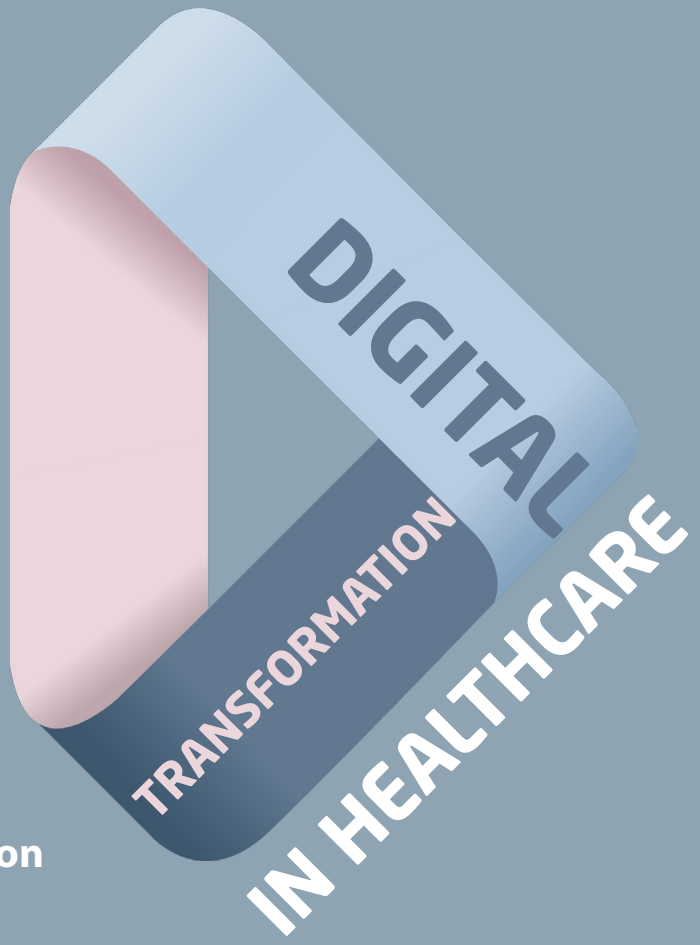
Digital transformation in healthcare

Designing an intervention to facilitate the implementation of the BgZ by bridging the gap between healthcare & policy.



Master Graduation Project - Lisa Kroon
Integrated Product Design - Medisign

TU Delft | Reinier de Graaf | Ministerie van Volksgezondheid, Welzijn en Sport

Towards a human-centred digital healthcare system

Delft, February 2024

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for the purpsoe of obtaining the degree of Master of Science.

A unique cooperation

A unique cooperation between the TU Delft, Reinier de Graaf Hospital and Ministry of Health, Welfare & Sport is created to research the implementation of digital information exchange within the Dutch Health Care system, looking at the interaction between physician and patient as a part of a large and complex ecosystem, to design an intervention that contributes to the bigger picture of the solution.

This trinity is required to fight the many problems we are facing today and to keep improving and innovating the health care system for the future.

TU Delft | Reinier de Graaf | Ministerie van Volksgezondheid, Welzijn en Sport

“The biggest part of our digital transition is changing the way we think.”

Acknowledgement

I would like to express my deepest gratitude to everyone who contributed to the completion of this graduation project and thank you for taking the time to read this graduation report.

Nevertheless, after a wonderful time within the healthcare ecosystem, especially within the Reinier de Graaf Gasthuis and at the Ministry of Health, Welfare and Sport, this project comes to an end.

Completing this master thesis has been a profound journey, and it is with a heartfelt sense of accomplishment and gratitude that I bring this project to an end. The support, encouragement, and shared moments with all those involved have made this endeavor not only academically rewarding but also personally fulfilling. This project represents not just a scholarly achievement but a shared accomplishment that I am proud to conclude. Thank you to everyone who has been part of this journey; your contributions will be cherished as I embark on new endeavors.

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Above all, I express my deepest gratitude to my parents, Ronadl & Anita. Thank you for your eternal trust and support. Without your belief in me, I wouldn't be standing here today. Throughout my entire life, you have been my pillars of strength, guiding me with love and attention to become the person I am today and help me achieve my goals and dreams. Your influence has shaped my journey, and I am forever grateful for the endless encouragement you have provided. Furthermore, my sister Nadine, who understands me without saying one word and never doubt my abilities. Because of you I will always keep going, because you are my greatest role model. Last but certainly not least, my boyfriend Pieter. Your unwavering faith in me and your loving support carried me through this project. When I was on the verge of giving up, you provided the strength to persevere. Every day, we learn from or complete each other. This project wouldn't have been possible without you.

Sincerely, I want to thank myself for always persevering and never giving up. You have proven yourself, which has been your goal since primary school. Never doubt yourself again and embrace yourself for who you are and what you are capable of, with all your imperfections. This will provide you with power and courage on your next endeavors.

Glossary

- **BgZ**

  Basisgegevensset Zorg/ Basic patient dataset

- **Implementation of the BgZ**

  The adjustment and adaptation of the current organization of digital information exchange towards the described legislative framework of the Wegiz to be able to exchange the BgZ

- **Interoperability**

  The ability of computer systems or software to exchange and make use of information by interpreting incoming data and presenting it real-time without limits.

- **IZA**

  Integraal Zorgakkoord/ Integral Healthcare Agreement

- **Journey map**

  A visualized illustration to showcase a holistic view of the steps taken by a user within a specific process and the involved activities, experiences, and interactions.

- **Legislative framework**

  A law that regulates general principles, responsibilities and procedures, but does not contain detailed rules.

- **Organizational employee**

  Employees that have a supporting and managing role within RdGG to manage the operational process of digital information exchange to facilitate the processes of patient care.

- **PGO**

  Persoonlijke gezondheidsomgeving/ Personal healthcare portal.

- **Policymakers**

  Employees of the Ministry of Health, Welfare and Sports

- **RdGG**

  Reinier de Graaf Gasthuis/Renier de Graaf Hospital

- **Transmural digital information**

  Digital information is exchanged between healthcare providers (“through its walls”).

- **VWS**

  Ministerie van Volksgezondheid, Welvaart en Sport/ Ministry of Health, Welfare and sports

- **Wegiz**

  Wet elektronische gegevens-uitwisseling in de zorg/ Act electronic information exchange in healthcare

Executive summary

Problem definition

The healthcare sector faces escalating pressure due to its current inefficient practices in digital information exchange. The Integral Care Agreement (IZA) from the Ministry of Health, Welfare, and Sport (VWS) and overarching healthcare organizations is focused on creating a future-proof healthcare system. The Wegiz, introduced within the IZA, outlines standards for electronic data exchange among healthcare providers, with the focus on the Basic Dataset for Care (BgZ). However, the implementation of BgZ faces challenges, as insight in the influencing factors and facilitating interventions are limited.

Research outcomes

This research addresses this gap by employing literature reviews, (semi-structured) interviews, observations, and a thematic analyses within the healthcare ecosystem, specifically focused on the experience of medical specialists with the current organization of digital information exchange, to identify the factors affecting the BgZ implementation. A critical finding reveals a disconnect between macro-level legislation and micro-level healthcare practitioners, resulting in an oversight of the human aspect in decision-making and communication of changes. Furthermore, VWS encounters challenges in effectively engaging the target audience, according to medical specialists and organizational employees, leading to various disadvantages, including negative experiences with legislatively driven developments and a lack of awareness among healthcare professionals regarding BgZ and their pivotal role in the transformation. Furthermore, the limited awareness for standardization among specialists and the time and efficiency constraints are additional factors to be taken into account. Although, legislation is obliging interoperability between systems on a technical level, including the human aspect to evoke behaviour change towards standardization is currently limited. The cultural factors of the medical environment are challenging as well as autonomy and hierarchy is deeply rooted, which may influence the attitude towards change.

Design goals

The study emphasizes the need to involve healthcare professionals, starting with the first step of engaging physicians in the change process. To address this, a serious game has been developed with the primary goal of raising awareness about the urgency of BgZ implementation and encouraging active participation and collaboration by provide positive experiences of the opportunities the BgZ includes. The game, evaluated through sessions with the target audience, has proven to be an effective intervention, achieving its set objectives.

Recommendations

As a recommendation, the game should be implemented in an interdisciplinary manner, involving physicians, assistants, IT personnel, organizational staff, and policymakers. This approach aims to connect perspectives and foster collaboration. Ultimately, the game serves as a tool to bridge the gap between policymakers and healthcare practitioners by providing insights into each other's perspectives, fostering a collective and collaborative approach towards successful BgZ implementation.

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II
III
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Basisgegevensset Zorg
Patiënt 23675
Diagnoses
Medicatie

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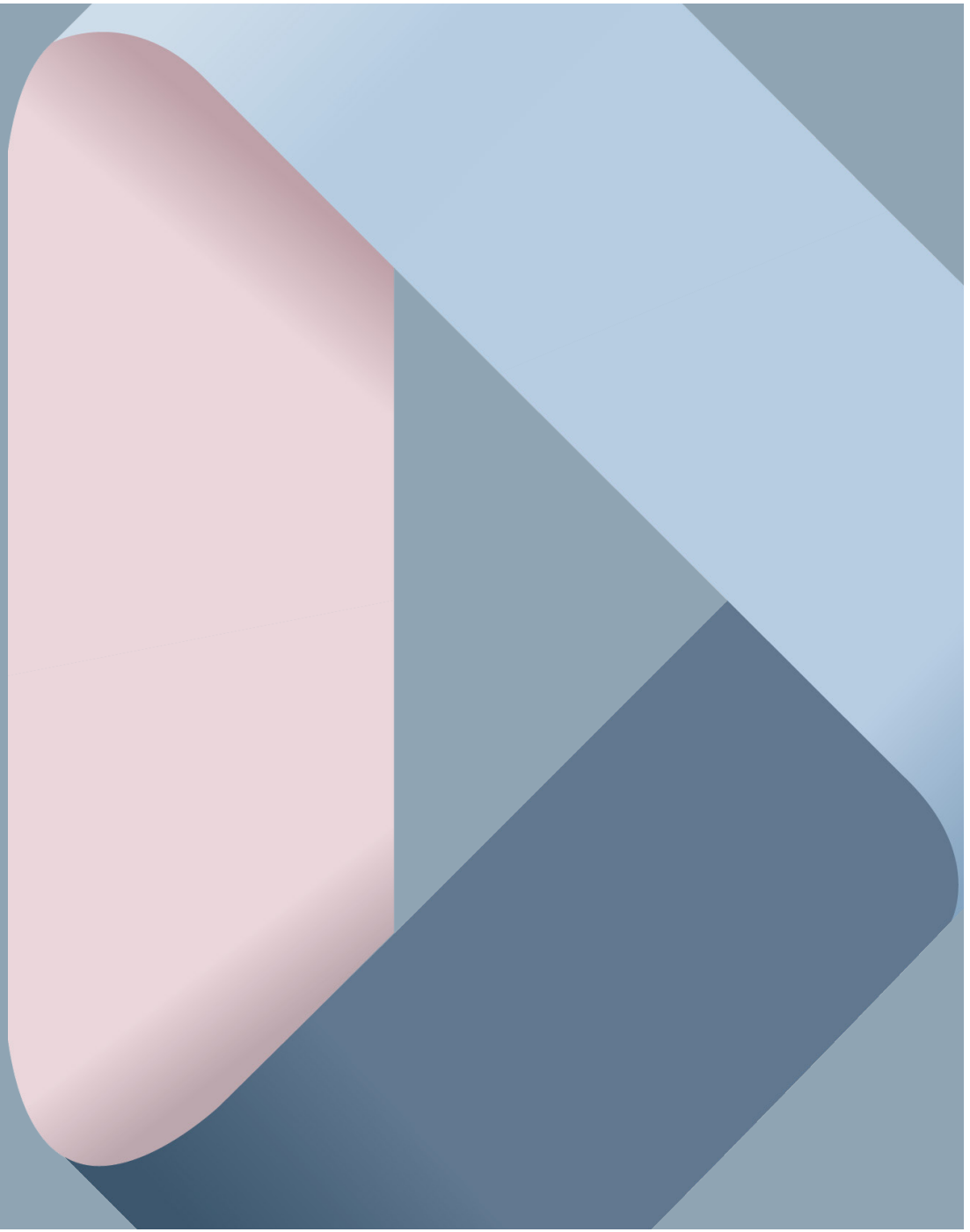
Chapter 0

Introduction

In this chapter, the project is introduced with a general description of its background and foundation (project foundation). Thereafter, the problem underlying the project and the aim of the project are defined (Problem definition & Project aim), and the scope of the project is delineated (Project Scope). Lastly, the project approach and research methods are presented (Project approach & research methods).



Project foundation

The current healthcare system is under tremendous amount of pressure, due to increasing healthcare consumption, which will continuously increase in the future due to ageing population and the amount of chronically ill patients. A growing shortage of (human) resources is the result, which will lead to a higher workload for caregivers (VWS, 2023) (Sterenborg, 2023). Consequently, a transition is needed to maintain a sustainable and efficient healthcare system. Therefore, the Integral Healthcare Agreement (IZA: Integraal Zorgakkoord) is created. Pursuant to this agreement, the start of a digital transformation is initiated by adopting new legislation: Act of electronic data exchange in healthcare (Wegiz: Wet elektronische gegevensuitwisseling in de zorg). Under this act, healthcare providers are obligated to exchange information electronically. The specific set of data that needs to be exchanged electronically is described in the Basic Patient Dataset (BgZ: Basisgegevensset Zorg). The aim of this legislative framework is to safeguard the continuity of patient care and to provide high-quality care, by bundling information and ensuring that a complete and up-to-date patient data set is readily available to all healthcare providers. (VWS, 2023).

In order to facilitate the implementation of this legislative framework, Reinier de Graaf Hospital (RdGG: Reinier de Graaf Gasthuis) and the Ministry of Health, Welfare and Sports (VWS: Volksgezondheid, Welzijn en Sport) have set up an initiative together with the Delft University of Technology (TU Delft) to conduct research in this regard. The objective of this initiative is to align the perspective of the healthcare providers and policymakers for the successful implementation of the aforementioned framework, and the BgZ in particular. As part of this initiative, research is conducted from the perspective of the healthcare providers (bottom-up) and from the perspective of the legislator (top-down). This project, which falls within the scope of this initiative, has a bottom-up approach (figure 1), and is conducted within the organization of RdGG. The scope of this project is further delineated in the next paragraphs.

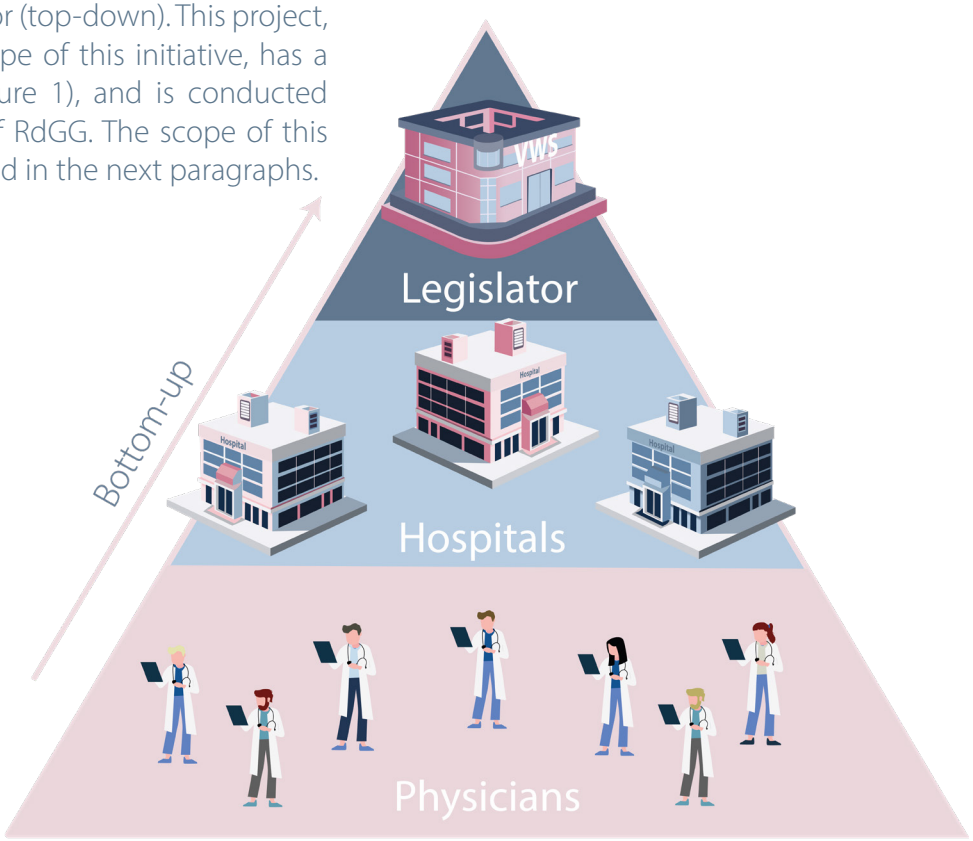


Figure 1. Bottom-up approach: from the perspectives of healthcare providers to the legislator

Facilitators

The Reinier de Graaf Hospital and the ministry of Health, Welfare and Sport facilitate the research environment and the necessary resources for this project.

Reinier de Graaf Hospital

RdGG is the oldest hospital in the Netherlands, that exists since 1252 and currently holds 200 medical specialists within various departments. Innovation is an important topic in the hospital, and this is the reason for their collaboration with the government to improve healthcare. They believe that embracing innovation can enhance care in terms of safety and efficiency. This improvement is not solely attributed to technology but also involves process optimization solutions. (Reinier de Graaf, z.d.)

Ministry of Health, Welfare and Sports

VWS has formulated goals regarding digital information exchange within the IZA. As part of the IZA, the Wegiz has been introduced that obliges digital information exchange following legislative boundaries. The BgZ is one of those boundaries that holds the minimal most relevant information of a patient, which needs to be exchanged between healthcare providers regarding patient referral from hospital to hospital. (VWS, 2023)

To ensure these legislative frameworks are meeting the requirements of the healthcare providers, their desire is to closely work together with healthcare professionals. Lastly, European legislation about digital information exchange is being developed, and therefore this collaboration is also desired.

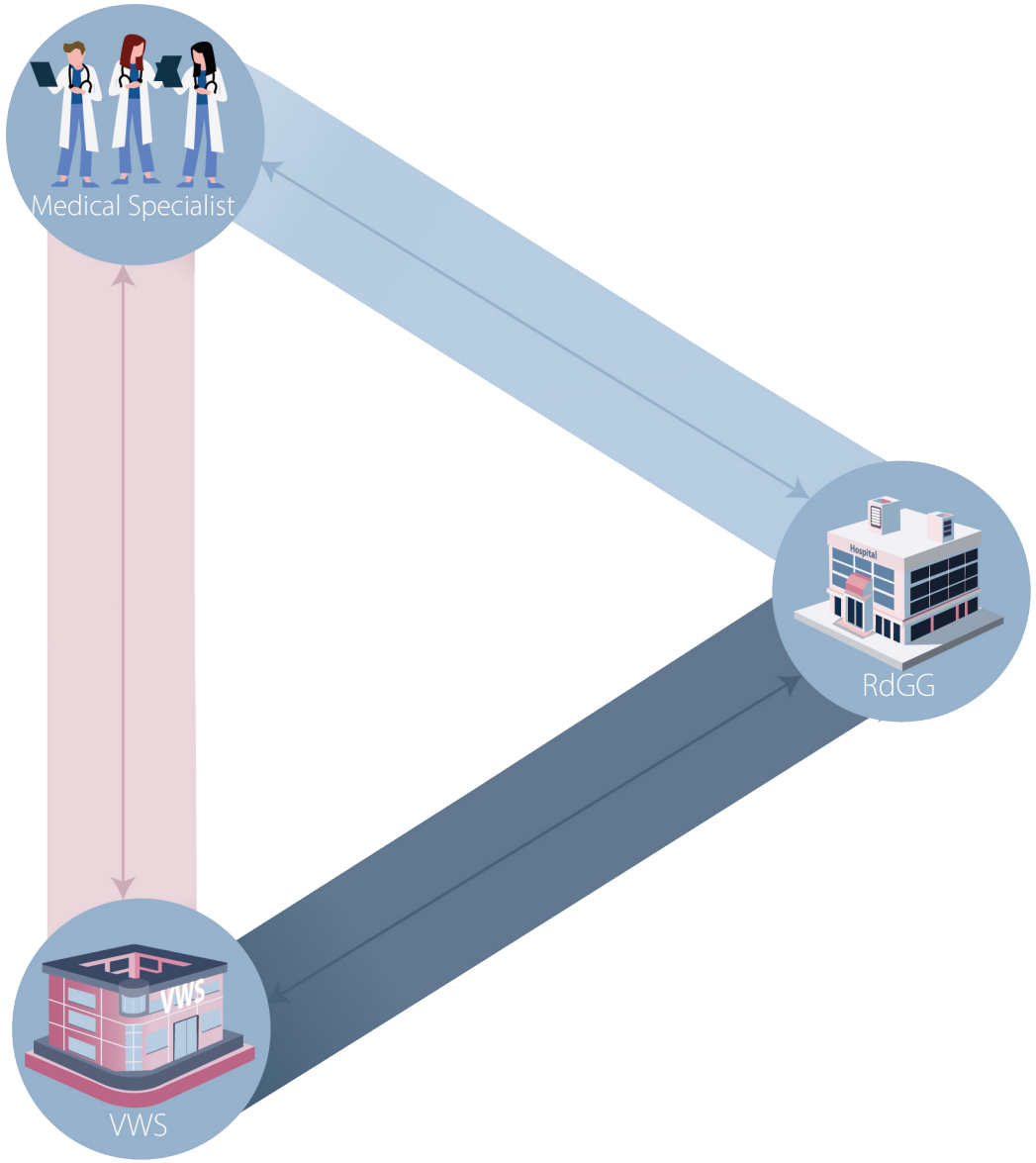


Figure 2. Primary stakeholders

Problem definition & project aim

Problem definition

As set forth in the first paragraph, this project is conducted within the broader objective of aligning perspectives between healthcare providers and policymakers for the successful implementation of the BgZ, in accordance with the IZA and Wegiz. Policymakers aiming to develop legislative frameworks that resonate with the needs and experiences of healthcare professionals could benefit from gaining insights from the experiences of medical specialists in digital information exchange. Currently, however, the factors that influence the implementation of the BgZ within the medical environment are not clearly defined and therefore not fully known to the policymakers.

