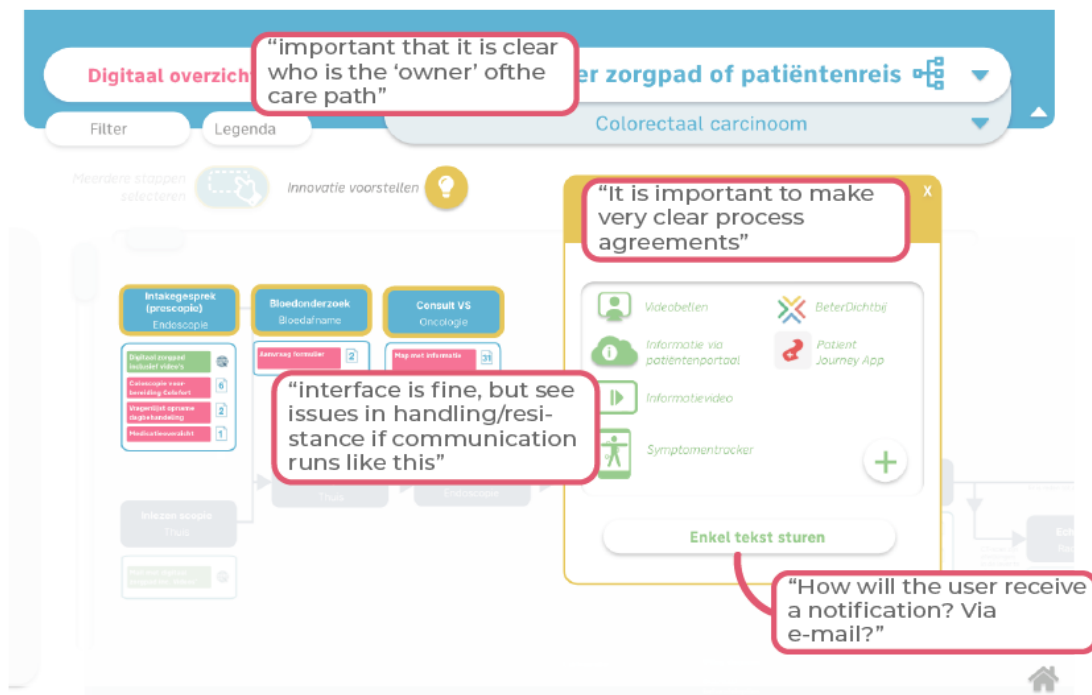
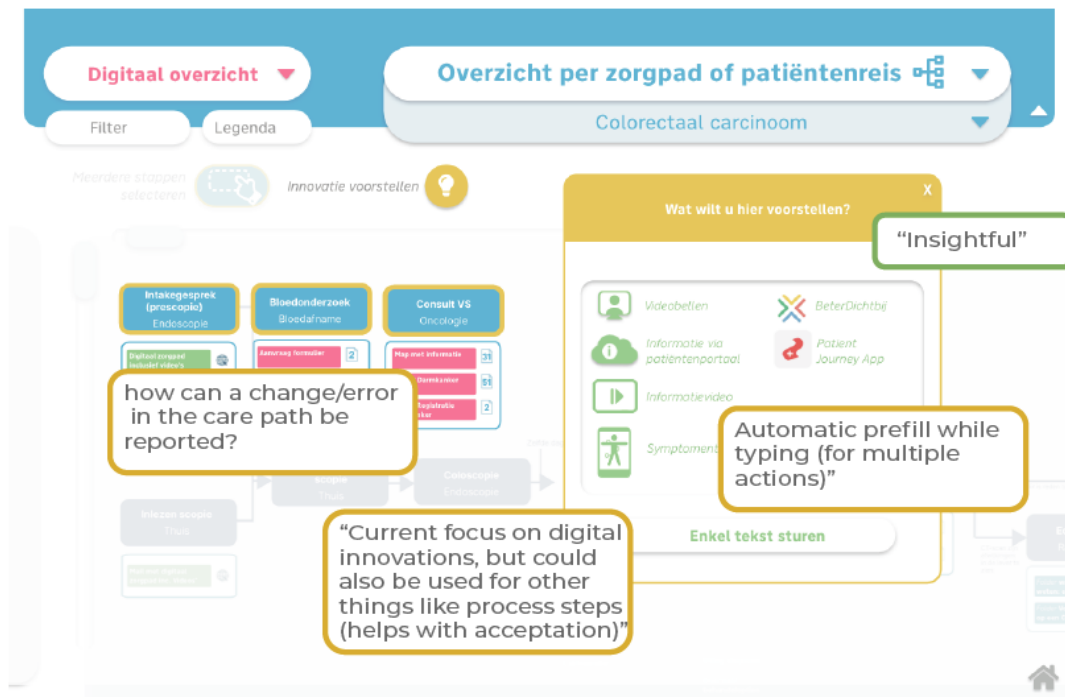
Participa