Project aim

In this context, the aim of this project is to identify which factors could influence the upcoming implementation of the BgZ in the medical environment, and to design an intervention with regard to such factors in order to facilitate the implementation of the BgZ. By fostering collaboration between policymakers and healthcare professionals, this project may help to enhance the overall healthcare system, contributing to improved physician-patient interactions. This initiative is in line with the Wegiz and BgZ development by VWS, working towards the broader objective set forth above and the objective outlined in the IZA. In short, the project aim can be described as follows:

Identify the factors that could influence the upcoming implementation of the BgZ in the medical environment, and to design an intervention with regard to such factors in order to facilitate the implementation of the BgZ.

Project scope

This project explicitly focuses on the implementation of the BgZ, as part of the Wegiz. It is important to note that the BgZ included in the Wegiz is not yet an active legislative framework, which means that this project is focused on the current organization of transmural digital information exchange to identify factors that may influence the future implementation of the BgZ. Transmural means that the relevant data set is exchanged between healthcare providers and institutes (i.e. "through the walls"). Since the research is conducted within the RdGG, which is a secondary care institute, the scope of this research is in principle limited to transmural exchange of information between secondary care institutions (figure 3).

As medical specialists are receiving the most patients that visit hospitals, they are overseeing a substantial volume of transmural (digital) information exchange, which may provide valuable insights in the experiences with, and organization of, digital information exchange to identify bottlenecks and opportunities for the implementation of the BgZ. Therefore, the research conducted as part of this project focuses on the medical specialists during consultation with patients within RdGG. To get a more complete overview of the organization of transmural digital information exchange, persons who are directly involved with the medical specialists are also taken into consideration (patients, general practitioners, and organizational employees). Figure 4 illustrates provides a visual representation of both the project's scope and the structure of the healthcare ecosystem observed during this research.

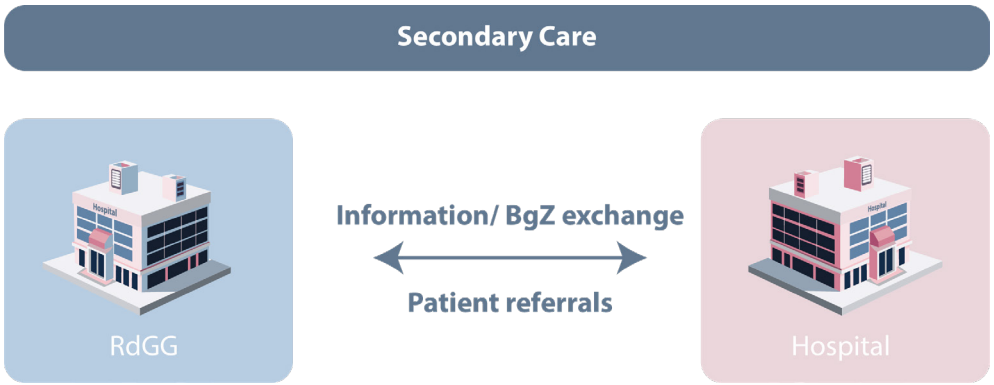


Figure 3. Exchange of BgZ between secondary care institutions

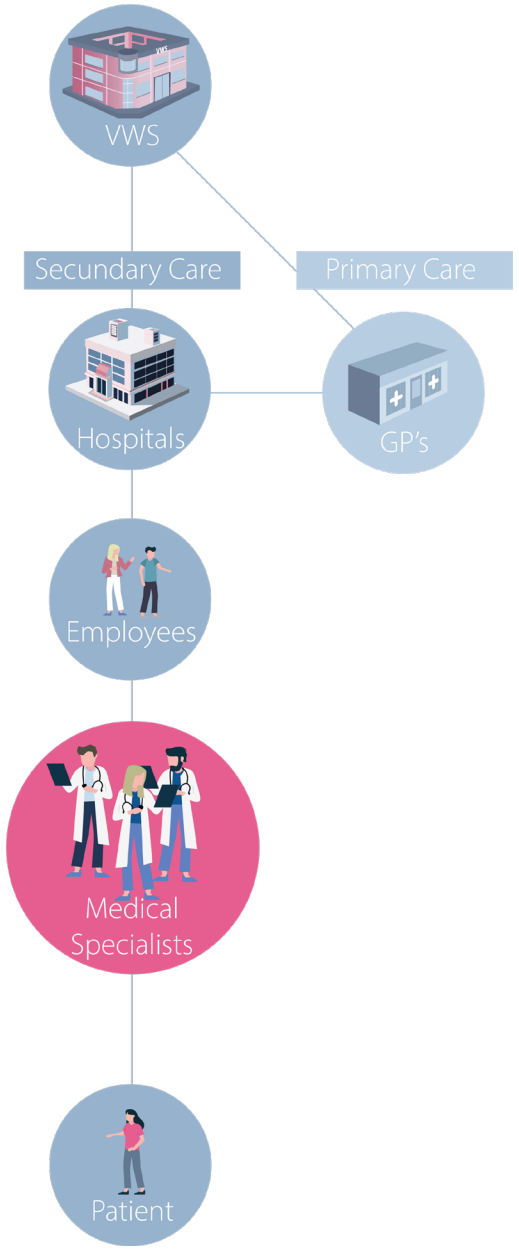
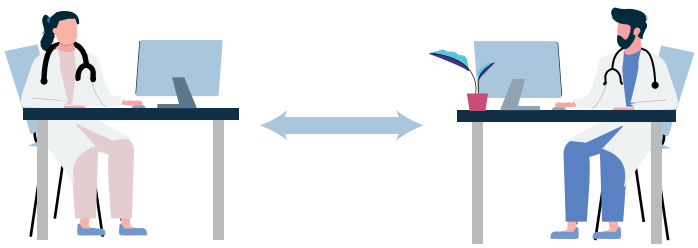


Figure 4. Scope of the project & structure of the healthcare system.



Project Approach & Research Methods

Double diamond model

As a well-know method for design projects, the concept of the Double Diamond Model is used as the starting point of this project. By applying the Double Diamond Model, diverging and converging stages in the project are created to broaden and narrow the perspectives to evoke decision-making. As the factors which may influence the upcoming implementation in the medical environment have not yet been assessed, and it is currently unknown which kind of intervention may be suitable to facilitate the implementation of the BgZ, a separate transition phase is introduced to analyze and evaluate the results and conclusions of the diverging phases before entering into the converging phases. As a result, a total of 6 phases are identified following the application of the Double Diamond Model in this project (see figure 5 for a visualization of the project approach).

During the first diamond, the factors are identified that could influence the upcoming implementation of the BgZ in the medical environment and preparations are made to start the second diamond. During the second diamond, an intervention with regard to such factors is designed in order to facilitate the implementation of the BgZ. To be more specific on the 6 stages, a brief explanation per phase is given and the research methods of each phase are briefly described (where relevant). Note that this report is structured accordingly, and that the six phases correspond with the chapters of this report.

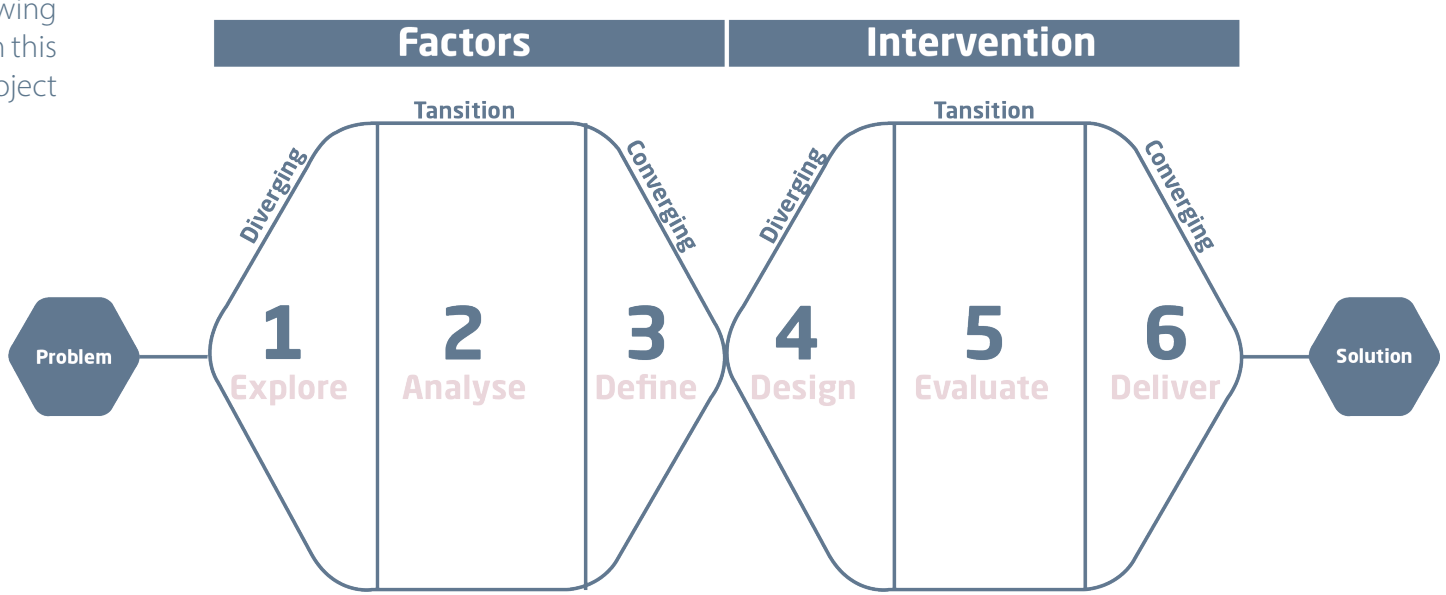


Figure 5. The Double Diamond Model as applied in this project.

Phase 1 – Explore
Within the diverging phase of the first diamond, the legislative framework of the IZA, Wegiz and BgZ is explored and explained through literature research. In addition, the medical environment with regard to the organization of digital exchange of information is explored by conducting informal interviews and desktop research. Furthermore, observational research within the consultation room of medical specialists is conducted to discover how the current situation regarding digital information exchange is experienced by medical specialists and patients at RdGG.

Phase 2 – Analyze
After the exploration phase, semi-structured interviews with medical specialists, organizational employees, and patients are conducted and a thematic analysis is performed in respect of the information collected during such interviews. Open, axial and selective coding is utilized on the outcomes of the interviews to identify themes. During this phase, factors are identified that could influence the upcoming implementation of the BgZ in the medical environment.

Phase 3 – Define
During the third phase, the reviewed problem is defined, and the factors identified during the second phase are assessed to clearly define which factor(s) could benefit from an intervention. Following this assessment, a design goal and criteria are formulated to initiate the design phase.

Phase 4 – Design
Within the diverging phase of the second diamond, a concept intervention is designed through iterative processes that include ideation and testing (i.e. a metaphor regarding an interaction vision and qualities, and a how-to method and generative brainstorm sessions). The design goal and criteria defined during the third phase will be the foundation for the ideation phase. At the end of this phase, the final concept for the intervention is presented.

Phase 5 – Evaluate
During this phase, the final concept of the intervention is evaluated based on the criteria defined during the third phase and from user input through focus groups.

Phase 6 – Deliver
Lastly, in the sixth phase, the final product is delivered and recommendations for further developments are provided.

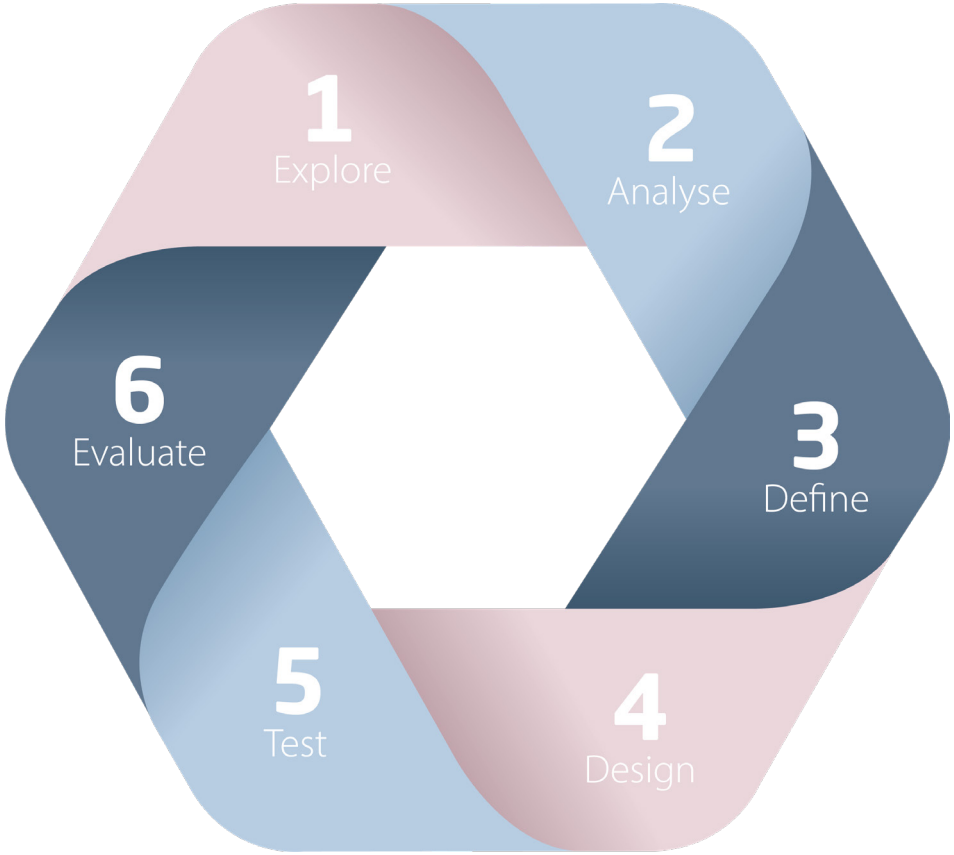
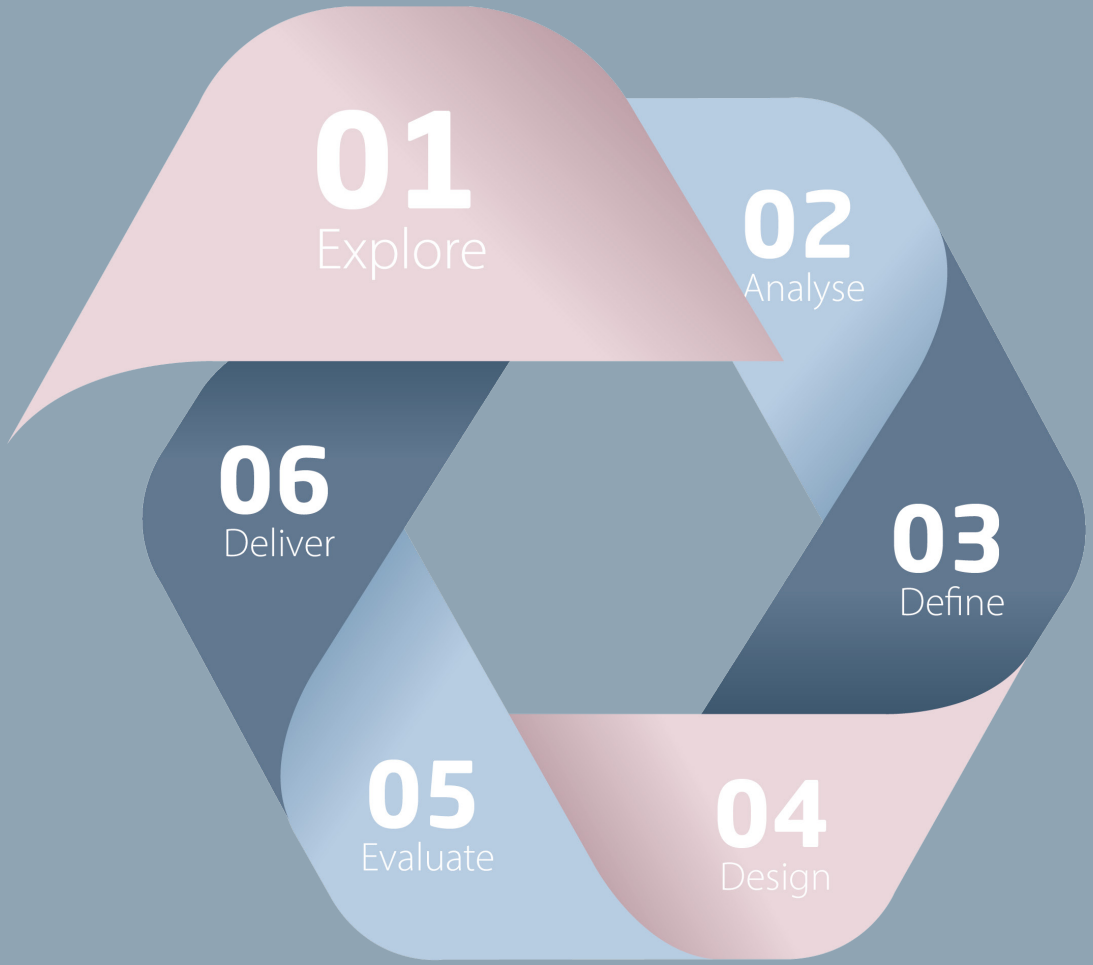


Figure 6. Visualization of the chapters of this report, corresponding with the phases described above.

Chapter 1

Explore

The exploration phase aims to create and enhance the understanding of transmural digital information exchange in the healthcare ecosystem and the BgZ. Literature research is performed with regard to the legislation proposed by VWS, the healthcare ecosystem and cultural developments (paragraph 1.1). Thereafter, the observational research within RdGG and informal interviews with general practitioners that have been conducted are described, and the outcomes thereof presented and mapped (paragraph 1.2). The conclusion of this research is set out (paragraph 1.3), to stage for the subsequent phase of the project. The holistic model is introduced as reasoning model to capture the research outcomes (paragraph 1.4).



1.1 Literature research

1.1.1 Tentative legislative frameworks

The project introduction outlines the inclusion of various legislative frameworks that influence the future of digital information exchange. This chapter will delve into them, offering detailed explanations and illustrating the relationships between these frameworks. To visualize how these frameworks relate to each other, figure 7 is presented. Here can be seen that the IZA is drawn up and signed by VWS and overarching organizations of stakeholders of the healthcare system. Within this agreement, various elements are included, among which is element I. Within this element, goals regarding digitalization and information exchange are formulated, including the Wegiz, which initiates the BgZ. All three will be briefly touched upon.

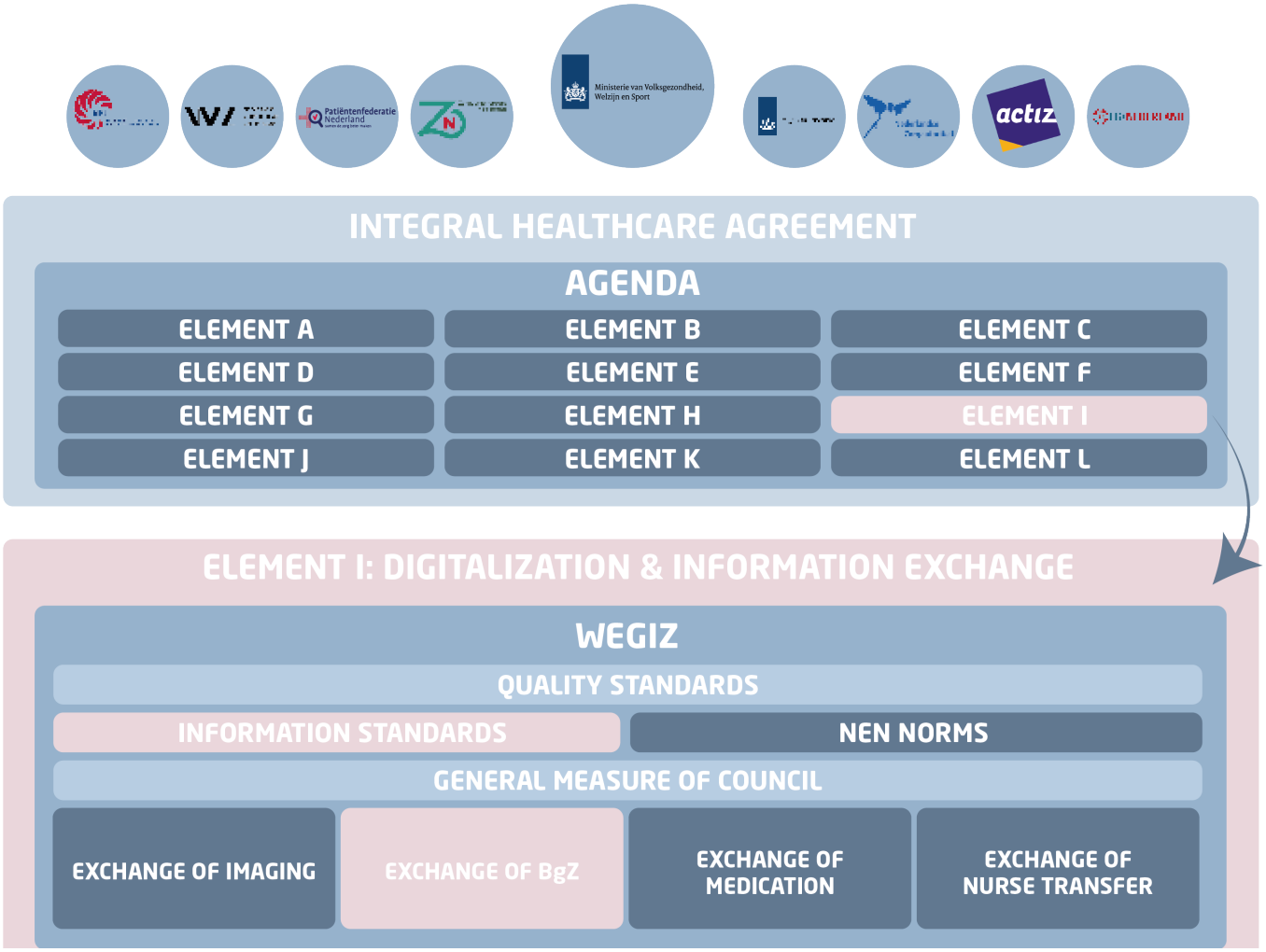


Figure 7. Relation between tentative legislative frameworks

The cirlces represent the organizations who signed the IZA. The first box represents the IZA and the second box element I. The content of element I is the Wegiz, which includes the BgZ in the bottom, pink box.

Integral Healthcare Agreement (IZA)

The IZA has been devised to guarantee qualitative, accessible, and affordable healthcare. To achieve these objectives and create a future-proof healthcare system, collaborative agreements are established with VWS and overarching organizations within the healthcare system (VWS, 2023). The specific goals relevant to this project outlined in the IZA include:

- Lowering the administrative workload for healthcare professionals.
- Increasing job satisfaction by given healthcare professional a say in strategy, policy and governance to create a co-creative environment based on trust.
- Building a fully functional information infrastructure to ensure good results by working together.
- Facilitating digital information-exchange to secure good and safe care for patients.

Wegiz & BgZ

The Act of electronica data exchange in healthcare (Wegiz) is introduced as a framework to organize digital information exchange within healthcare. The framework consists of policies to manage standardization of functions (figure 8) and registration and NEN norms, these are determined in the elements illustrated in figure 9. The Wegiz is applicable in 4 situations, the exchange of medication, imagery, nurse transfer and the BgZ. The project focuses on the implementation of the BgZ as part of the Wegiz, illustrated in figure 10.

Figure 9. Wegiz act components

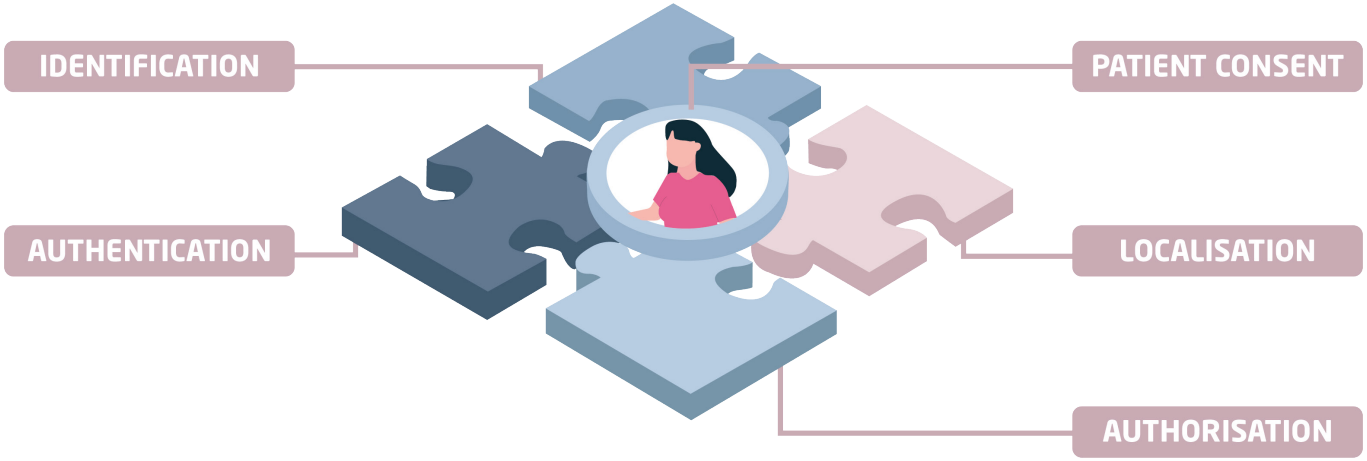


Figure 8. Generic functions obliged by the Wegiz

The BgZ is a dataset that includes the minimal and essential patient information required for transmural exchange. In order to allow data exchange in a structured way, the BgZ standards are incorporated within 26 categories (e.g., medication, diagnosis, allergies, vaccinations, etc.), called ZIBs (Nictiz). The BgZ has been defined with the contribution of the medical field, because physicians are highly reliant on correct data to provide good care. Effective implementation of the BgZ is anticipated to meet the goals set in the IZA (VWS, 2023).

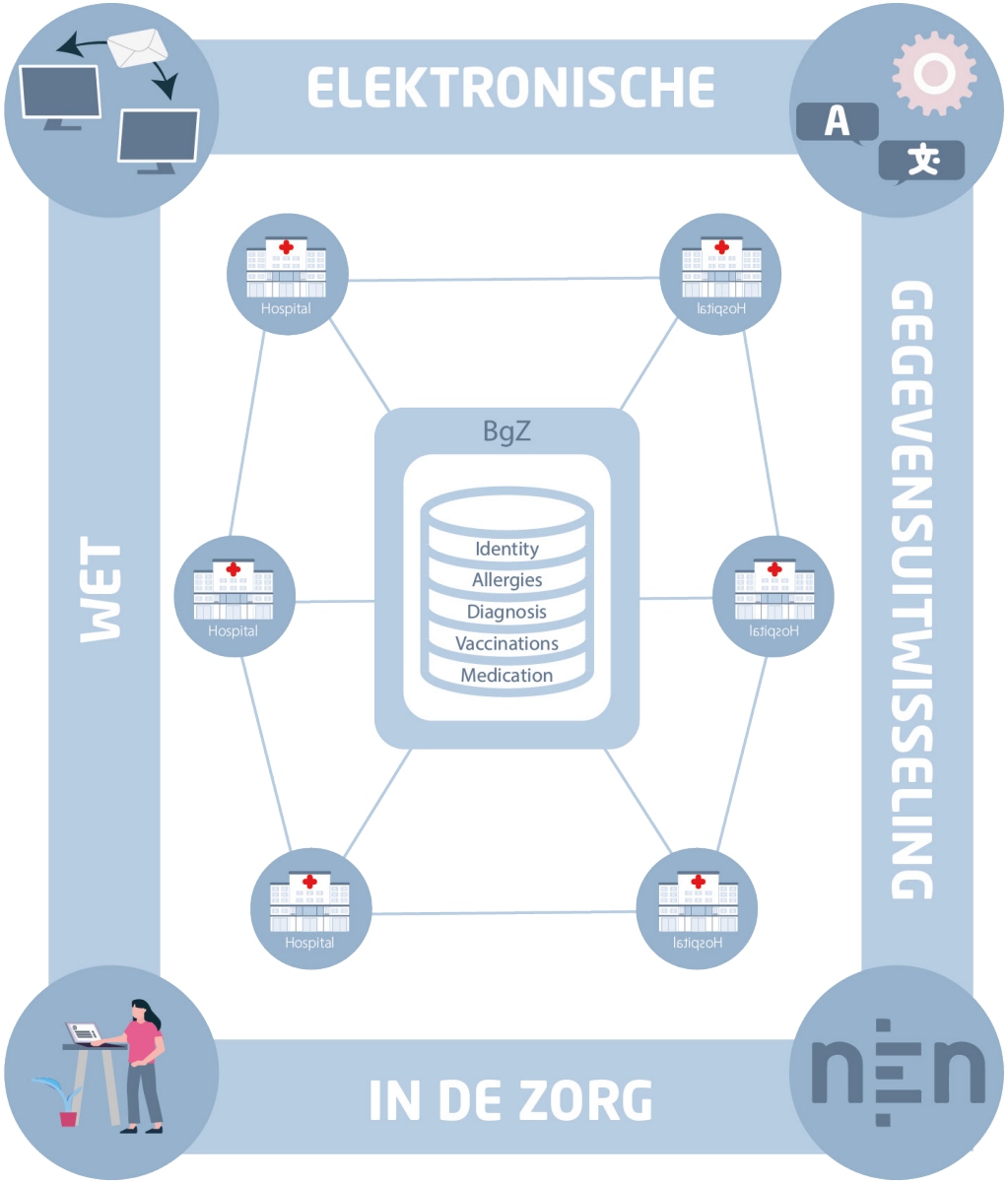


Figure 10. Relation between Wegiz & BgZ

General Data Protection Regulation (GDPR)

The last legislative factor that needs to be taken into account is the privacy law (GDPR) (Ministerie van Algemene Zaken, 2023). Through this law, people get more privacy rights, regarding their personal information. All organizations must follow this law to protect their customers. This law creates a safe environment for sharing data within the healthcare sector as well. Consent is needed from the patient to be able to share information with other treating relations of the patient when referred to another hospital, for example.

The Wegiz is a framework that obliges:

- Digital information exchange (top left)
- Generic functions and standardized language (top right)
- Following NEN norms (bottom right)
- Information exchange with patients (bottom left)

The BgZ is exchanged between hospitals, containing the 26 categories of information (middle)

1.1.2 Information exchange in the Dutch healthcare system

An extensive understanding of the current organization of digital information exchange is required, therefore literature research is performed to provide a thorough explanation of the current digital information exchange landscape.

Firstly, a step back into the past is necessary to understand how the current state of digital information exchange has been evoked. In 2006 the Dutch healthcare system evolved due to the decision by the government to let market apply its forces on healthcare. The purpose was to evoke competition between healthcare providers to improve the quality of care. However, fragmentation had taken place within the healthcare ecosystem, because healthcare providers implemented their own policies, workflows and systems with little integration of surrounding healthcare providers.

Over the years, digitalization has become unavoidable within the healthcare ecosystem, through the worldwide digital transition. Various companies have developed an electronic patient file (EPD) (Van Eekeren & Van Zuilen, 2018) for hospitals and general practices (HIS) (Van Dorresteijn, 2019). Furthermore, various software developers have stepped in to facilitate information exchange between primary and secondary care. However, the exchange between hospitals is still done via email or a physical letter. The purpose of these systems is to exchange patient information to provide medical specialists with the relevant and accurate data to ensure qualitative care (Interoperabiliteit -Nictiz, 2023). Fragmentation caused many information-exchange systems to lack interoperability (Interoperabiliteit -Nictiz, 2023), which will impact individuals in their day-to-day activities and experience regarding digital information exchange. Further research is done to explore the experienced impact among individuals within the healthcare system.

Furthermore, the developments within information provision towards patients is started as well. Nowadays, all hospital have their own patient portal to share medical information with their patients. In addition, various companies have started to develop Person Healthcare Portals (PGO: persoonlijke gezondheidsomgeving) to bundle medical information of patients in order to provide patients access to all their healthcare information. (Medische gegevens in een PGO, 2023)

The illustration, in figure 11, presents the current healthcare ecosystem regarding digital information exchange. The project focus is represented by the dark pink lines: patient information exchange between healthcare providers.

Explanation of figure 11

In the top left corner VWS is represented as well as the BgZ, Wegiz and the GDPR. In the top right corner software developers are represented.

Within the dark pink areas the patient is depicted to be walking through the healthcare system. First, the patient enters the healthcare system through the GP and can be referred to medical specialists in different hospitals. When a referal occurs patient information is exchange. This can be done through multiple different possible channels. Therefore, the patient walks over the dark pink line to a medical specialist department, where a specialist will be treating the patient. This department is part of a hospital. In addition, when a patient referal from hospital to hospital takes place such an exchange system isn't available yet and therefor medical specialists email or call when a patient referal occurs. The GP is informed when such a referal takes place and is therefore included in the communication. These information exchange streams are represented by the lines between healthcare providers with communication means on them.

Furthermore, each general practice or hospital have their own information exchange system. For GP's this is called HIS and for hospitals this is called EPD. HiX is presented as an example of an EPD.

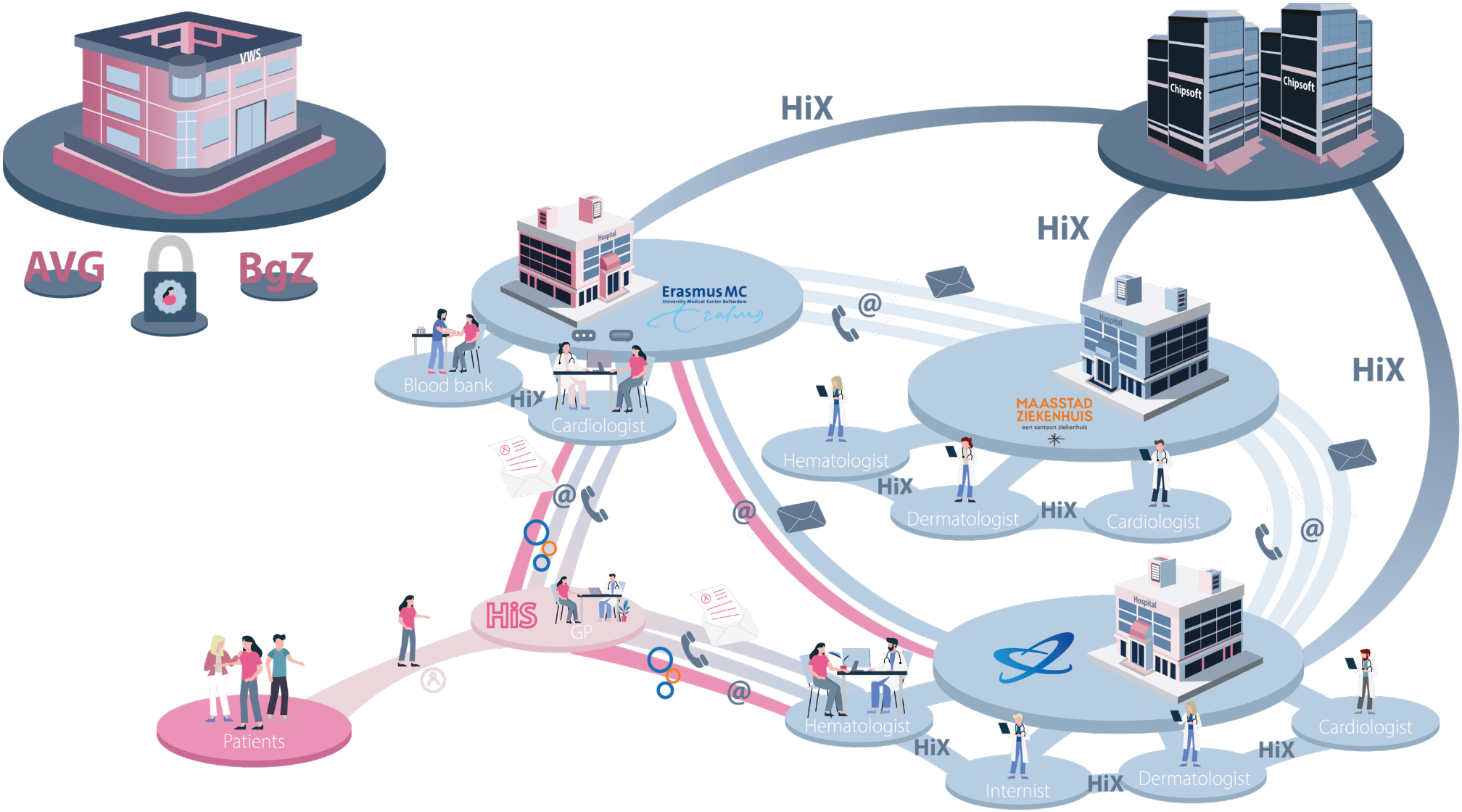


Figure 11. Current organization of digital information exchange within the healthcare ecosystem

1.1.3 Cultural developments in healthcare

According to Scott (2003) cultural aspects within medical organizations might shape the implementation of legislative policies related to digital information exchange. Therefore, cultural developments are important factors to include within this research.

The history of healthcare culture has seen significant changes in the role of physicians. Initially, doctors were at the top of society, serving only the rich and physicians were profoundly respected and had a knowledgeable reputation (VWS, 2023). Over time, they became essential members of society, providing care to various layers of society. In the late 20th century, government involvement shaped modern healthcare, making it accessible for all, which created financial challenges. While doctors remain highly trusted and responsible for patient care, cultural shifts, especially in physician partnerships, contributed to fragmentation within the healthcare system.

Physician partnerships, initiated in the latter half of the 20th century for financial benefits, unintentionally foster fragmentation, hindering standardization and protocol implementation. Commercial interests within partnerships may compromise transparency and introduce power dynamics. Existing hierarchical structures and autonomous culture in hospitals, designed to support physicians, further impede change implementation. In contemporary hospitals, where thirty percent operate within partnerships, challenges persist in aligning interests and making necessary changes (De maatschap in ontwikkeling, 2016).
Lastly, in recent decades, digitalization has empowered patients to obtain more knowledge regarding health, which changed the patient-physician relationship. Shared decision-making has replaced traditional dependency (Lange et al, 2011), although some older generations still prefer a doctor-centric approach. Amid these changes, medical professionals must adapt their communication to evolving patient roles (Koedam, 2022).

1.2 Observational research & informal interviews

(Original photo: Reinier de Graaf, z.d.)

Although literature research has led to fundamental insights into the organization of transmural digital information exchange and the development thereof, an extra step is needed to obtain a deeper understanding. Therefore, observations and informal interviews are conducted to explore the experience with transmural digital information exchange among healthcare professionals and patients. This approach aims to uncover additional factors that may impact the implementation of the BgZ.

1.2.1 Observational research

During observations of consultation hours at various specialisms, more was discovered on the experience with transmural digital information exchange and what the current process looks like.
In total 8 observations were performed during consultation moments between medical specialist and their patients, each taking up 1–3 hours. The observations were performed at the following specialisms of the RdGG: urology, dermatology, rheumatology, haematology, ophthalmology, geriatrics and cardiology. Only non-disruptive observations were performed during consultations for which the patient gave consent, and afterwards questions were answered by the medical specialists to obtain more information.

1.2.2 Informal interviews

To explore whether the factors and experiences already identified are inherent throughout the entire healthcare system informal interviews are performed to include perspectives beyond RdGG. In total, 3 general practitioners (GP) were interviewed to gain a comprehensive understanding of the total care process regarding transmural exchange. The interview guide is included in appendix 1A.

1.2.3 Research outcomes

The insights derived from the observations and the interviews are compared and the overlapping and relevant outcomes are clustered into themes, which will be discussed in this paragraph.

Lack of interoperability
The lack of interoperability has caused concerns about the accuracy and completeness of information. The amount, frequency and speed of information exchange affects the sense of overview and the ability to keep up. This was also noticed, because specialists seemed overwhelmed by the amount of data available. Most of the time and attention of the specialist was spent on navigating through the systems to locate relevant information. Specialists try to cope by limiting the amount of input and focuses on prior notes, the referral letter or test results. Lastly, the lack of interoperability was noticed when specialists were literally copying and pasting

or retyping patient information from a source into their own patient file.

Documentation burden
During each observation, documentation takes up the majority of the time available. It influences the interaction with the patient negatively and distracts the attention that is supposed to be for the patient. During each observation, patients almost had no time to dialogue with their specialist or ask questions, because specialists were busy with their administrative duties. All physicians explained that the focus lies on the computer instead of the patient, because of the regulatory burden that is involved when practicing healthcare.

Time management & efficiency
Time & efficiency are important factors during consultations. Each specialist has a tight schedule and a specific workflow to maximize efficiency and minimize delay. The consultations had a standard pattern and everything was registered into the patient file. However, the differences in the methods of registration were noticeable when comparing specialists. The variety in focus on detail, structure and strictly filling the boxes between specialists and departments was a major observation. In addition, the difference in abbreviations and writing style was noticed as well. Lastly, all specialists had one method in common, to create overview through summarizing everything into the summary section, and they used this to prepare their consultations.

Privacy & consent
Significantly, consent emerges as a frequently discussed theme in the observed consultations. Specialists must deal with privacy legislation by asking the patient for consent before sharing any personal information with other parties. The physicians explained that consent is the biggest bottleneck of smooth exchange, because consent management isn't meeting the requirements.

Respectable position
The respected position of physicians is noticed and mentioned as a factor within healthcare. During consultations, patients were expressing their respect within the conversation. In addition, physicians explained that because of this respected position and superiority it is sometimes difficult to manage healthcare, because all physicians are educated within a hierarchical environment to be autonomous.

Physician-patient interaction & patient empowerment
Shared-decision making was mentioned by physicians as an important factor in the consultation room to empower patients, which nowadays is the standard of the treatment approach. However, it was noticed that each patient had different needs and that specialists were adjusting their approach per patient to meet these needs and provide good care. On the other hand, the time consumed by managing patient data and documenting influenced this approach, and the focus on meeting patient needs was clearly decreasing further into the conversation.

Furthermore, a sense of dependency of the patients on specialists was noticed. The activities of the specialist influenced the behaviour of the patient. Due to the awareness of digital information exchange among new patients, the expectation that everything about them is known, was seen when this expectation wasn't met. This observation illustrates the expectation of availability of information. Lastly, various patients brought notes and questions on paper, citing the need to remember crucial details.