Participant has an

Participants envisions a prob

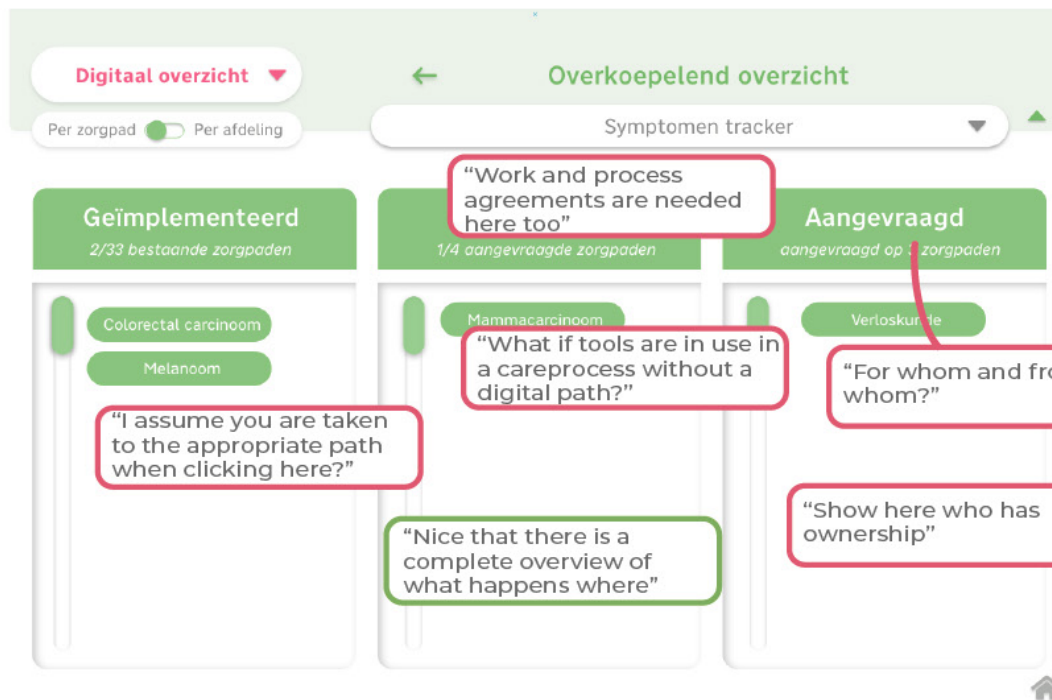
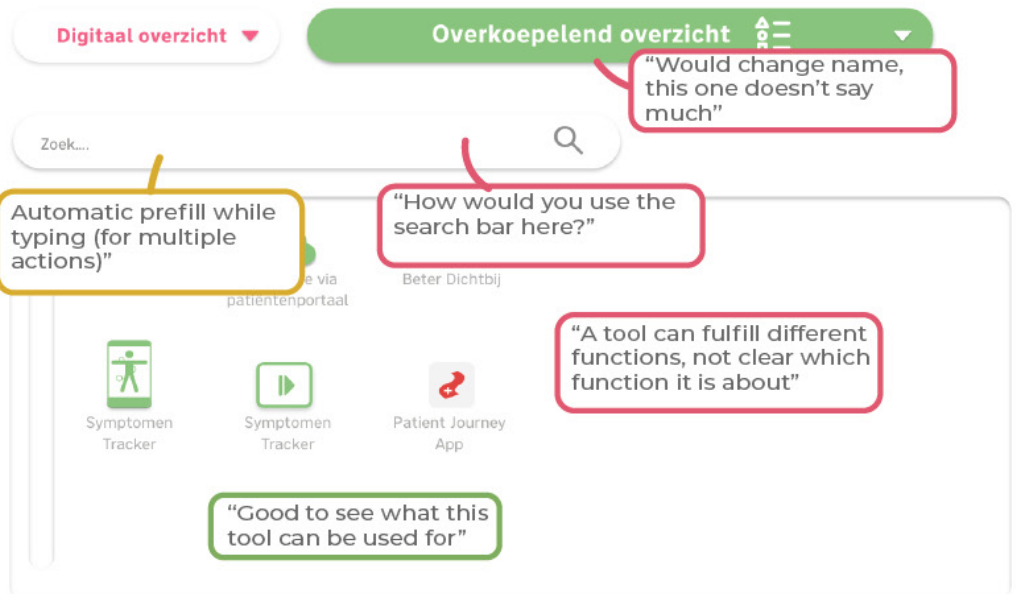
E.3: results of third exercise: evaluating the most important screens





Legenda

- Participant values something
- Participant has an idea or suggestions
- Participants envisions a problem / has a question



Personal Project Brief - IDE Master Graduation

Designing digital health care towards a smart hospital: Journey Mapping as a tool for digital transformation of health care

project title

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

start date 04 - 04 - 2022

16 - 09 - 2022 end date

INTRODUCTION **

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

In our current society, there is an ongoing trend of digitalization. As this process continues to evolve and grow, certain sectors such as hospitals cannot lag behind in the adoption of this trend [1]. Health care workers will (at least partially) meet patients in a digital world and digitalization can also be used to inform patients when they are not physically present at the hospital. However, getting digitally connected to patients can be a challenge for employees at the hospital and also for the patients themselves.

During this project, I will research what kinds of digitalization are currently used at the RDGG and how employees and patients experience this. Journey mapping will be used as a tool during this research. The results of this inquiries will lead to a future journey map, showing how to implement digitalization at the RDGG. Since there is a limited amount of time available, this research will focus on the department of colon cancer. This is a very interesting department to examine from a standpoint of digitalization, since patients with colon cancer are often elderly [2], who interact with technology differently than young people [3]

The project consists of two stages. The first stage is the research stage, as described above. The second stage will consist of designing a solution to a bottleneck or opportunity found in the patient journey and will depend on the first stage. An example of a potential solution could be designing a digital product to improve the experience of patients with colon cancer and their healthcare professionals.

Multiple different stakeholders are involved: First and foremost; the patient. What phases does the patient go through and how does the patient experience these? Will the integration of digital products and/or services improve the experience of the patient? And what is important from the patient's point of view when designing digitalization?

Other stakeholders are healthcare professionals. Can digital transformation be of help when improving their experience of interacting with patients? Does this differ between different kind of care professionals?

The secretarial staff could also be a potential stakeholder. Can digitalization help to improve the interaction and organizational efforts between the secretaries and patients?

In addition, family and friends of patients could be stakeholders. They can join visits to the hospital or assist patients when using digital products/services at home.

And lastly, the managers in the hospital. Do they see value in digitalization, and why (not)?

The main opportunity in this project is that there is currently only little digitalization implemented at the department of colon cancer, but patients have indicated that they would like to see more digital products/ services. A limitation is the average age of patients with colon cancer. Some aspects of digital products/ services can be difficult to understand and use for elderly patients, which can complicate the implementation of digitalization. Furthermore, change costs money, which can be a limitation. However, I still have to discover this during conversations with staff in the hospital (especially the managers).

1. Mishon, E. V., Sokolov, A. A., & Breslavtseva, N. A. (2019, April). Analysis of healthcare digitalization trends and tools for their implementation. In Institute of Scientific Communications Conference

2. Eijdsen, P., Mevius, L. Zaat. J. (2015). Bevolkingsonderzoek naar darmkanker. Ned Tijdschrift voor geneeskunde, 159.

3. Vaportzis, E., Giatsi Clausen, M., Gow, A. J. (2017). Older adults perceptions of technology and barriers to interacting with tablet computers: a focus group study. Frontiers in psychology, 8

Personal Project Brief - IDE Master Graduation

introduction (continued): space for images



image / figure 1: Logo Reinier de Graaf (RDGG)

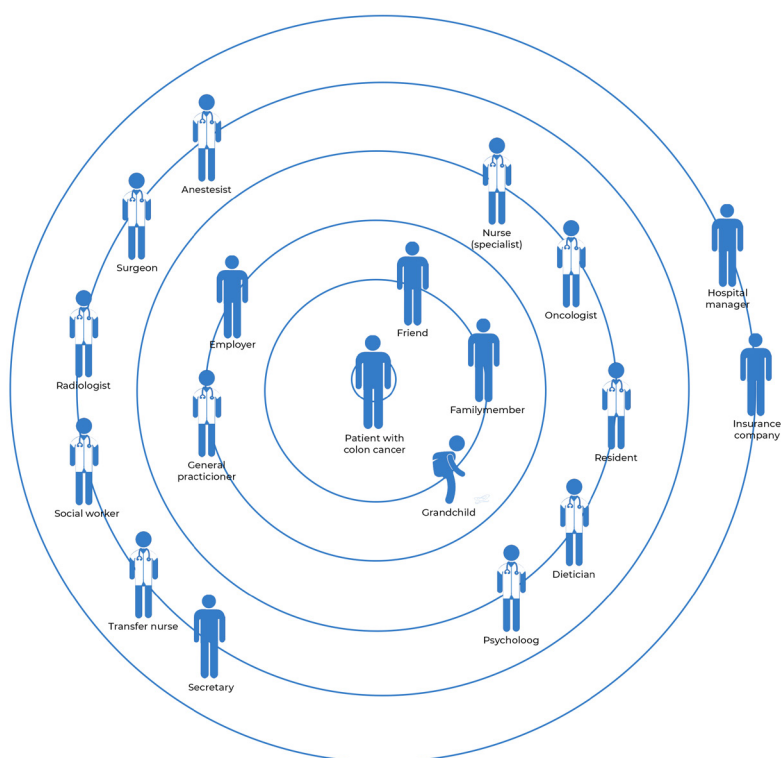


image / figure 2: First draft: overview of stakeholders

PROBLEM DEFINITION **

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

The scope of this project is to:

1. Use journey mapping in order to explore how patients with colon cancer and their healthcare professionals currently experience the care process and if/in what way digitalization can be used to improve the experience of patients with colon cancer and their doctors/nurses.
2. Translate the findings into a design brief and develop a digital product/product-service combination that improves this experience or a tool to implement digitalization. This will depend on the outcomes of the patient journey.

The issue(s) that will be addressed are the following:

1. Mapping the process patients with colon cancer go through in the Reinier de Graaf Gasthuis.
2. Analyzing how these patients and their doctors/nurses experience these steps, focusing especially on digital products/services that are available or missing; identifying barriers and opportunities for improvement.
3. Choosing a barrier or opportunity to design for.
4. Design a digital product, product-service combination or tool for digitalization.

ASSIGNMENT **

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

I will research how digitalization can be used to improve the experience of patients with colon cancer and healthcare professionals they interact with at the RDGG. During this process I will create (a new version of) a patient journey map and use this tool to analyze if, and how digitalization can be best used. Using the knowledge gathered during my research, I will design (a part of or a tool for) this digitalization.

PLANNING AND APPROACH **

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start date    4    - 4    - 2022
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16 - 9 - 2022

end date

Research & first ideas

Concept development

Week	1 4 – 8 apr.	2 11 – 15 apr.	3 18 – 22 apr.	4 25 – 29 apr.	5 2 – 6 mei	6 9 – 13 mei	7 16 – 20 mei	8 23 – 27 mei	9 30 – 3 juni
Literatuuronderzoek									
Opstellen onderzoeksvragen/doelen									
Colorectale kanker									
Patient journey									
Digitalisering zorg									
Opstellen zorgpad colorectale kanker									
Meelopen gesprekken									
Online onderzoek									
Design zorgpad									
Creatie stakeholdermap									
Ontwerpen patient journey									
(Laagdrempelige) Interviews met zorgverleners									
Ontwerpen eigen versie 'sensitizing toolkit'									
Benaderen patiënten en opsturen toolkit									
(Online) interviews met patiënten									
(Laagdrempelige) interviews met stakeholders									
Creatie journey map									
Review met stakeholders (focus group)									
Beoordeel knelpunten en kansen voor digitalisatie									
Creëer lijst van evaluatie criteria									
Eerste digitale product/tool ideeën									
Brainstorm									
Co-creation met andere IO studenten									
									</

MOTIVATION AND PERSONAL AMBITIONS

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

The principal reason I chose to work on this project is my years-long interest in, and fascination of the medical field. Thinking of my career path, I can envision myself working in, or collaborating with people in this sector. I believe there is an interesting opportunity to incorporate my area of expertise into this project, since to me it seems like there is room for improvement when looking at digital integration in hospitals; both in terms of accessibility and ease of use. I feel like doing this project could result in something meaningful and useful for the patients, caregivers, and employees.

I have recently completed an internship at the Hematology department at the Erasmus MC – Sophia Kinderziekenhuis. The experience of working in the Hematology department reaffirmed and increased my interest in working on topics that involve healthcare. Furthermore, not only did the internship provide me new perspectives, the internship also showed me the challenge of working as a designer in a healthcare environment. Although I know there are obstacles to overcome I hope that I can inspire healthcare specialists by showing them different ways of looking at healthcare processes.

During this internship, the focus was primarily on children; something I enjoyed. During this graduation project, I aim to find out if I also enjoy working with elderly and expand my understanding of more facets of the healthcare environment.

In addition, I found that I greatly enjoyed courses that where (partially) focused on designing digital products (like Interaction & electronics and Product Understanding, Use & Experience during my studies. This graduation project offers me the opportunity to further explore this interest.

Throughout my masters and internship I have become more interested in journey-mapping and I am eager to explore if I can take the implementation of this tool to a 'new level'. I have already noticed that journey-mapping is becoming an increasingly popular tool, not only in the business world, but also in healthcare. Therefore, I think it is a valuable skill to have and to develop.

I would also like to improve my communication skills. When saying this, I do not intend to only practice giving clear presentations, but also develop my capabilities when interviewing and communicating with patients and colleagues. I aim to improve in working and communicating with different stakeholders, who have and represent different interests.

To summarize, I would like to find out if I would like to start working in a hospital after graduating, or if I would prefer working for a company that collaborates with or supports hospital staff and activities.

FINAL COMMENTS

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