1.2.4 Journey map

To bundle all the information gathered regarding the organization and experience of transmural digital information exchange from literature review, observations and interviews, a journey map is created to visually explain the current experience with digital information exchange within the care process. The map in figure 12 illustrates a journey of a patient through the healthcare system from primary care regarding the general practitioner to secondary care within the first hospital and a referral to another hospital. This includes experiences, transmural information exchange actions and healthcare management activities.

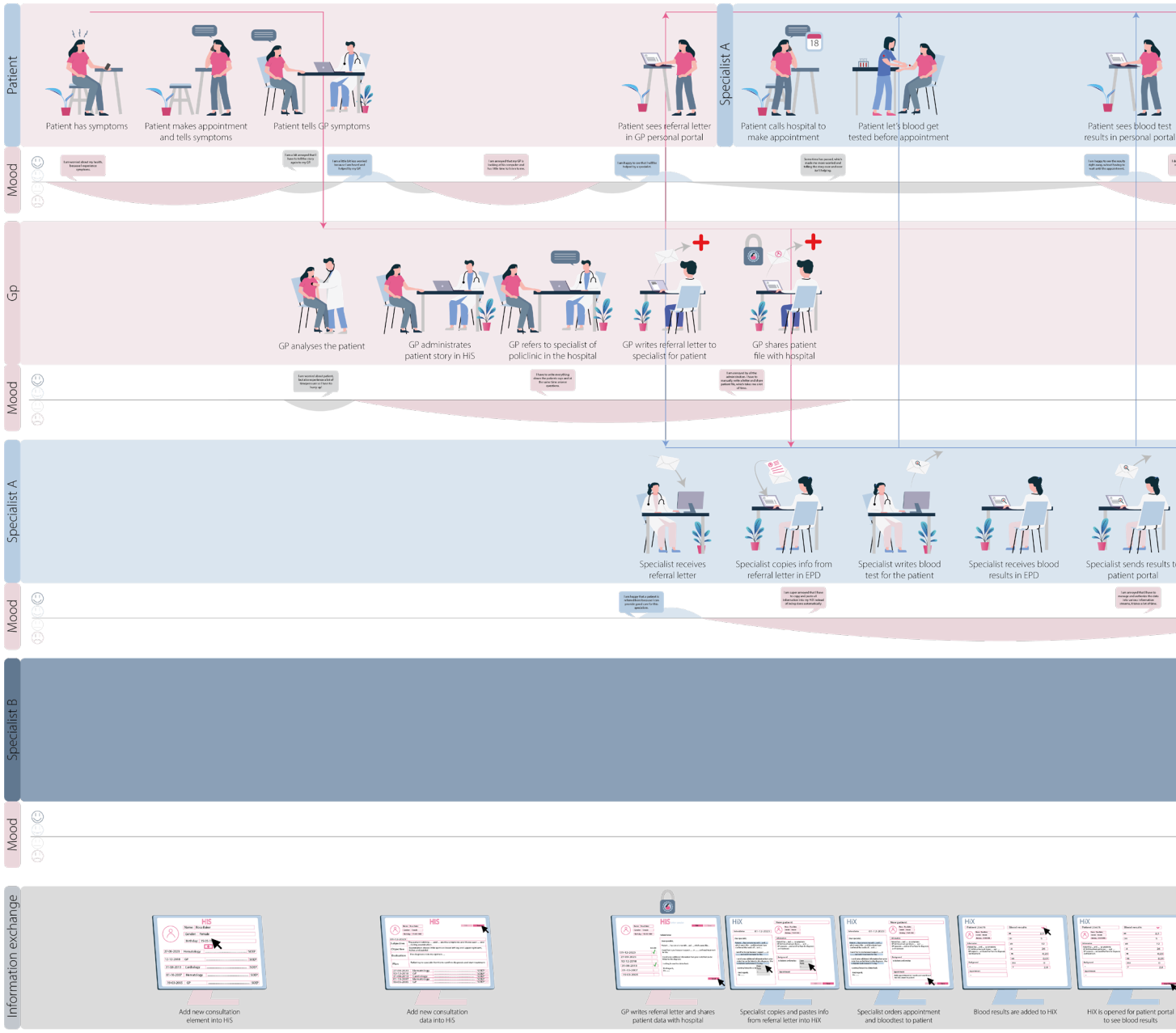
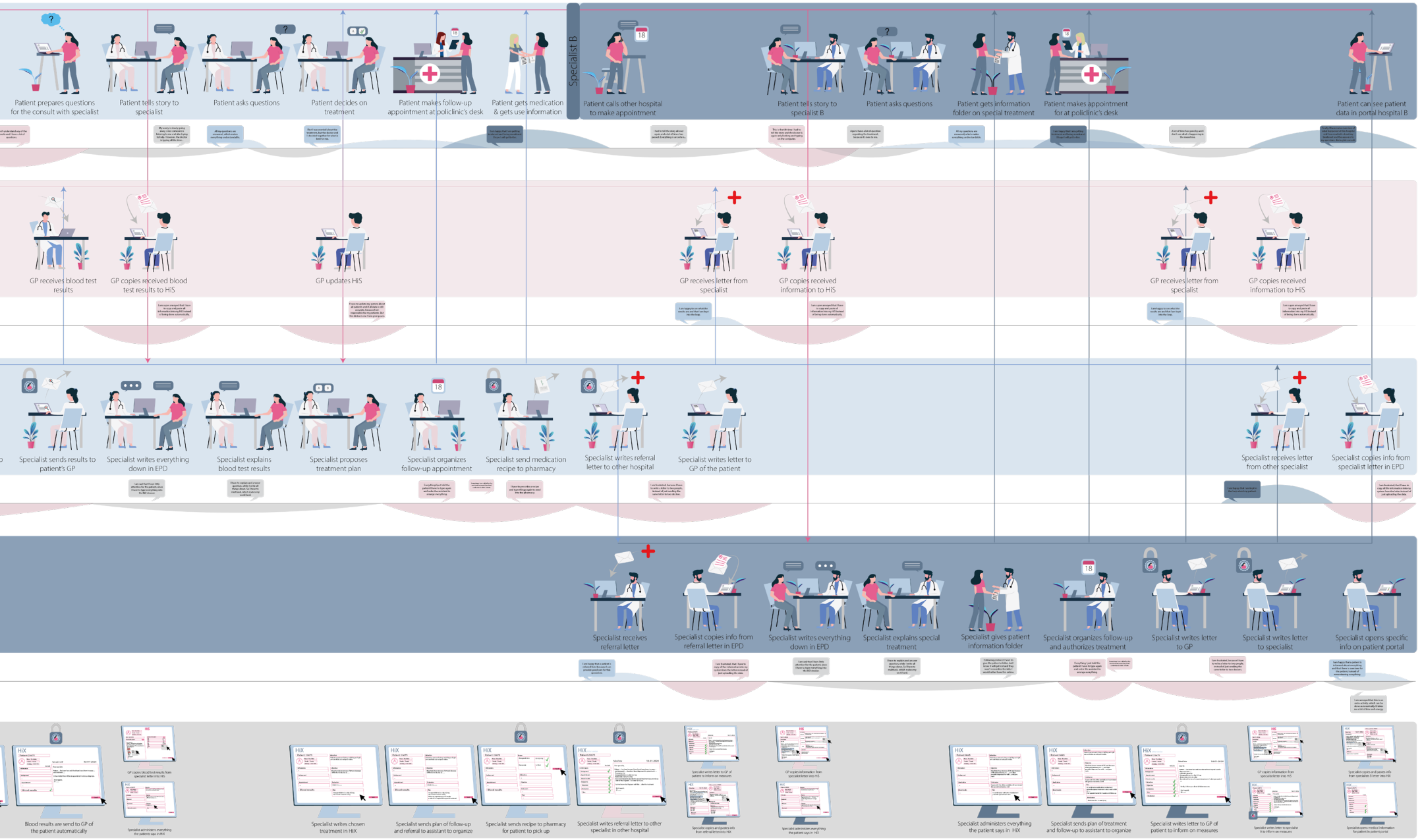


Figure 12. Journey map


Specialist B
Patient prepares questions for the consult with specialist
Patient tells story to specialist
Patient asks questions
Patient decides on treatment
Patient makes follow-up appointment at policlinic's desk
Patient gets medication & gets use information
Patient calls other hospital to make appointment
Patient tells story to specialist B
Patient asks questions
Patient gets information folder on special treatment
Patient makes appointment for at policlinic's desk
Patient can see patient data in portal hospital B
GP receives blood test results
GP copies received blood test results to HiS
GP updates HiS
GP receives letter from specialist
GP copies received information to HiS
GP receives letter from specialist
GP copies received information to HiS
Specialist sends results to patient's GP
Specialist writes everything down in EPD
Specialist explains blood test results
Specialist proposes treatment plan
Specialist organizes follow-up appointment
Specialist send medication recipe to pharmacy
Specialist writes referral letter to other hospital
Specialist writes letter to GP of the patient
Specialist receives letter from other specialist
Specialist copies info from specialist letter in EPD
Specialist receives referral letter
Specialist copies info from referral letter in EPD
Specialist writes everything down in EPD
Specialist explains special treatment
Specialist gives patient information folder
Specialist organizes follow-up and authorizes treatment
Specialist writes letter to GP
Specialist writes letter to specialist
Specialist opens specific info on patient portal
HiX
Blood results are send to GP of the patient automatically
Specialist administers everything the patient says in HiX
Specialist writes chosen treatment in HiX
Specialist sends plan of follow-up and referral to assistant to organize
Specialist sends recipe to pharmacy for patient to pick up
Specialist writes referral letter to other specialist in other hospital
Specialist administers everything the patient says in HiX
Specialist sends plan of treatment and follow-up to assistant to organize
Specialist writes letter to GP of patient to inform on measures

1.3 Conclusion

In continuation, a conclusion of the exploration phase is given to summarize the outcomes of the literature and observational research, and the informal interviews, which will be used within the next phase of the project.

The Wegiz focuses on the implementation of the BgZ within hospitals to exchange information transmural. The act obliges digital exchange, following quality and information standards, which are required to exchange the BgZ on national level. Unity of language and generic function are required to do so, and 26 ZIBs have been identified that should include the most relevant information regarding a patient for exchange to ensure qualitative and safe care.

Furthermore, from literature research could be derived that market forces have caused fragmentation in the Dutch healthcare system, which have caused a lack of interoperability. During the observations, this could be noticed since specialists seemed overwhelmed by the amount, frequency, and speed of information exchange via many channels. They were coping by limiting the amount of input, with the purpose of creating an overview. However, the accuracy and completeness of information can be jeopardized. The standards, defined within the quality and information standards of the Wegiz and BgZ, will initiate the process of creating interoperability of digital exchange systems, since this is obliged by law and might solve the issues experienced by specialists. However, standardized workflows within documentation structure and language are required to be able to create interoperability as well, which might be challenging looking at the observations and interview outcomes.

From the observations at RdGG could be derived that due to time management and efficiency, specialists were following a specific workflow and routine in their approach of consultation and digital documentation. However, comparing observations, standardization of workflows, routines and digital documentation structure and language isn't in place, department, or hospital wide. Alternatively, the documentation and regulatory burden have been cited as factors to impact time management and efficiency.

Legislation states that the AVG obliges consent management to maintain safety regarding private information. In addition, privacy and consent management is noticed during the observations, since this topic is often discussed. However, the consent management is experienced as a bottleneck for efficient information exchange according to the outcomes of the interviews. Another interesting topic discovered is the cultural factor that can be influential on the attitude towards change. The attitude that is caused by the respectable reputation, as explained in the interview outcomes, can be an interesting factor for further research. Lastly, digitalization caused patients to be more knowledgeable, which evoked a shared decision-making approach within the medical ecosystem to empower patients and adapt to patient needs. In contradiction to this, patient empowerment was affected due to the influence of digitalization within consultation rooms, because specialists were focused on their task to manage information and documentation, but the expectations of patients weren't met either.

All derived insights mentioned above are factors to be researched during the next phase of this project. See the key takeaways below for the list of factors.

Figure 13 present the gathered insights, clustered into themes, that influence digital inforamtion exchange.

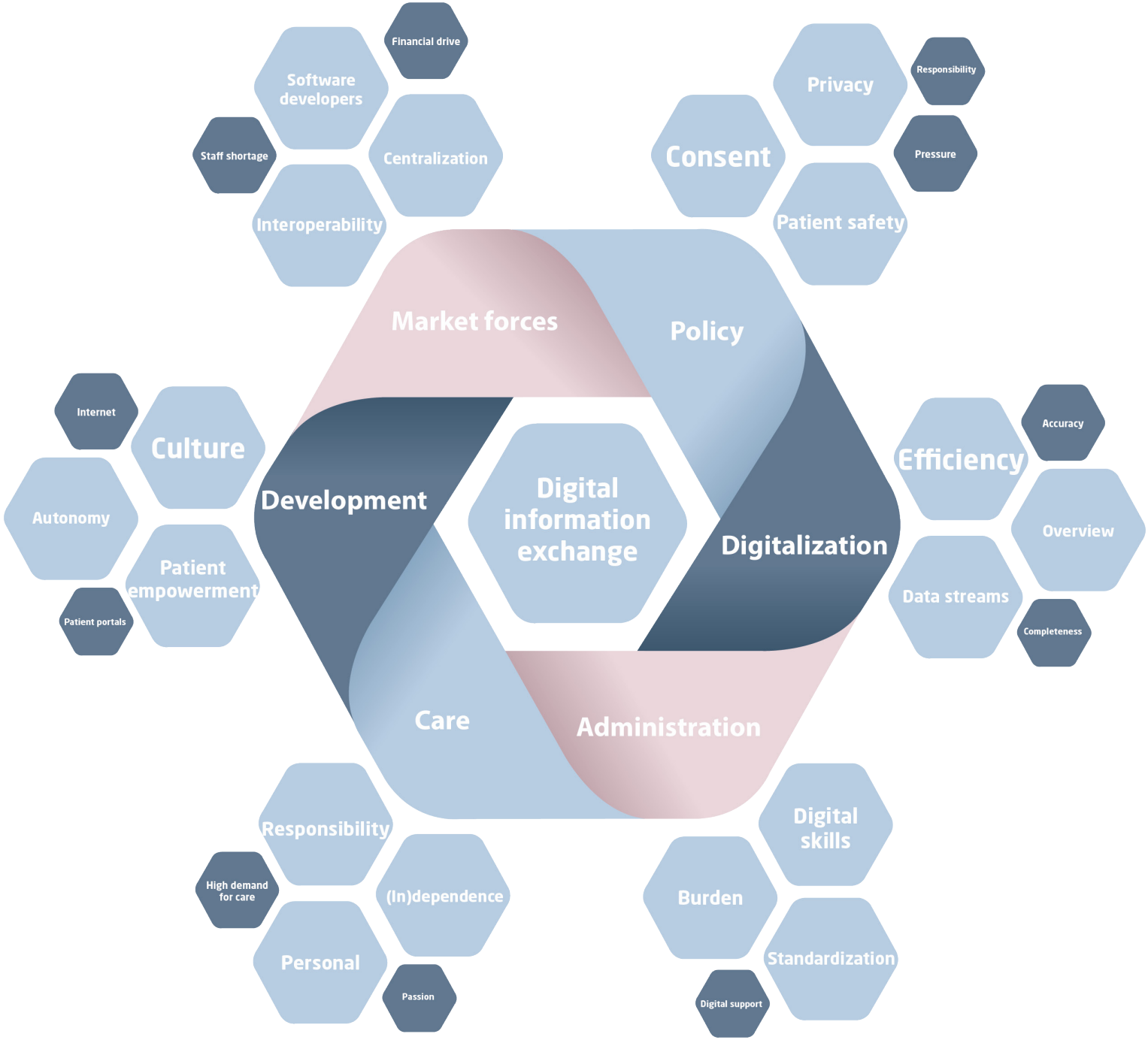


Figure 13. Clustered topics that influence digital information exchange.

1.4 Introducing the holistic model

As the last step of the explore phase, an exploration into a reasoning model was undertaken to structure and enhance the understanding of the healthcare system. The holistic model, integrating, macro, meso and micro levels, has been identified as a suitable framework to systematically organize and elucidate the research findings.

Saetra en Fosch-Villaronga (2021), explains that applying a holistic approach within research regarding digital change in the healthcare sector is a useful method to gather a complete understanding of the effects of change on the entire system.The method serves as a structural framework to analyze and present research findings, offering insights into the layered challenges. By addressing different levels and how they relate to each other, the aim is to identify potential issues that might arise when implementing the BgZ to come up with specific challenges and opportunities.

This approach not only enhances the research's effectiveness but also aligns with the purpose to bridge the gap between policymakers (macro level) and healthcare professionals (micro level) to foster collaboration and facilitate the development of solutions for the identified issues and to enhance the healthcare system. The insights derived can initiate the development of actionable strategies for policymakers and healthcare institutions, providing practical guidance for implementing transformative healthcare initiatives.

As summarized in the conclusion, many factors can influence the implementation of the transmural digital exchange of the BgZ and each factor can be categorized to a specific level within the healthcare ecosystem. However, the awareness of interdependencies is highly important to be able to understand how each level impacts the others to be able to change the entire system successfully. Therefore, taking a holistic approach, covering macro, meso, and micro levels in the investigation of BgZ adoption within the healthcare system, serves as a comprehensive approach to understand the complexities and interdependencies within the adoption of the BgZ.

To illustrate how the holistic model looks like within the context of this project figure 14 is presented. Looking back on figure 11 and chapter 1.2, where the entire ecosystem is introduced and explained, the macro, meso and micro level can be recognized.

Within the micro level lies the foundation of this project, since the study delves into the current experience and perspectives of individual stakeholders, notably medical specialists, organizational employees and patients with digital information exchange. The purpose is to research which factors within micro, meso and macro levels influence the adoption and implementation of the BgZ in healthcare. Furthermore, the relation between the levels and its corresponding factors will be identified as well.

In conclusion, the holistic model, encompassing macro, meso, and micro levels, adds substantial value to this research by providing a structured and comprehensive framework for understanding the intricate dynamics of the healthcare system, especially in the context of implementing the BgZ. This model not only facilitates the identification of challenges and opportunities at various levels but also ensures a nuanced exploration of the interdependencies within the healthcare ecosystem. Moving forward, this model will serve as a guiding framework in the subsequent phases of the research, enabling a more nuanced and insightful analysis of the factors influencing the adoption and implementation of the BgZ in healthcare.

Micro level
At the macro level, the focus shifts towards governmental legislation. Within this project this level represents VWS as the governmental organ and the proposed legislative framework of the Wegiz and BgZ.

Meso level
Transitioning to the meso level, the focus shifts to the organization of transmural digital information exchange within organizations within the healthcare system, such as hospitals, software developers and other healthcare organizations.

Macro level
The micro level involves individuals within a system and their day-to-day challenges, expectations, experiences and interaction with the current organization of transmural digital information exchange.

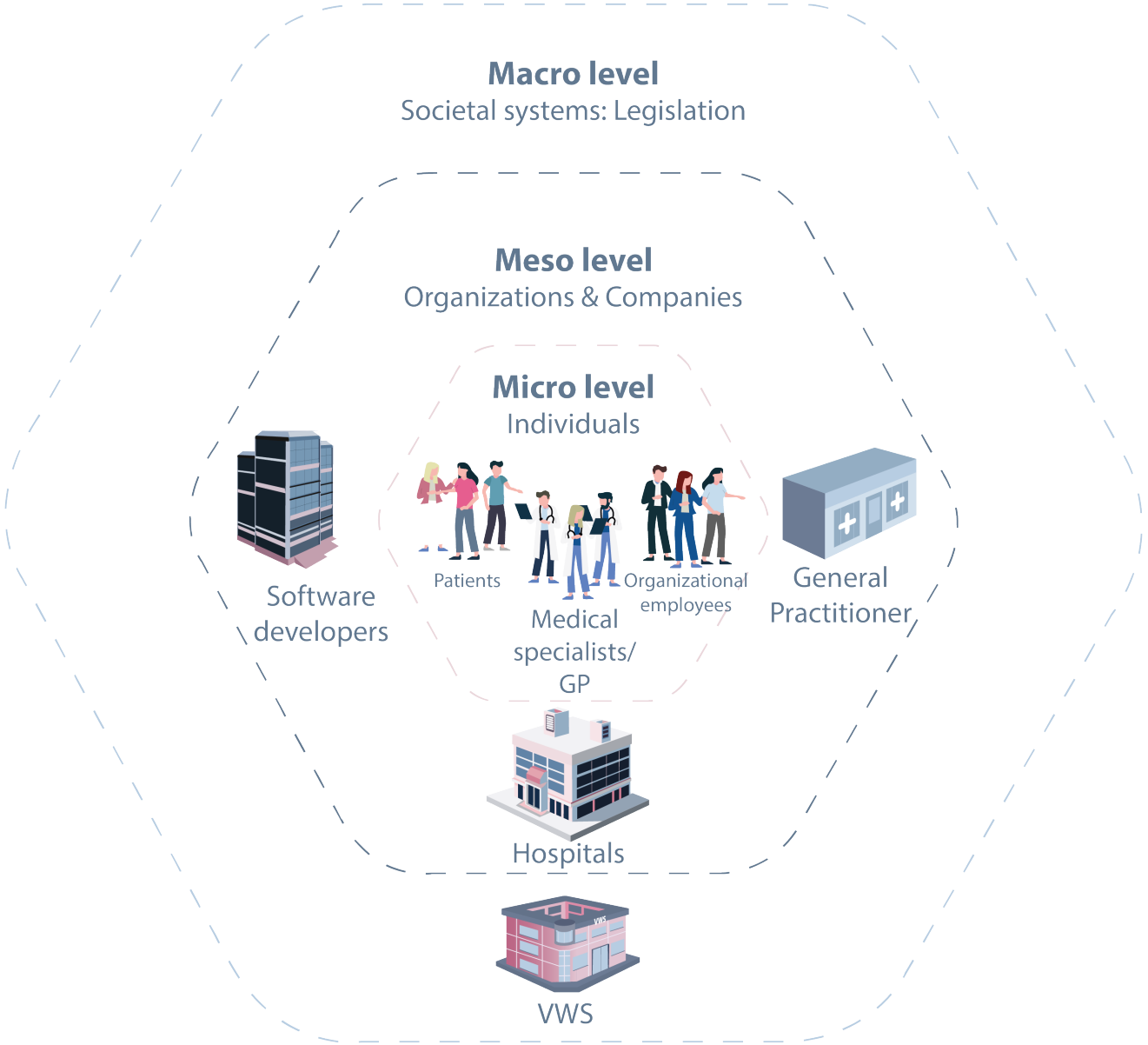
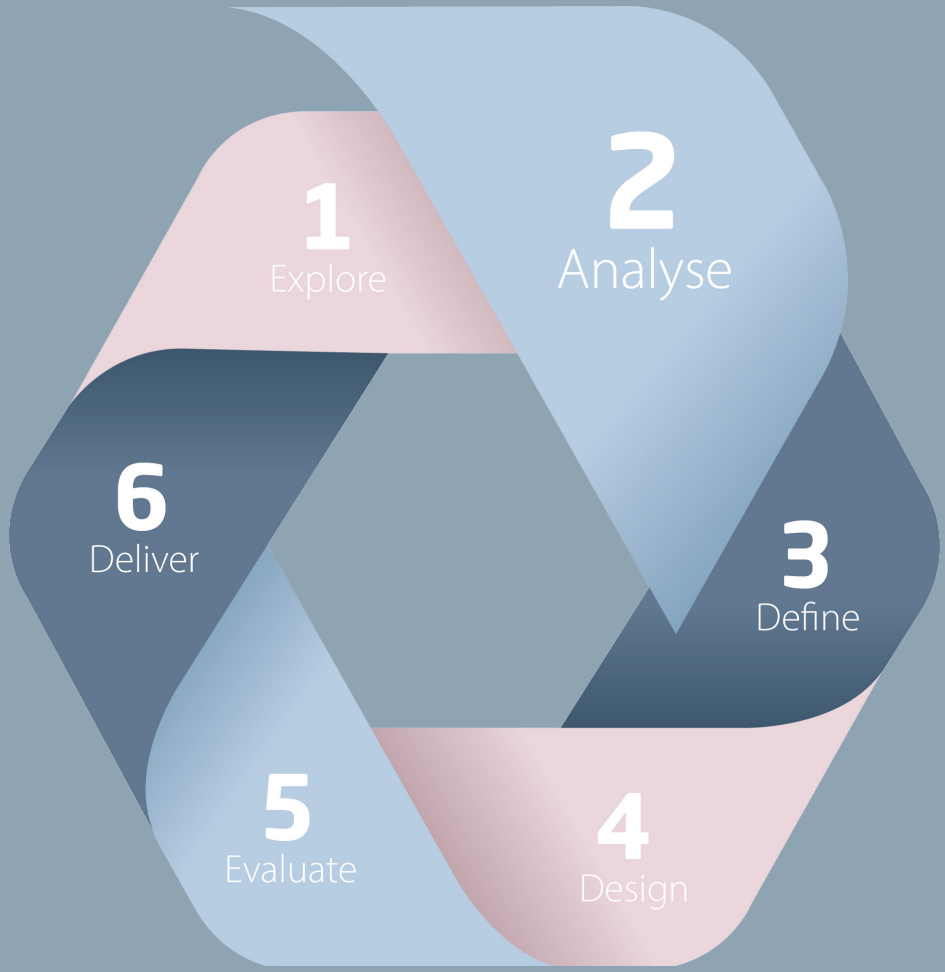


Figure 14. Holistic model: macro, meso and micro levels

Chapter 2
Analyse

This chapter delineates the foundational questions that form the basis of the qualitative research (paragraph 2.1). Thereafter, the method used for this research – semi-structured interviews with medical specialists, organizational employees, and patients of the RdGG – is described (paragraph 2.2). The interview transcripts are analyzed through a thematic analysis, the results of which will be included in this chapter and presented per target group (paragraph 2.3). The holistic model described in the conclusion of chapter 1 helps to interpret the results of the research analysis included in this chapter. Lastly, the results will be summarized and categorized in a conclusion (paragraph 2.4) and discussed to identify the opportunities for refining the problem definition in the next phase (paragraph 2.5).



2.1 Qualitative research

Research questions

With the knowledge gathered within the previous chapter, many factors have already been discovered that may be expected to be influential when implementing the BgZ within the medical ecosystem. The holistic model will be used to categorize these insights derived from the semi-structured interviews conducted within this chapter and expose the relations between the levels and how they impact each other. This will provide an understanding of the integral healthcare system.

The research at RdGG focuses on obtaining qualitative insights into the current organization and experience of transmural digital information exchange. Given that medical specialists, organizational employees and patients are considered the most trustworthy sources for these insights, the qualitative research primarily targets their perspectives, aligning with the micro level of the holistic approach. This decision is substantiated by the project's overarching aim of connecting healthcare providers (micro level) with policymakers (macro level). The focus on micro-level insights is seen as bottom-up feedback to inform macro-level decision-making. Therefore, the research questions are defined to further dive into the problem and reach the project aim.

Research Questions

The following research questions need to be answered, through conducting semi-structured interviews, to address the project goal. The answers to research question 1 and 2 will be compared to answer the main research question.

MRQ. **Which factors influence the implementation of the BgZ?**

RQ1. **How is the transmural digital information exchange currently organized and experienced by employees, and medical specialists in particular, of the RdGG?**

RQ2. **What are the expectations and requirements of employees, and medical specialists in particular, of the RdGG of the organization and experience of transmural digital information exchange?**

2.2 Research method

Semi-structured interviews are conducted with medical specialists, organizational employees and patients of the RdGG, as qualitative research, to gather research data. The semi-structured interview approach allows for a deeper exploration of the identified themes through supplementary questions beyond the interview guide, facilitating the discovery of new insights that contribute to addressing the main research question. A thematic analysis (Williams, 2019) is performed to determine which factors can be expected to be influential during the implementation of the BgZ.

2.2.1 Data collection

The interviews were conducted following an interview guide, included in appendix 2A, with highlighted topics and questions to initiate the conversation. All interviews are audio recorded with an audio recorder and transcribed with the transcribe tool in Word. All data is stored within a password secure environment at RdGG, where only the principal and executive investigators have access too.

Each participant was provided with an information letter, included in appendix 2B, to explain the research and what could be expected regarding their participation. Furthermore, an informed consent form, included in appendix 2C, was signed before the interview to authorize the use of data in this report. All personal information is excluded to protect participants privacy; however, their profession is included in the data. The form is also signed to confirm that each participant has read the information letter and is fully informed.

To ensure this research is medically and ethically responsible, since contact with medical situations regarding patient information and privacy-sensitive interactions is possible, a Medical Ethical assessment is submitted to the Dutch Medical Ethical Review Committee. The assessment provided permission for this research, since it falls outside the scope of the Medical Research Act (niet-WMO plichtig).

2.2.2 Participant selection

For the semi-structured interviews, eight medical specialists were selected within various specialist departments to ensure a variety of participants. Therefore, no specific criteria were defined. Furthermore, seven organizational employees were selected, with the only criteria that they are involved in the organization of digital information exchange. Lastly, three patients were randomly selected. All participants needed to be employed or under treatment at the RdGG. In table 1 and 2, the selected participants and their department and title are illustrated. table 3, present the selected patients.

2.2.3 Research procedure

Prior to each interview, an informed consent form was signed by each participant. Afterwards, a formal introduction about the research project is provided, and the procedure is explained. Each participant was asked to give consent for audio recording the interview, if consent was provided the audio recorder was started. While recording, the interview guide was followed to initiate the conversation and to dive deeper into the answers given by the participants. During each recording, the time of the recording, when the participants gave important answers, were noted to make sure to include this quote in the analysis and results. Each interview required 45–60 minutes and when the time had passed the recording was ended.

2.2.4 Data analysis

Before the data could be analyzed, the interview results were transcribed with the transcribe tool in Word. The transcript of all interviews can be found appendix 2D. Afterwards, the transcripts were coded openly, axially, and selectively (Williams, 2019) to identify themes. The analysis is performed on each separate research group, medical specialists, organizational employees, and patients. The data analysis can be found in appendix 2E.

2.2.5 Validity and reliability

To ensure reliability and validity of the answers from participants during the semi-structured interview, 18 interviews are performed, 8 interviews with medical specialists, 7 with organizational employees and 3 with patients. This provided enough insights, since saturation had occurred, and no new insights were derived. In addition, reliability of the interview outcomes is ensured, because during the interviews only the researcher and the participant were present, however the fact that participant were aware of the audio recorder to be recording the interview might have influenced their answers. The outcomes and recording are saved and stored at their employer's online environment, which might be a risk for social desirable answers.

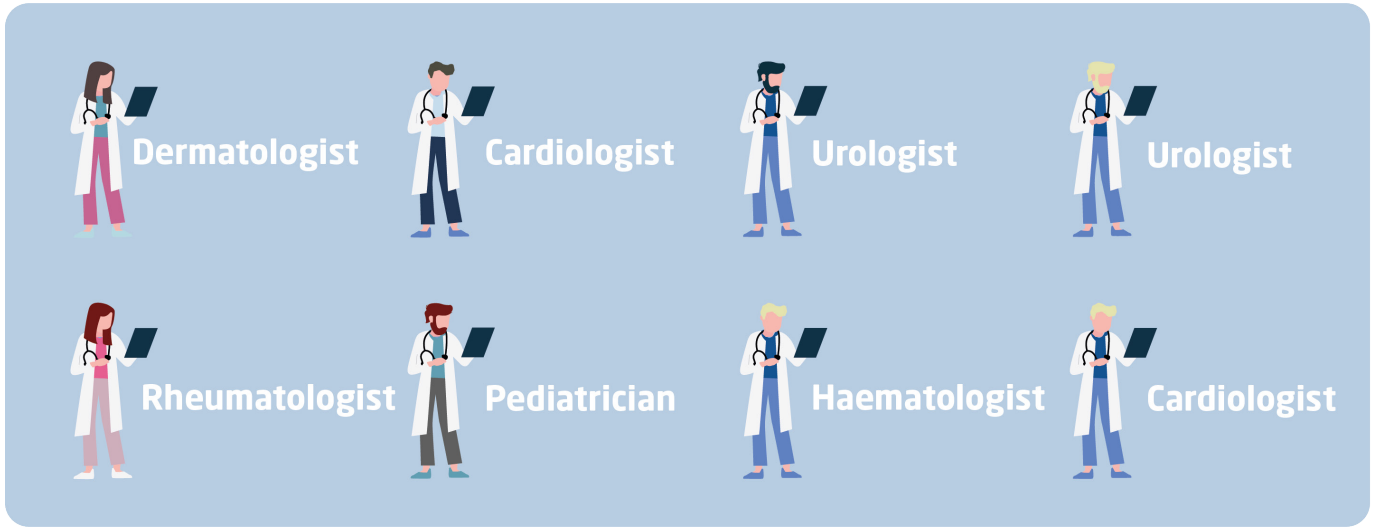


Table 1. Interviewed medical specialists

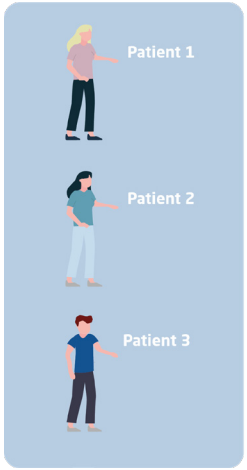


Table 3. Interviewed patients

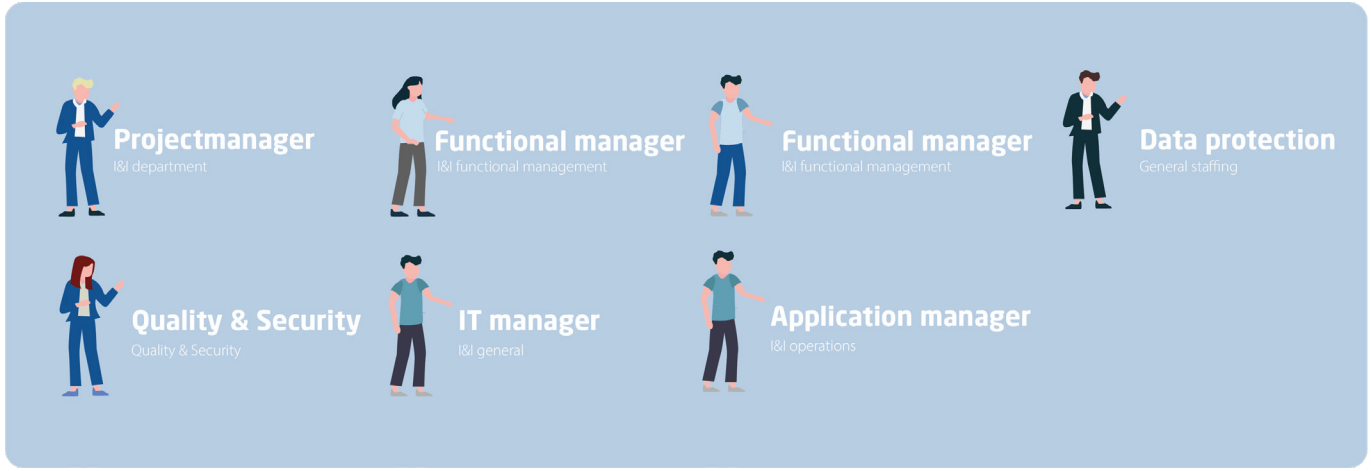


Table 2. Interviewed organizational employees

2.3 Results

The results of the semi-structured interviews will be discussed per research group, medical specialists, organizational employees and patients. With these insights, the main research question will be answered. Per result, a brief explanation of how the addressed issue relates to the macro, meso and micro level is given as well.

2.3.1 Results of interviews with medical specialists

The results of the analysis derived from the semi-structured interviews with medical specialists are presented. Several quotes are included to substantiate the explanation of the results.

Lack of human-centered approach

The interviews indicate a lack of awareness among medical specialists regarding the BgZ and Wegiz, since none were familiar with the either the name or content of these legislative frameworks. This lack of awareness is attributed to a deficiency in human-centered design, as specialists expect to be included in the development process of crucial frameworks that (in)directly impact their work. In line with this, there is a sense of powerlessness in the healthcare sector due to its dependency on external factors. Medical professionals express a hope for government intervention and leadership to support the perspective of physicians. The emphasis is on prioritizing quality patient care through efficient workflows centered around user-friendly systems. The focus should shift from a technical perspective to mandatory requirements regulated within the macro level, ensuring that systems meet not just basic criteria but stringent standards to guarantee the effectiveness and safety of healthcare services. Therefore, specialist advocate for the integration of user perspective in the development of digital systems at meso level as well.

> *"First of all, the step of including the most impacted stakeholder within development processes of legislation, software and management is already skipped."*

Attitude towards digitalization of transmural digital information exchange

In summary, the results underscore a prevailing reluctance among specialists towards the digitalization of transmural information exchange, largely influenced by negative experiences with existing systems. Specialists express concern that the integration of new digital systems exacerbates their workload, adding tasks rather than replacing them, leading to a hesitant attitude and minimal effort in compliance. The fear of an increased documentation burden is a significant factor contributing to this attitude. Specialists attribute their attitude to macro-level decisions promoting market forces in healthcare, resulting in system fragmentation and a proliferation of incompatible digital platforms. The plea for legislative changes at the macro level is emphasized, with specialists advocating for strict measures to enforce interoperability and streamline information exchange options.

By meeting these preconditions, efficiency is evoked through automatic integration of digitally exchanged information and overview is created by minimizing the input of information, which will alleviate their workload since the documentation burden will decrease. However, the attitude towards digitalization is dependent on potential positive experiences.

At the micro level, specialists highlight additional influential factors contributing to their hesitant attitude. Some specialists point out the prevalent belief that a system will solve all issues, but they emphasize the necessity for individual effort, motivation, and discipline to effectively integrate a system into their workflow. Investing in digital skills is also mentioned as an important factor. This underscores the importance of individual behaviours and attitudes within the micro-level dynamics influencing the adoption of digital systems for information exchange.

> *"Most doctors expect that the system will fix everything for them, but that is a very about statement, since you have to be motivated and disciplined to learn and make use of the full potential of the system to make sure it is beneficial to you."*

Attitude towards standardization

According to the results, the medical culture, characterized by a hierarchical and autonomous structures, is identified as a significant factor influencing specialists' resistance to change in digital information exchange. Specialists acknowledge the importance of standardization but face challenges in implementation, citing a lack of time, expertise, and skills. The resistance stems from a strong attachment to individual workflows and a fear of relinquishing autonomy. The perceived lack of urgency for standardization, coupled with the absence of management at the meso level, hinders efforts. Specialists emphasize that addressing the autonomous culture at the micro level is crucial for standardization, yet acknowledge the need for meso-level management, which is currently limited. To enable nationwide exchange, specialists call for macro-level decisions and policies to support standardization efforts.

> *"Doctors are involved in a complex force field, which creates a difficult environment to change."*

In addition, efficiency is key according to specialists and since there is no time available it is also impossible for them to adapt to a different workflow, which sustains the individual workflows. Navigating the intricate interplay of time constraints, efficiency concerns, and the regulatory obligation to document every aspect poses a challenging puzzle on the path toward standardization and transformation.

> *"Everyone should be very disciplined and committed to a standard workflow, which is vital for patient safety. However, the challenge is that doctors are very stubborn and want to do things their own way."*

Privacy & consent management

The most considerable and extensive bottleneck for transmural digital information exchange mentioned by specialists is the privacy and consent legislation at macro level. Specialists expect a central management system, at meso level, that regulates consent, so that precious time during their consultations isn't spent on this complicated topic. However, at micro level they are directly influenced by the lack of such a system, because they are highly reliant on patient information that is being exchanged, wherefore consent is required.

> *"I believe it isn't up to me to explain consent to the patient and waste precious time I have within a consultation on this topic."*

Patient empowerment

In summary, specialists prioritize patient safety but express concerns about the impact of digitalization on patient interaction. The dominance of digital tasks reduces time for patient engagement, potentially compromising the quality of care and patient empowerment. While specialists emphasize the importance of involving patients in digital exchanges, challenges arise due to varying patient needs and the potential risk to patient safety. Developments such as Personal Healthcare Environments and Patient Environments contribute to confusion and a lack of overview. Specialists highlight the need for clear legislation at the macro level and organizational measures at the meso level to ensure effective patient involvement and safe digital information exchange.

Conclusion of interviews with medical specialists

To answer the main research question in the conclusion, which factors can be expected to be influencing the implementation of the BgZ?, first the sub-questions 1 and 2 will be answered per research group.

RQ1. **How is the transmural digital information exchange currently organized and experienced by employees, and medical specialists in particular, of the RdGG?**

According to medical specialists, the current organization of transmural digital information exchange isn't meeting their expectations. The decision at macro level to apply market forces is blamed for the consequences experienced by medical specialists. Fragmentation have caused the development at meso level of many digital information systems and the lack of interoperability, which have caused the workload to increase for medical professionals to maintain quality and safe care. Nevertheless, developments and decisions made within macro and meso level have impact on the micro level, within the micro level several factors also influence the organization and experience of information exchange. In line with this, the current autonomous and hierarchical culture is challenging and is holding back innovation, growth and change. But also the negative experiences with information exchange have led to a hesitant attitude towards change. On the other hand, discipline, motivation and commitment among specialists are also influential factors. Of course, time management is a burden, which evoke the expectation of efficiency, therefore, the urgency of standardization isn't present. So the effort and input of medical specialists at micro level is also lacking. Due to the respected position of specialists, they have a significant influence on the decision-making process and currently management, at meso level, is organized around the specialists.

Lastly, the current organization of consent management is experienced as a huge bottleneck for a positive experience of transmural digital information exchange and the biggest concern for specialists is the safety of their patients. The current organization is impacting patient empowerment within consultation rooms, which is what specialists try to minimize by staying in control and try to cope

RQ2. **What are the expectations and requirements of employees, and medical specialists in particular, of the RdGG of the organization and experience of transmural digital information exchange?**

The expectation of the organization and experience of transmural digital information exchange is clear. Medical specialists expect that when decisions are made at other levels that will impact them they are included to provide input, however a user-centred approach is required to start developing from the perspective of the user. Involving medical specialists is the most important requirement. Furthermore, they expect an interoperable and minimal amount of exchange system that can support their need for overview and efficiency to practice time management successfully. This requires a practical Electronic Patient File and a centralized consent management system. Medical specialists are aware of the benefits of standardization but expect a guided approach and implementation, because they lack skills and knowledge, but therefore the autonomous culture needs to change as well and effort and contribution is required.

2.3.2 Results of interviews with organizational employees

The results of the analysis derived from the semi-structured interviews with organizational employees are presented. Several quotes are included to substantiate the explanation of the results.

Lack of human-centred approach

In essence, organizational employees at RdGG are familiar with the Wegiz and BgZ but highlight the need for improvements, emphasizing a human-centered approach for efficient BgZ exchange. Despite ongoing implementation efforts to meet legislative obligations, challenges persist. Specialist input is labor-intensive for BgZ extraction due to explicit ZIB filling, deviating from desired workflows. Additionally, information filtering by specialism is lacking, causing time inefficiencies. The absence of layout standards allows varied interfaces, resulting in user-unfriendly designs and interoperability issues. Conversely, positive government initiatives, reflecting support for addressing specialists' concerns, evoke optimism among healthcare employees for the future. This result explains that the lack of taking micro level input into account during the development of legislation at macro level will affect the developments at meso level and the workflow at micro level. The translation between macro and micro level is rather technical, however the awareness of the human aspect is limited. According to the employees, this also includes informing all stakeholders within the healthcare ecosystem about the legislative developments of the BgZ to prepare them for change.

Attitude towards digitalization of transmural digital information exchange

The outcomes mirror those of medical specialists, highlighting the repercussions of macro-level decisions introducing market forces in healthcare. Fragmentation caused numerous digital systems, and interoperability gaps create hesitancy among organizational employees. Organizational employees advocate for streamlining information sources and implementing interoperable systems to enhance efficiency. Crucially, a plea is made for sustained commitment to a chosen solution to avoid perpetuating problems. Organizational employees emphasize the necessity for clear guidance on prioritizing and integrating digital solutions into medical specialists' workflows for a positive experience and attitude. This again substantiates the relation of macro, meso and micro levels.

> *"The BgZ is the first step in the right direction, and I am very happy that we are starting somewhere, but I hope that we can be aware of the time and effort that is required to invest and build a working solution. Jumping to the next solution won't solve anything, we need to keep building if it isn't perfect from the start, because physicians can't handle changes any more."*

Organizational employees identify key factors influencing attitudes toward standardization across various levels. At the macro level, they observe a lack of structured control in establishing nationwide information and quality standards necessary for BgZ implementation. On the micro level, a natural fear of increased documentation burden and resistance to change is noted, exacerbated by deeply ingrained autonomous cultures fostering individual workflows. These personalized workflows, though inefficient, act as coping mechanisms due to the absence of viable alternatives. Moreover, at the meso level, the customization of digital registration systems to individual preferences supports these workflows. Despite the organizational employees' urgency for standardization, they highlight that medical specialists have a significant position and lack a sense of urgency, pose a challenge. Additionally, the absence of management contributes to delays in implementing standardization efforts.

> *"We as organizational employees are subordinate to medical specialists, and so we maintain the use of individual workflows by listening to individual preferences."*

Lack of collaborative management

The autonomous and hierarchical nature of healthcare organizations is identified as a root cause of the lack of collaborative management. Fragmentation within hospitals and departments, driven by medical

specialists who are in control but constrained by time, hinders uniformity and the pursuit of common goals directed by a central management team. Organizational employees emphasize the need for changes in the hospital's organizational structure and the adoption of business models to foster a collective approach. They stress that changes at the micro level are essential to drive changes at the meso level, aligning with legislative obligations set at the macro level. This highlights the interconnectedness of levels, demonstrating that changes at the micro level can influence higher levels.

The role of organizational employees is to translate legislative frameworks into technical solutions. However, they mention to encounter challenges in engaging medical specialists to provide the necessary input for this translation from the macro to the micro level. The control of the macro level is mentioned as a requirement to engage the input from micro level to guide the process from top to bottom.

> *"Healthcare organizations are very old-fashioned in their structure, because the physician is at the top, however this isn't beneficial if you want to accomplish change."*

Change awareness & management

The research findings emphasize the need for a paradigm shift in change management within healthcare organizations, particularly at the meso level. Organizational employees propose improved management practices, allowing specialists more time and education to adapt to new features or systems. Suggestions include dedicating time for adjustment, exploring the system's nuances, and engaging specialists in collective decision-making. However, specialists' fear of losing control, as mentioned by organizational employees, poses a challenge, influencing their perspective on change management. An effort from their side is expected to commit and contribute to also reach goals.

> *"Maybe it's better to say today you have more time per patient, but we are working with this system so you can learn and adjust to the new workflow and figure things out, before we implement it entirely."*

Privacy & consent management

The organizational employees collectively identify privacy and consent legislation as a substantial obstacle in the realm of digital information exchange. The lack of centralized systems for managing consent is perceived as a risk, potentially resulting in data breaches and heightened scrutiny. This decentralization leads to intricate, labor-intensive procedures, demanding meticulous validation of personal information to adhere to legal requirements. The complexity of the consent process, coupled with patient unawareness, creates challenges in information management and meeting doctors' expectations. The employees emphasize the need for a more streamlined and informed consent system to ensure effective care without unnecessary complexities.

Patient empowerment

Organizational employees anticipate a forthcoming trend of increased patient responsibility but underscore the importance of addressing internal challenges within healthcare systems before extensively involving patients. They advocate for a short-term adjustment by challenging assumptions about patients' capabilities in organizing their healthcare journey and navigating digital components. The employees emphasize the necessity for a mindset shift among healthcare providers, promoting trust in patients' abilities rather than viewing them as inherently vulnerable. While recognizing the eventual shift towards patient responsibility, the employees caution against an exaggerated focus on patient empowerment, highlighting that patients primarily seek what is best for them while acknowledging the expertise of doctors. They stress the need for a measured approach and a change in assumptions about patient capabilities as crucial short-term adjustments. Additionally, employees assert the importance of government control over Personal Healthcare Environments (PGOs) to address issues arising from numerous providers inadequately serving user needs.

"The purpose of the PGO is great, however the way of developing is repeating the mistakes made due to market forces Within the healthcare system itself. Let's hope the government won't shut the eyes for this rising problem."

Conclusion of interviews with organizational employees

To answer the main research question in the conclusion, which factors can be expected to be influencing the implementation of the BgZ?, first the sub-questions 1 and 2 will be answered per research group.

RQ1. **How is the transmural digital information exchange currently organized and experienced by employees, and medical specialists in particular, of the RdGG?**

Organizational employees acknowledge that the current organization of transmural digital information exchange, and experience and witness the consequences. Again, market forces are blamed for the chaos in the meso and micro level. They also acknowledge the experience of specialists and are amazed by the urge to keep developing solutions, without commitment to trying to decide on one and make it perfect. They witness that specialists can't prioritize a system due to the lack of time, and it's simply added to the pile of tasks, without replacing anything. Consequently, everyone has developed their individual workflow to be as efficient as possible and the autonomous culture is holding back the awareness and urgency of standardization. Nevertheless, the efforts of organizational employees to change, the current organization is maintained also due to the fact that specialists have a significant position within the organization, which is supported by employees to adjust workflows to personal preferences of specialists. However, translating legislation into technical solutions require user input, which is a gap to bridge.

The importance of patient empowerment is acknowledged, however the urge for internal organization of information exchange as priority is mentioned. Employees address their fear of repeating the same mistakes within the exchange towards patients and mention the current development of many PGO's as an example already. In addition, the privacy & consent management is causing the biggest problems.

RQ2. **What are the expectations and requirements of employees, and medical specialists in particular, of the RdGG of the organization and experience of transmural digital information exchange?**

Among organizational employees prevails the expectation of the government taking control in the matter of organizing the future of information exchange, because at other levels this is impossible, since it is a nationwide issue. They expect clear and concise standards, legislation and guidance. In addition, the urge for a human-centered approach is stressed. Not only within the approach but also within legislation to really enforce this by making decisions and providing policies for software developers, healthcare organizations etc, so that a national standard is defined. This will exclude the risk of the lack of interoperability and the development of many different systems. Including the user within the decision-making process is required since they are impacted indirectly, so their expectations for efficiency, time management and overview should be met. At meso level, they expect that business model should be applied to create a clear approach and management towards collective goals. However, implementing this transition requires the commitment of specialists and a willingness to relinquish some control and autonomy at the micro level. Furthermore, a centralized consent management system should be organized, and patient empowerment must be dealt with in a structured way.

2.3.3 Results of interviews with patients

The results of the analysis derived from the semi-structured interviews with patients are presented. Several quotes are included to substantiate the explanation of the results. However, the results present the experience of patients with digital information exchange themselves and during consultation with their specialist, and what their expectations are for the future.

Expectations
Patients expect doctors to possess comprehensive knowledge about their medical history and the purpose for a referral. While they understand the challenges doctors face due to their busy schedules, patients often hesitate to ask questions or take up extra time during appointments. This adjustment in patient expectations is influenced by the doctor's focus on the computer, creating a dynamic where patients may not fully express their concerns or seek additional information to avoid causing pressure on the doctor's schedule. The interaction is notably impacted by this adjustment, highlighting the need for improved communication and understanding between patients and healthcare providers.

"I know that doctors are extremely busy, so I just don't want to bother them too long, and sometimes that means that I won't ask all my questions."

Lack of Overview on Medical Information & Journey
Patients express challenges in managing their medical information due to the multitude of healthcare portals, each with its login system and interface. They desire a unified platform for a cohesive overview and preparation for consultations. Personal Healthcare Environments (PGOs) are known but not considered a solution due to their diversity. Patients mentioned that they mostly remember or make notes during consultations, despite the knowledge that everything is shared within the patient portal, because the information provided there is too medical and lacks overview as they explained.

Digital Skills
Patients feel confident in their digital skills but emphasize the importance of user-friendly interfaces. They trust specialists to have adequate digital skills for providing care. Patients envision contributing more medical data via devices like smartwatches in the future, they highlight a positive attitude towards digitalization.

"I can imagine that older generations are having difficulty with digital applications, therefore other means should be available, but in the future I believe everything will be digital, which is a good thing in my opinion."

Communication preferences
Patients find medical processes unnecessarily complex and prefer email or applications for communication. Consent issues are perceived as unclear. Video or phone calls are preferred for their efficiency. Expectations include a desire for doctors to possess comprehensive knowledge about patients and a willingness to actively manage their healthcare data if provided with accessible tools.

"I simply don't make use of the digital environments because they are all very technical, and I don't understand why everything medical should be so difficult."

2.4 Conclusion

The answers to research questions 1 and 2 per research group have led to answering the main research questions.

MRQ. Which factors influence the implementation of the BgZ?

The results show a clear list of factors that can be expected to be influential during the implementation of the BgZ.

Firstly, interoperability and streamlining the amount of exchange streams are the most instant factors to be taken into account. Consequently, the BgZ offers one means of exchange and the Wegiz is obliging technical components to meet standards to create interoperability. However, the human aspect within the current organization is limited and therefore a gap between the translation of legislation into technical solutions is originated. This also addresses the dependency factor of healthcare providers of software developers, which evokes the desire to regulate their influence, that is driven by financial factors, through legislation.

Moreover, time pressure, efficiency and overview are key for qualitative care, since the reliability of accurate and complete information is significant and therefore efficient information exchange is reliant on interoperability. The tension field between above-mentioned factors have caused individual workflows among healthcare professionals to cope with the current situation. This is challenging for the implementation of the BgZ, because these individual workflows are a bottleneck for standardization. There are other factors that influence these individual workflows to be a challenge as well. The current organization of information exchange has caused many negative experiences, and therefore a hesitant attitude towards digitalization and change is evoked.

Furthermore, cultural factors are influential as well. The profound position of physicians is observed and mentioned in various ways. Firstly, current organizational structures within hospitals are centered around physicians to support them in their daily activities. However, due to a lack of time, collective decision-making is a challenge. While organizational employees strive to incorporate user input into their processes, their dependence on individual interactions leads them to tailor their activities and adjust systems based on one-on-one conversations and individual preferences. This creates fragmentation of workflows as well. In addition, the autonomous and hierarchical culture within the healthcare system is an important influential factor as well. Due to the autonomy of physicians, it is hard to create a collaborative environment and collective decision-making is limited. The lack of time is of course also influential.

In addition, there is lack of a sense of urgency for standardization due to the factors mentioned above (time pressure, individual workflows, patient empowerment and culture within healthcare). The cultural aspect is also used as coping mechanism of physicians, because their autonomous position provides them control over their activities to manage healthcare. Standardization might be a threat to this autonomy and requires commitment and additional effort to adapt, which they can't afford within their tight schedules. The perspective of several physicians is very straight forward, and they believe that this motivation for putting in an effort is also required to get used to something new. So external and internal factors are involved.

Other factors that may influence that lack of collective management is the lack of digital knowledge and skills among physicians to provide useful input and make decisions. A potential solution the organizational employees mention is the awareness for change (change management). Guidance and preparation time provided through incorporating change management is needed for people to adjust to change and adapt their workflow. Consequently, the attitude towards change is dependent on experiences.

Another factor that is of high influence is consent management. The lack of a centralized management system is a bottleneck for the current digital exchange of information, because there

seem to be no specific owner that is responsible to manage this and therefore misunderstandings occur between physicians and patients. This leads to the last factor that is to be taken into account, patient empowerment. The shared decision-making approach is applied in healthcare, however this approach is threatened by the documentation burden during consultations, which takes up the majority of the time and therefore attention for the patient seems less present.

Lastly, the current developments regarding information exchange with patients through patient portals and PGO's might cause concerns for patient safety, because the lack of overview and the complexity of medical information and environments can cause confusion and stress. The expectations and preferences of patients are highly influential for the perception of good care, and therefore a structured approach is required according to all interviewees.

The conclusion shows a complex, interconnected tension field of factors within the multiple layers of the ecosystem. Therefore, a discussion is needed to distil the meaning to identify opportunities for further research and for a design intervention.

2.5 Discussion

The conclusion gives a comprehensive understanding of the factors that are potentially influential for the implementation of the BgZ. What these insights mean will be discussed within this paragraph.

The lack of incorporating the connection with the human aspect within the organization of digital information exchange can be distilled from all research results, which is recognized within the development of the Wegiz and BgZ as well. The legislative framework that is proposed by VWS is focused on solving technical components through legislative regulations, wherefore standards are defined to ensure smooth exchange of digital information, with the intention to increase information availability with the desire to decrease the workload for healthcare providers. However, human behaviour change is required for the BgZ to be successful because human labour is required to register information to exchange the BgZ. Therefore, the human factor is a crucial influential factor for the implementation of change and therefore also for the BgZ. This substantiate the conclusion that there is a gap existent between macro and micro level, that is expected to be filled by the meso, however direct integration of micro level perspectives into macro level is required. This underscores the importance of the recognition of the interconnectedness between levels.

The conclusions, however, show that incorporating the micro level within the various layers of the healthcare system is required for change management. Therefore, the possible opportunities discovered during conducted research are discussed.

The implementation of the BgZ requires behaviour change, however awareness for the BgZ is not at all present, which is a challenge for the implementation of the BgZ in the first place. Therefore, connecting legislation to the human aspects in micro level is needed. To enable behaviour change it is important to guide and involve the stakeholders towards change. Therefore, creating a supportive base is needed to have the early adapters on board and the change process over the various types of people is initiated. However, to create a supportive base the willingness for change should be evoked. This can be done through creating awareness by informing, educating and experiencing users regarding the content of the BgZ. Through input sessions, pilots and presentations, input can be gathered regarding practical, technical, and experiential components, which can be useful for decision-making. By creating a supportive base, users will adapt to change. The need for a collective approach is required, because the exchange of the BgZ can only be successful if everyone contributes. When contribution is increased, the benefits can be experienced, and confidence can be built. The connection from macro level to micro level is a two way street. VWS can provide input towards healthcare and the other way around regarding the implementation of the BgZ. In addition, representing users within legislation through gathering input can evoke a more human-centered approach within the entire healthcare system as well. From the research outcomes, several examples could be derived.

The dependency of healthcare providers of software developers and the desire for legislation to regulate their influence is mentioned. The reason is that a field of tension originated from different perspectives regarding care and financial factors. Furthermore, input could be gathered regarding the wish for the obligation of a standard interface of the BgZ that incorporates a user-centered approach to avoid the development of many different interfaces of the BgZ. This also underscores the connection between meso level with the other levels to be important.

Moreover, a shift within organizational structures at meso level to incorporate the connection with the human aspect at micro level may be needed as well. The awareness of the important position of physicians within an organization and the cultural factors within the medical environment and how these factors challenge change might be the first step. By recognizing the different workflow and combining this with the awareness for the benefits of standardization, collaboration between physicians can originate. Therefore, a change in management might be needed to guide this process. An example can be to adopt change management, to roll out a

pilot within departments where physicians are given more time per patient to learn a new system or give workshops or trainings regarding the improvement of digital skills. Applying business models within hospitals can also be a fruitful opportunity. The purpose of this change in management can be to support physicians and spare them the complex task of decision-making to evoke change, for which they lack time. By incorporating this connection meso level will not only be the translator from macro to micro level, by translating legislation to technical applications, but will have a direct influence on micro level as well.

Hopefully, through the guidance and support within multiple layers, the attitude of physicians will change over time. However, individuals can also change their attitude by reflecting on their role within the healthcare system and how they could contribute, therefore intrinsic motivation is required. The willingness among healthcare providers to take care of their patients in a safe and qualitative way can be the motivational force. However, to change human behaviour for the benefit of implementing the BgZ external influences are required. Therefore, the connection of the micro level to the other levels is also required and this underscores that contribution at all levels is required for a successful implementation of the BgZ.

The conclusion underscores the intricate interconnectedness of macro, meso, and micro levels in the healthcare system, particularly in the context of transmural digital information exchange and the prospective challenges associated with BgZ implementation. Recognizing the interdependence of these influencing factors is crucial for instigating meaningful change and cultivating a collaborative and efficient healthcare environment. The comprehensive understanding of these interdependencies serves as a foundation for addressing current challenges. The conclusion emphasizes the necessity of transcending individual assumptions and preferences, advocating for a cohesive and integral approach. Aligning strategies across different levels and acknowledging the nuanced aspects within influencing factors between levels are highlighted as essential steps in achieving effective change in the healthcare landscape. See figure 15

In short, to evoke change it is necessary to reflect on influential factors overarching the macro, meso and micro levels and the effects within the levels. Within each level it is, however, required to include the perspectives from the other levels as well. This process for change is illustrated in figure 16. Moving from a present situation towards the future the inclusion of all levels is required.

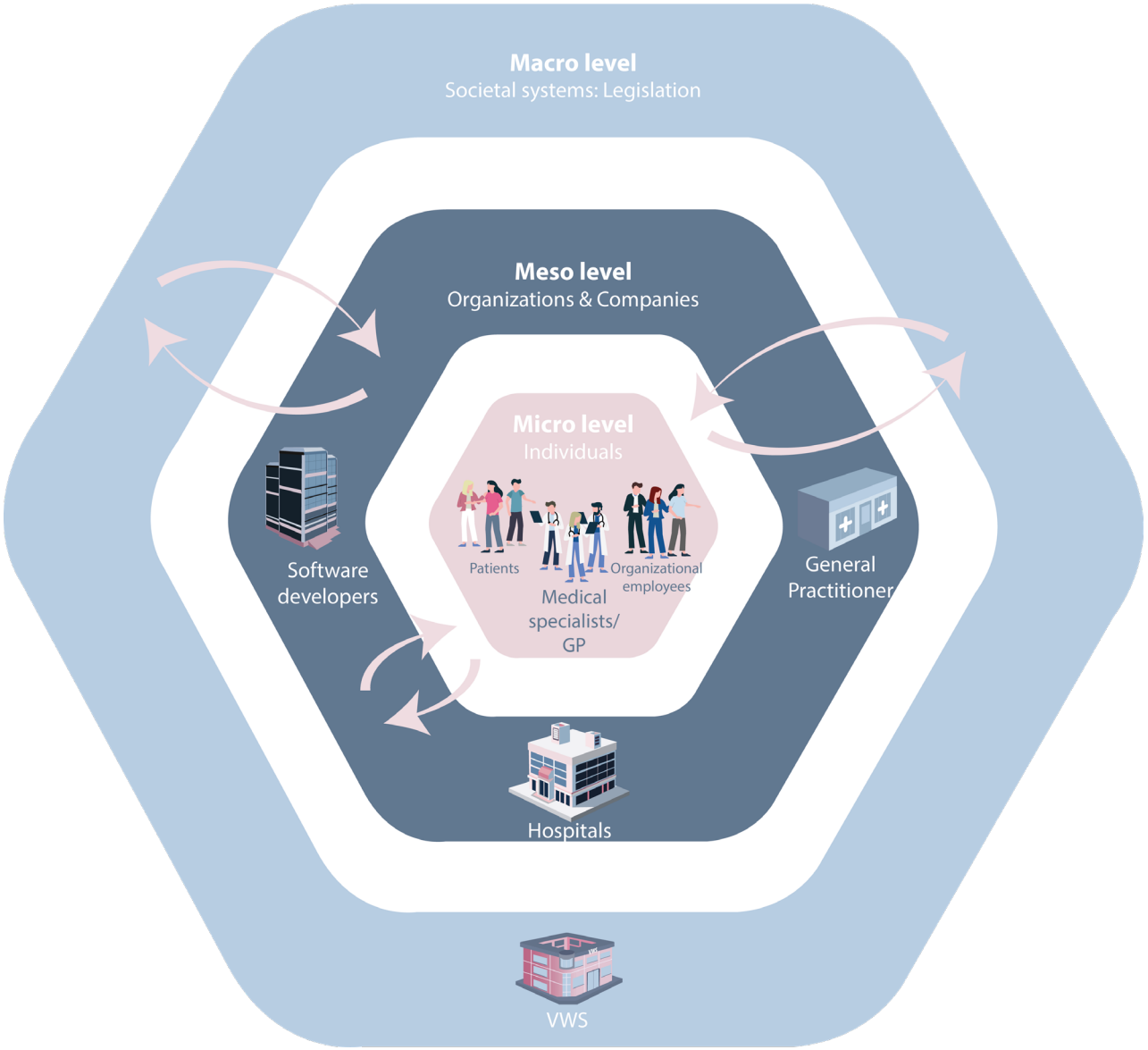


Figure 15. The gaps between the levels of the healthcare system are required to be bridged

The figure illustrates the gaps between the levels within the holistic model of the healthcare system with the white spacing. However, the need to bridge the gaps is depicted with the arrows between al levels back and forth.

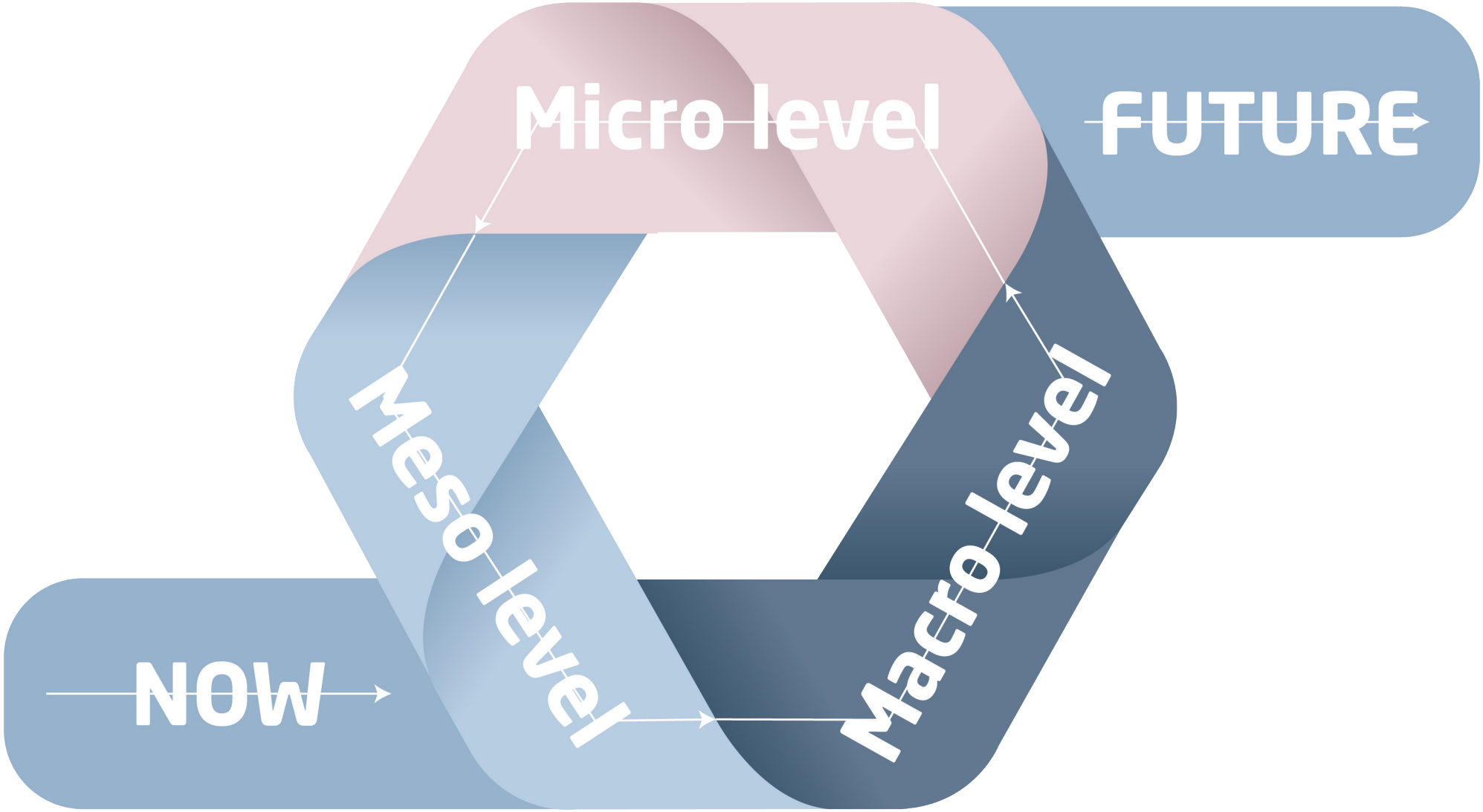


Figure 16. Change model: macro, meso and micro levels

2.5.1 Limitations

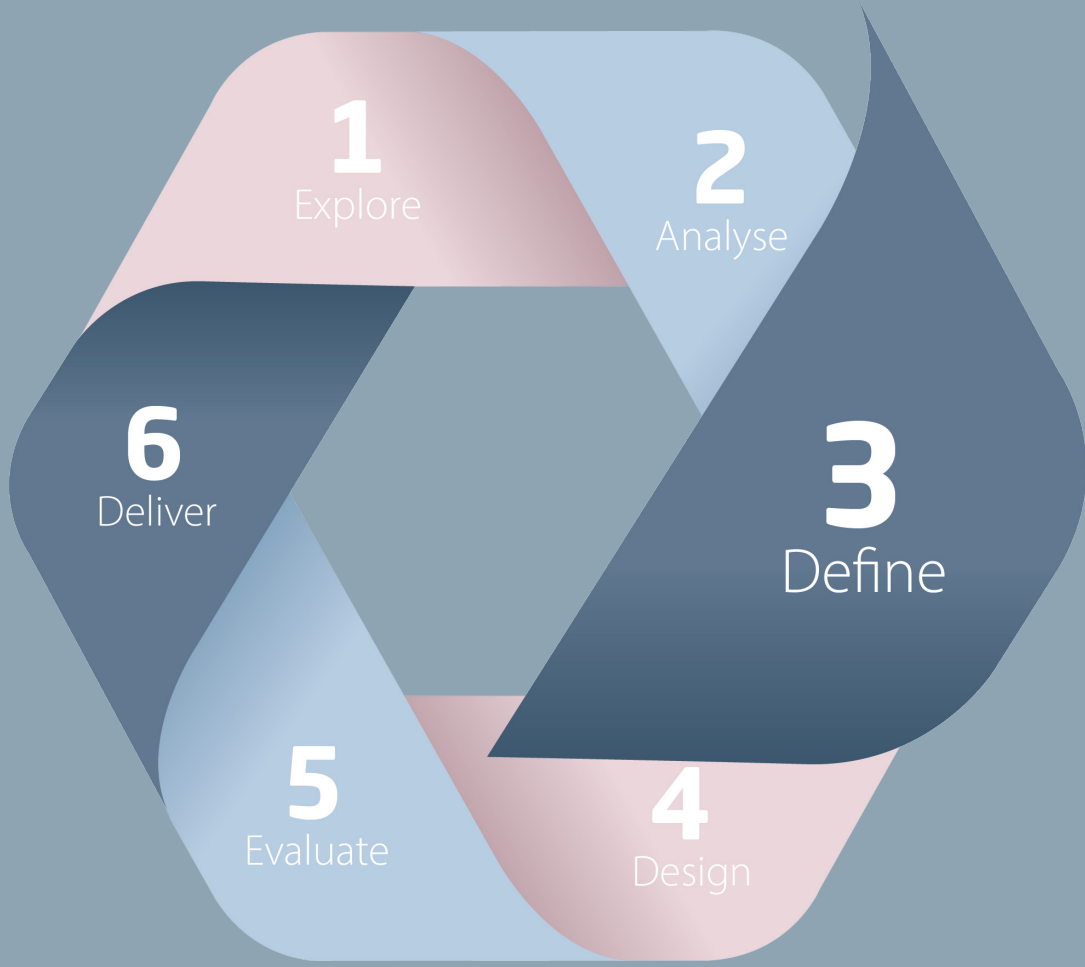
The potential impact of the project outcomes at RdGG is underscored by its role as an illustrative example for implementing the BgZ in other healthcare institutions.
The insights and tools derived from this research may provide guidance for the implementation process of the BgZ and therefore, offering valuable resources to VWS and the healthcare ecosystem.

It's crucial to acknowledge a potential limitation. Given that the research is exclusively conducted at RdGG, the findings may be context-specific to this particular hospital. Furthermore, all results are based on the input of GP's, medical specialists, organizational employees and patients, and their perspective and opinions. Consequently, the applicability of the outcomes to other hospitals may be constrained, posing a limitation for broader generalizations. This recognition of potential limitations ensures transparency and helps manage expectations regarding the transferability of the research findings to different healthcare settings.

Chapter 3

Define

This chapter translates the insights from the analysis into a refined focus within the problem definition (paragraph 3.1). A design goal is defined (paragraph 3.2) and criteria for a desirable, feasible and viable design are formulated (paragraph 3.3).



3.1 Reviewed problem definition

The project aim, as defined in the project introduction, consists of two components. The first component, the identification of factors which may influence the implementation of the BgZ. This is researched in chapters 1 and 2. The conclusion of the analysis in respect of the first component was, in short, that the connection between macro and meso level with micro level within the implementation of the BgZ is currently lacking. The second component is to design an intervention with regard to this conclusion in order to facilitate the implementation of the BgZ. Following the discussion included in the previous chapter, it has become apparent that the intervention should focus on providing a tool for policymakers to facilitate the implementation of the BgZ with regards to incorporating the connection to the micro level.

In the previous chapter's results and discussion, the importance of fostering awareness for change, especially concerning the BgZ, becomes evident among medical specialists (figure 17) who currently lack this awareness. Recognizing the pivotal role of their involvement and contributions in driving change is crucial. However, a hesitant attitude, shaped by negative experiences with digital information exchange, currently hinders their active participation. It is essential to acknowledge their existing experiences as potential intrinsic motivators for embracing change and addressing inefficiencies. Furthermore, introducing the BgZ as a potential solution to mitigate these negative experiences could be a pivotal step in fostering positive change.

The initial purpose of the tool is to evoke human behaviour change to implement the BgZ by bridging the gap between macro and micro level. Therefore, the focus of the second part of this project will shift towards this purpose.

Medical specialist

Dr. Martijn van Dijk - Cardiologist
45 years old
Dutch
Lives in Delft

Activities & responsibilities

- Patient care/Consultations
- Diagnosing/Treatment
- Treatment planning
- Administration
- Patient data management
- Research
- Team coordination

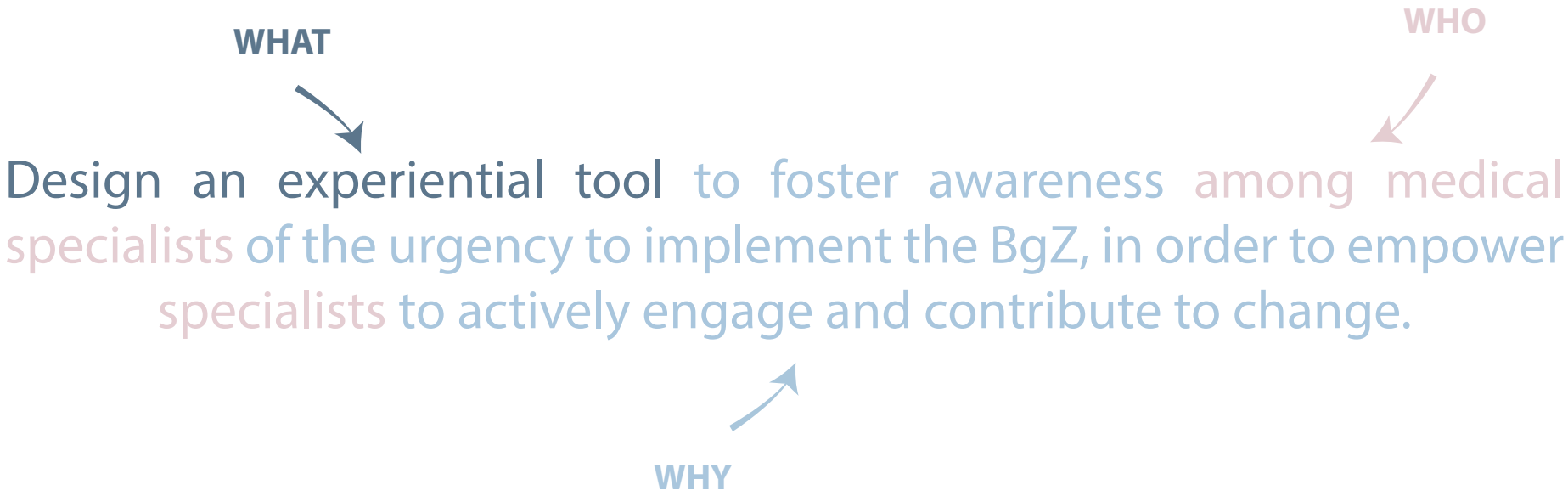
"Navigating the digital landscape in health-care is like deciphering a complex rhythm strip, vital but not without its challenges."

Figure 17. Persona of medical specialist

3.2 Design goal

In view of the above and in order to warrant a fruitful design phase, the design goal is redesigned as follows:

Design goal



3.3 Design criteria

In order to reach the design goal and in order to create a desirable, feasible and viable design, the intervention should comply with the following criteria. These criteria will also serve as a performance indicator in the evaluation of the final design concept in chapter 5.

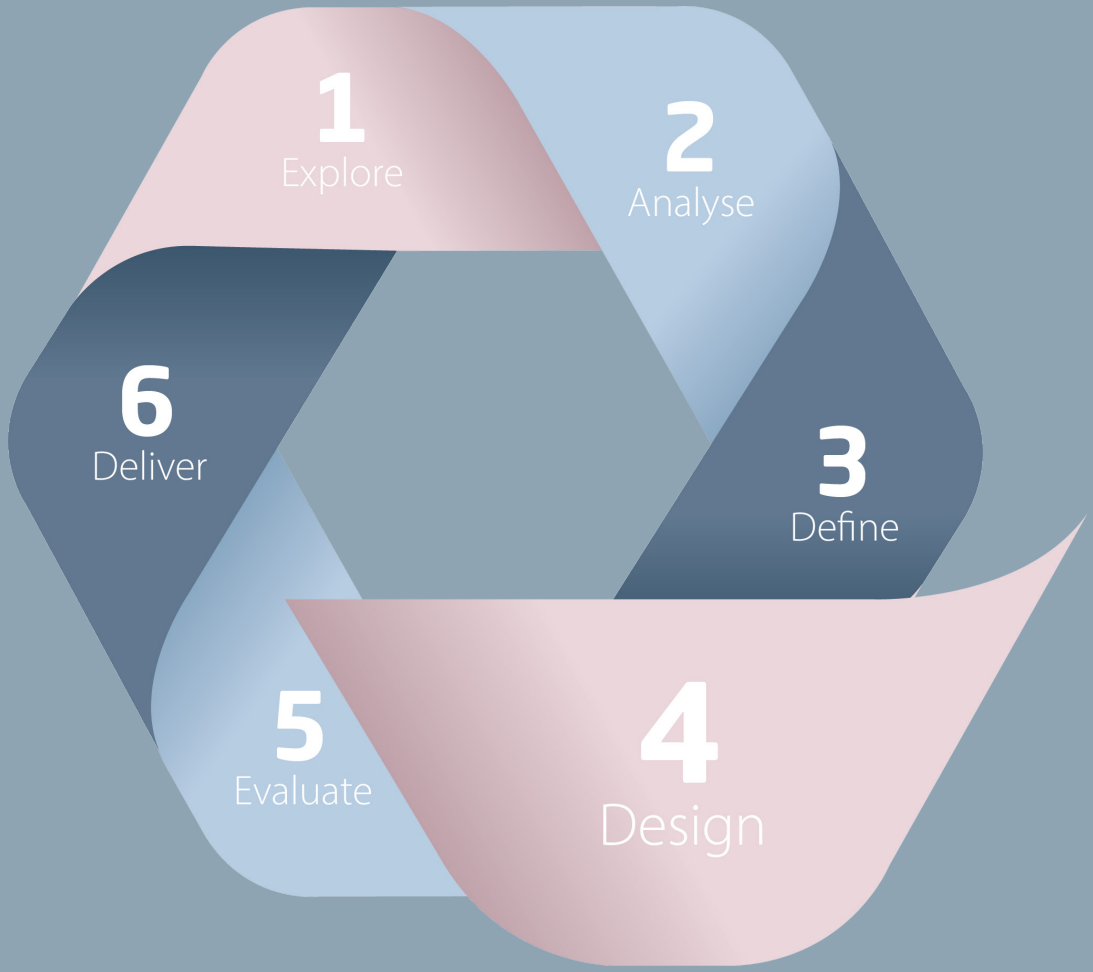
Design criteria

1. The design should educate users on the topic of the BgZ.
2. The design should be user-friendly and intuitive to use.
3. The design should increase engagement.
4. The design should reflect theory and reality to apply gathered knowledge and experience into reality
5. The design should evoke collaboration between users.
6. The design should be accessible for any audience related to the healthcare ecosystem.
7. The design should encourage users to share their perspectives.
8. The design should motivate and inspire for change and contribution to a future-proof healthcare system.

Chapter 4

Design

In this chapter, the design activities are described that led to the final design concept. Firstly, the ideation process, where several design methods are used to come up with concepts that fit the criteria and design goal, is explained (paragraph 4.1). Serious gaming is chosen as the best means to reach the design goal, and literature is presented to explain this decision (paragraph 4.2). Furthermore, the design of the first serious game concept is presented (paragraph 4.3) and the results of various iterative cycles are presented (paragraph 4.4). Lastly, the final design concept is presented (paragraph 4.5).



4.1 Ideation

Various design methods are applied to ideate and come up with a concept. Firstly, a metaphor is defined as an interaction vision to find inspiration for a solution that combines the design goal and criteria into interaction qualities. Certain qualities were chosen from the vision that address the design goal naturally. These qualities are used during brainstorming and HOW-TO methods to come up with concept that contain these qualities.

4.1.1 Interaction vision

In the exploration to a suitable vision, several interactions are explored in which education and to directly experience and apply the knowledge into reality, which will empower people to engage and contribute to the collective goals. Accordingly, the qualities of this interaction to reach the described goal are distilled and analyzed to pick the most fruitful qualities. A short description is given on what the quality can deliver.

The chosen interaction vision (figure 18)

Envision the education on the BgZ as learning to cultivate a community garden. Cultivating a community garden is a complex process. Initially, one must gain an understanding of each participant's role and learn the cultivation techniques and tools required for each area. This mirrors the need to comprehend the intricacies of the BgZ regulations. However, true expertise in the rules comes from practical experience, as one learns about the advantages and disadvantages through hands-on involvement.

In the garden, everyone tends to their own plot, emphasizing the necessity for collaboration to make progress. Establishing agreements together is crucial, as it allows the community to move forward collectively. These agreements may evolve as participants gain more experience with the garden, fostering a dynamic and responsive collaboration. This collaborative effort is essential for building and sustaining the garden over time.

The corresponding interaction qualities and what is delivered through the qualities are described as well.

Figure 18. Interactive vision

Learning to cultivate a community garden.

Interaction qualities

The interaction qualities are presented in figure 19. Each quality is accompanied with a brief explanation of what the quality delivers and its purpose.

Interaction qualities

Qualities	Delivered	Purpose
Responsive/Progressive	To encourage moments of reflection to observe the current situation and adapt to grow.	Feedback mechanisms should guide towards a deeper understanding of the experience
Collaborative	To encourage collaboration among users to achieve a collective goal	Collaboration mechanisms should guide users to share knowledge, experiences or expectations to reach the goal together
Engaing	To ensure to captivate and maintain users' attention	Provide interactive/realistic elements that stimulate curiosity, interest and involvement
Motivational/Rewarding	To motivate users to actively contribute	Provide rewards/achievements or the experience of progress that can inspire to make a positive impact on the healthcare system

Figure 19. Interaction qualities: delivery and purpose

4.1.2 How-to method

To move from the interaction qualities to idea generation, the How-to method is utilized to formulate the qualities into questions to stimulate the process.

The following How-to questions were used during the ideation brainstorm:

How can you reflect?
How can you educate and experience simultaneously?
How can you work together?
How can you evoke collaboration?
How can you engage people?
How can you create an interactive education & experience?
How can you reward people?
How can you inspire people?

The results are clustered to come up with a concept direction. Both are presented in figure 20.

The two most promising concept directions, serious gaming and a case, are used during generative brainstorming sessions with specialists to come up with ideas and evaluate the desirability.

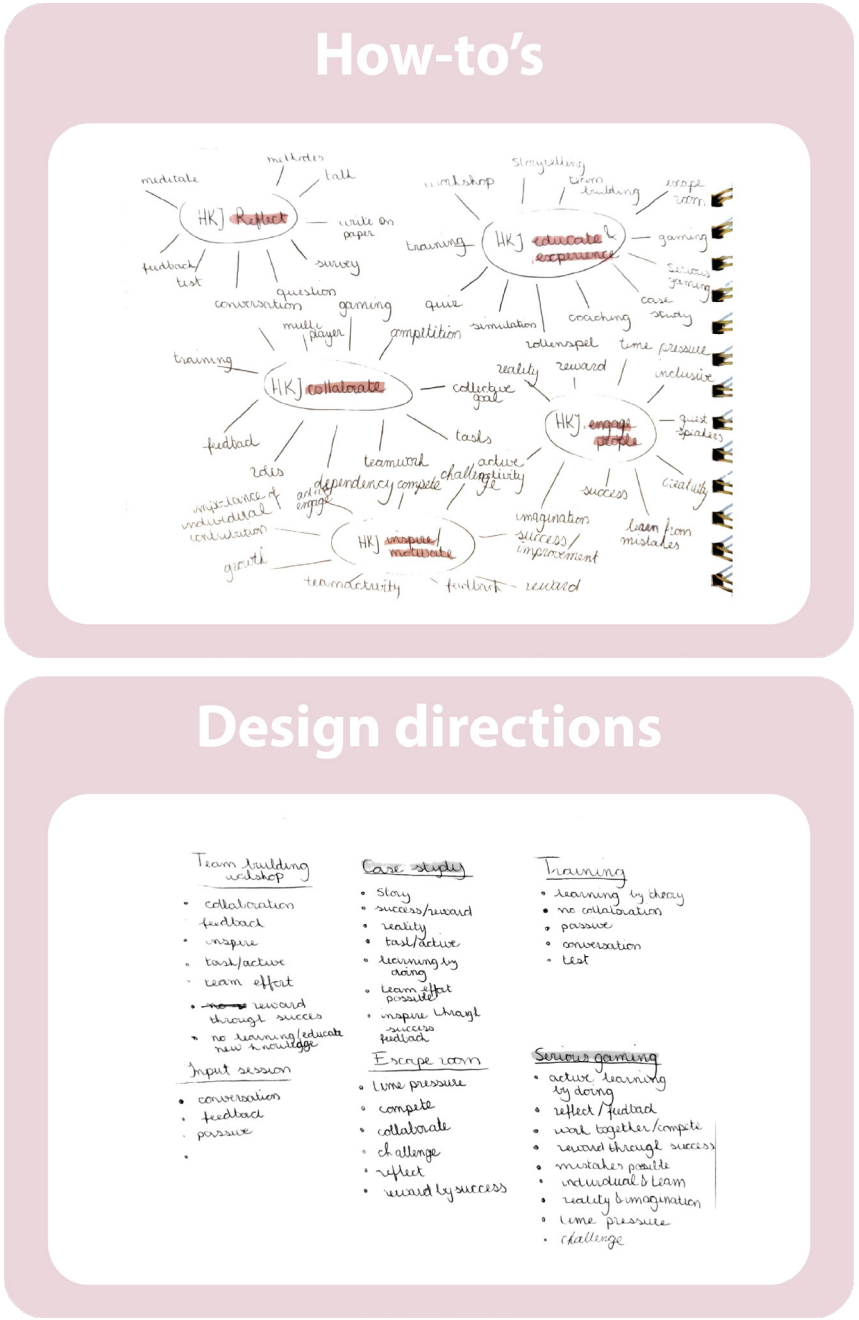


Figure 20. How-to's & design directions

4.1.3 Generative brainstorming sessions

The goal of the generative brainstorming session is to come up with ideas that fit the 2 most promising concept directions and to evaluate what idea is desirable in order to make a substantiated decision.

The two promising concept directions are presented and several How-to questions are stated to stimulate idea generating. Afterwards, the concept directions are evaluated, and a concept direction is chosen that seems most desirable through utilizing a Harris Profile (Harris, 1961). The session is organized in Miro, figure 21. The figure is enlarged in appendix 4A.

The chosen concept direction

"A serious game"

The concept of a serious game is also evaluated upon with the stakeholders, the CMIO as representative of the RdGG and the senior policymaker as representative of the ministry of VWS. They both have expressed to support the concept direction.

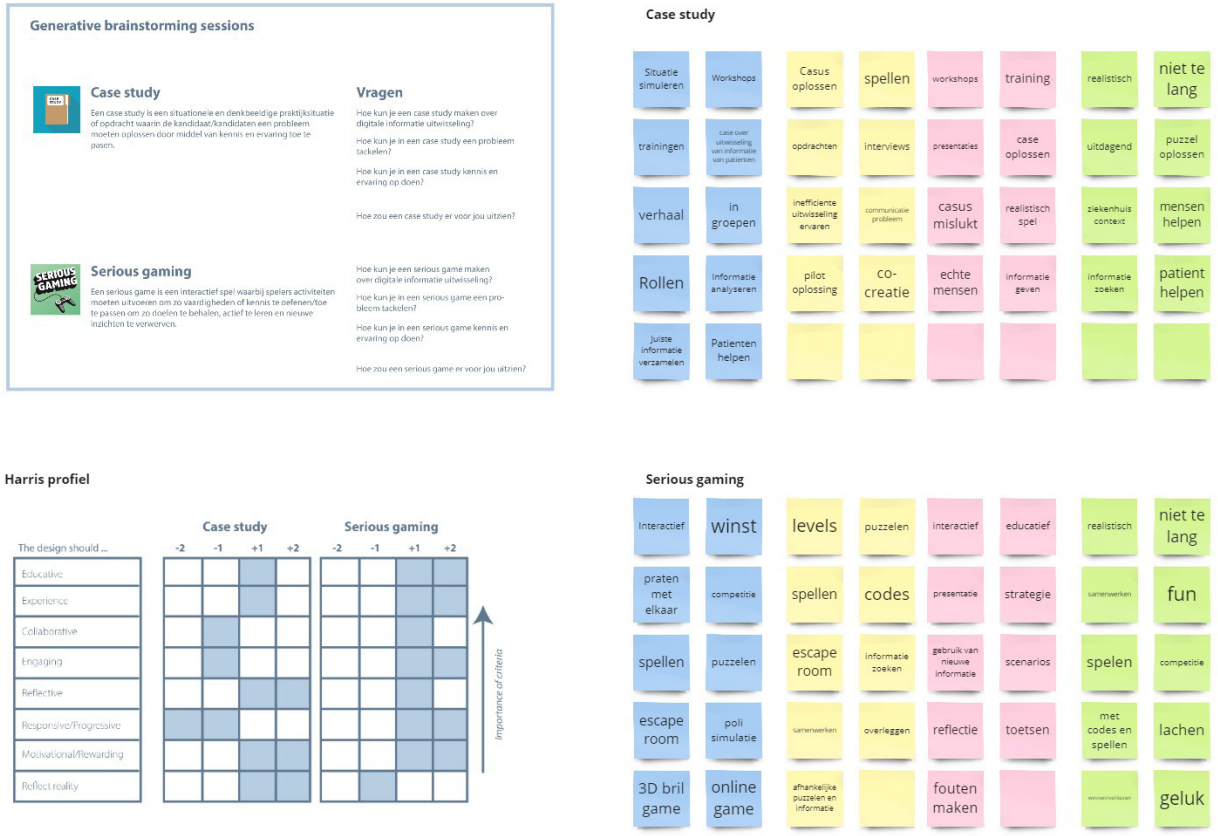


Figure 21. Generative brainstorming sessions

4.2 Serious gaming

The adoption of serious gaming in the process of change stems from its proven effectiveness as a transformative tool (Otto et al., 2016). Literature emphasize that serious games offer a unique blend of experiential learning and active participation, enabling individuals to navigate complex scenarios, understand diverse perspectives, and witness the consequences of their decisions in a risk-free environment. This immersive learning experience contributes significantly to individual and collective understanding, fostering a shared goal and facilitating smoother transitions. (Hernandez, M., Mereno, j., 2018)

The literature underscores the adaptability of serious gaming to various organizational contexts, providing a dynamic platform for employees to engage with change initiatives. By simulating real-world challenges, serious games effectively bridge the gap between theoretical knowledge and practical application. Moreover, their interactive nature sparks intrinsic motivation, promoting a sense of ownership and commitment to organizational objectives. In light of these findings, the decision to design a serious game for organizational or cultural change is substantiated by its demonstrated ability to accelerate learning, enhance collaboration, and drive positive shifts in mindset and behaviour (Larsen, 2019) (Ahmed & Sutton, 2017) which is in line with the interaction vision and design goal and criteria.

In line with the defined criteria, further research is done to complete the list of criteria with game related requirements. According to McMullin (2007), 7 design game principles; objective, constraints, success criteria, reward, play, competition, and fidelity, are fundamental to adopt. Therefore, these principles are applied within the design process and criteria are defined accordingly.

1. The game should have an achievable outcome/objective. (Objective)
2. The game should have clear constraints. (Constraints)
3. The game should have clear success criteria and indicate when achieved. (Success criteria)
4. The game should have clear success criteria based on participant experiences. (Success criteria)
5. The game should include intrinsic rewards (Reward)
6. The game should include extrinsic rewards (Reward)
7. The game should ensure a balanced distribution of rewards (Reward)
8. The game should prioritize a sense of play (Play)
9. The game should balance between challenges and player abilities (Play)
10. The game should include competition with a positive dynamic (Competition)
11. The game should include a simplified reality (Fidelity)
12. The game should serve a dual purpose of clarity and learning (Fidelity)

4.3 The serious game

Firstly, the developments that have taken place to come up with the concept and the brainstorming sessions to design the game are explained. Afterwards, the first serious game concept is presented.

4.3.1 Serious game developments

The design goal, criteria, interactive vision and qualities are defined. However, these elements need to be incorporated within the serious game and therefore game design principles are utilized. Each principle is applied during the game design process.

Learning goals

Understand the need for change
Application of new knowledge and skills
Understand the need for contribution and collaboration
Enable feedback and reflection

Scenarios (Game design principle: Fidelity)

A serious game is a playful way to learn, however the serious part about the game is that reflective moments are required. These moments are important because they enhance the learning effect, since participants can reflect on the decisions that have been made to identify points for improvement, but also translate theory to reality. They can reflect on their behaviour and how to change this through the theory that has been introduced, which can increase their engagement. So reflective moments are incorporated into the game as well. In addition, roles that occur are chosen for the participants to empathize with.

To dive deeper into the game components, it is important to narrow down the approach of the game. Since the current situation with information exchange is an important insight in the experience of specialists and their day-to-day activities, it is interesting to start from there.

However, the implementation of the BgZ is important to incorporate as well, because the goal is to foster awareness and urgency thereof. Therefore, the experience with the BgZ can be an additional game component. By comparing the two scenarios, interesting conversations can be evoked to reflect on theory or experiences and apply this into reality. These components will tackle learning goals 2 and 4. The component of time pressure can be added, since this reflects reality and can address learning goal 1. Both scenarios are played within a specific amount of time, however the current experience is complex and difficult so that the game doesn't succeed within the given timeframe. However, in the scenario where the BgZ exchange is used, the game is succeeded in the given timeframe. This approach can provide participants with insights that the BgZ is beneficial for efficiency and the need for change is addressed. During the game, the exchange of information between participants will include the collaboration component in the game. However, the need for contribution can be derived from the reflective moments where participants can be stimulated to provide feedback on how to change their behaviour in reality to contribute to change.

This game approach has led to a defined game flow in figure 22, from where further brainstorming sessions are done to come up with the content of the game components.

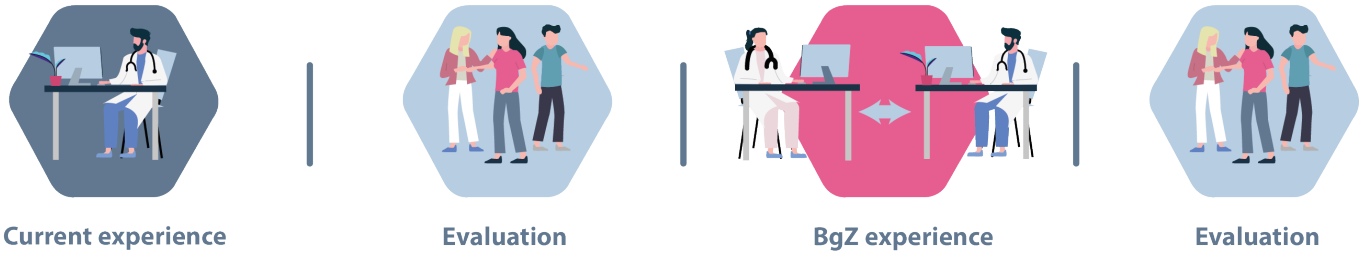


Figure 22. Initial game flow

4.3.2 Individual brainstorming sessions

Now that specific decisions regarding the serious game are done, the content of the game can be designed to meet the game design principles. Therefore, individual brainstorming sessions are executed. The brainstorming sessions are presented in appendix 4B.

4.3.3 Serious game concept 1

The first serious game concept is presented in figure 23.

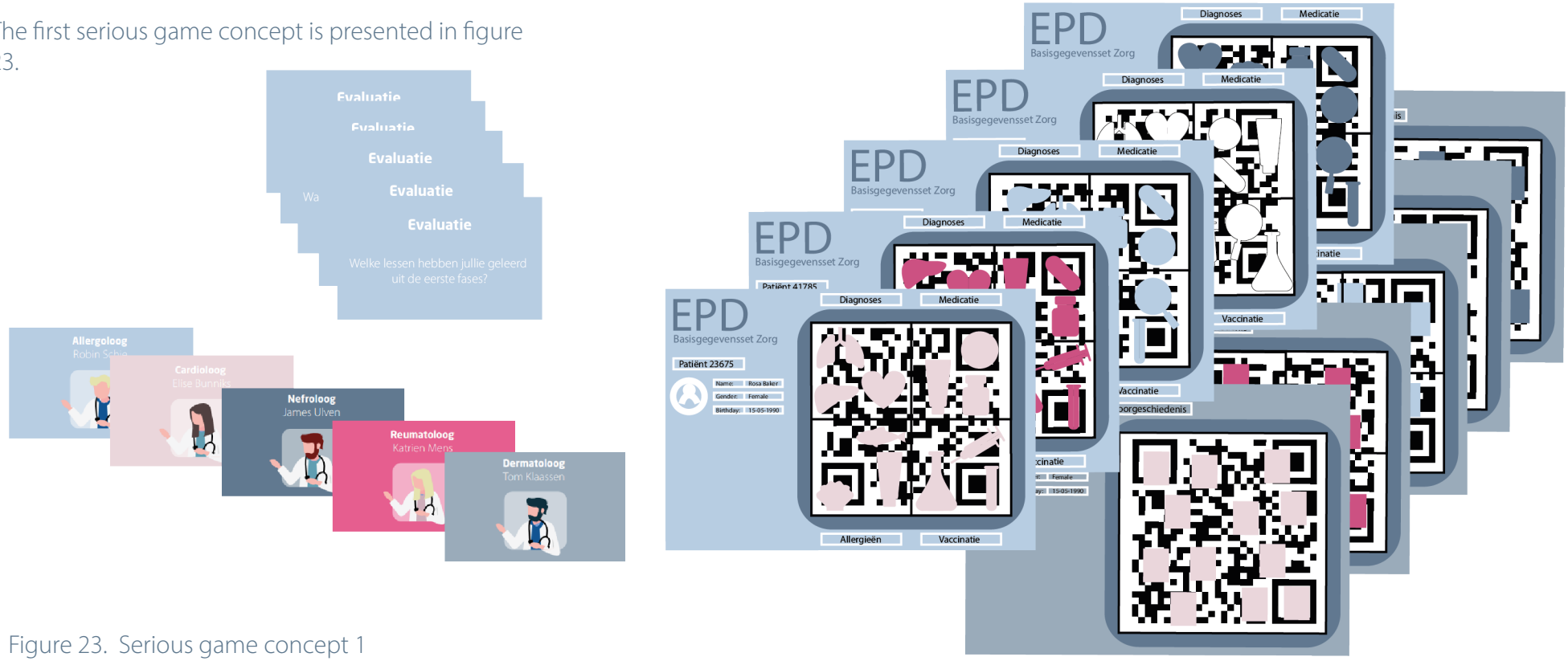


Figure 23. Serious game concept 1

4.4 Design iterations

Multiple cycles of iterations have been completed to optimize the game and design the final game for evaluation. Testing the game with participants during game play, and short evaluation sessions with specialists are performed as part of the iteration cycles to validate the desirability as well. (See figure 24 & 25). Clustered outcomes are presented that have been iterated upon. The iteration cycles are presented in appendix 4C and the enlarged figures are presented as well.

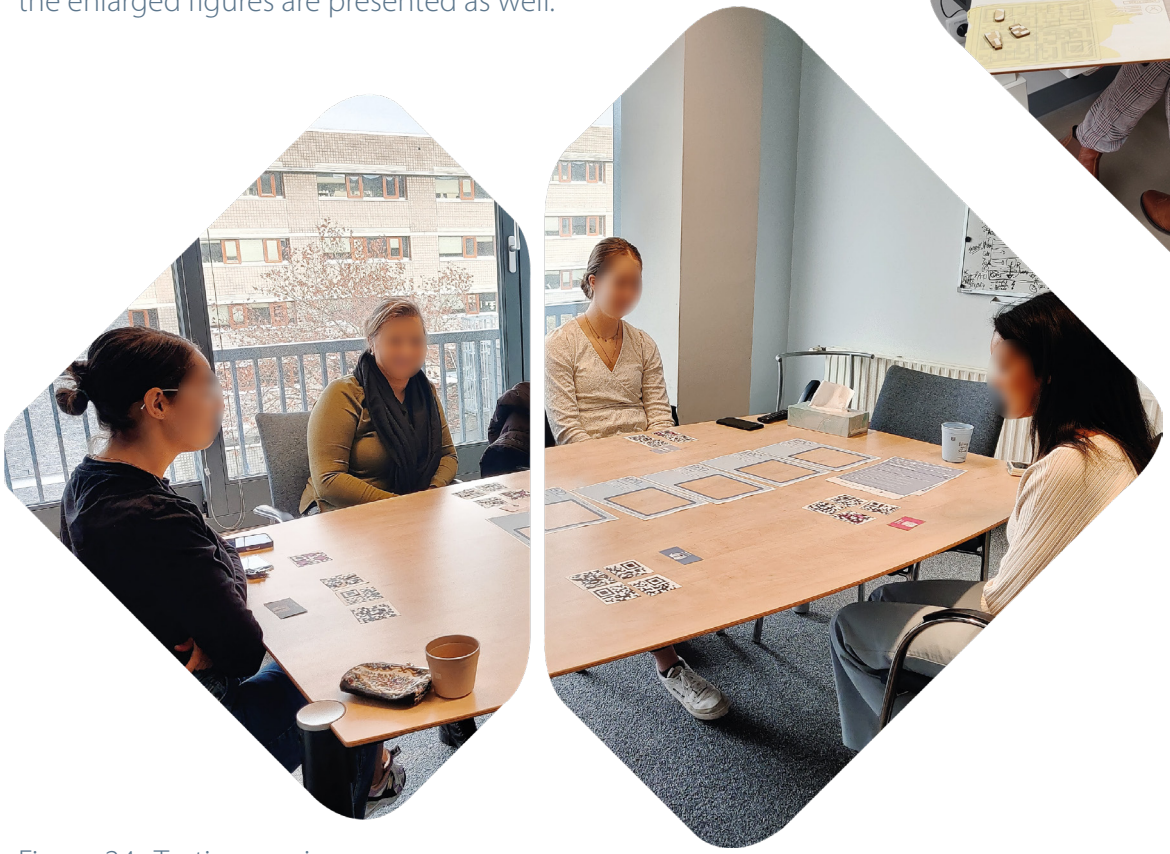


Figure 24. Testing sessions

Figure 25. Evaluation sessions

Game flow (Game principles: Objective & Play)

The game is built up in several phases, with reflection phases in between, illustrated in figure 26, to contribute to the learning goals and keep participants engaged. However, the game flow needs to be guaranteed to make sure the game is played according to the rule to reach the goal.

Therefore, a clear game flow is included within the game through an introduction card as well as instruction posters per phase. This creates structure and overview within the game for the players. Figure 27 Furthermore, the many game components can be confusion for the players, so the components are separated into boxes with the phase numbers on it.

During the tests, an important insight was gained. A story-telling approach is needed to give players context and a purpose in the game to evoke engagement. Furthermore, to let players settle into the game, a small preparation game is incorporated as well (figure 28).

Figure 26. Game flow

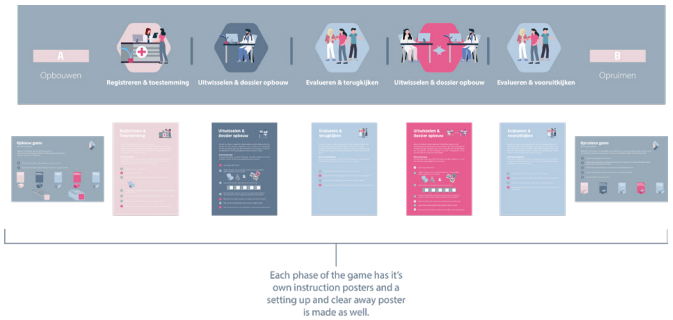


Figure 27. Game structure

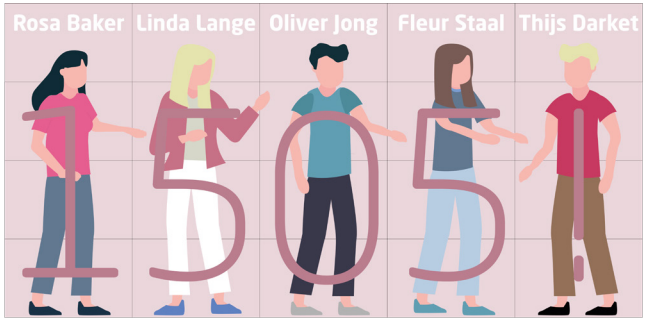


Figure 28. Preparation game

Time pressure (Game principle: competition)

Time pressure (Game design principle: competition) Including the time components was to evoke a competitive attitude for players to be willing to reach the goal and complete the game. Furthermore, a given timeframe is needed to keep players concentrated. Therefore, the game will take between 45-60 minutes and each phase has a specific time frame between the 5-10 minutes. A timer is used within the game. To establish the amount of time needed, several tests were performed, and the amount of time spent per phase has been timed. The time available per phase and in total is also shared with the players within the instruction poster.

Complexity (Game principle: constraints)

Several tests were performed to establish the amount of complexity incorporated within the game. Therefore, the most important factors in reality are distilled and incorporated into the game. However, reality is quite complex, so the decision to simplify is made.

Consequently, the goal of the game is to work together on filling in the patient files, instead of all players doing this separately. This narrows down the complexity by reducing the amount of game components like puzzle pieces.

Furthermore, the puzzles are all QR-codes to create complexity, because through trial and error the puzzle is completed. The QR-code is also a perfect means to include a reward.

Reward (Game principles: Success criteria & Reward)
Including a reward is an important component of games, because this enhances the competitive attitude of players. The reward in this case is completing the puzzle and therefore ending the game successfully. However, the QR-code can also be scanned, and a video will pop up to reward the players with their success. The video is included in figure 29.

Figure 29. Scanning the QR-code leads to a reward video

Number of players (Game principle: Competition)
The possible number of players that can play has been iterated on. Finally, the number of players that can be included in the game is scalable. The game can be played with 4-8 players. This will keep the complexity within the determined range, but also give the opportunity for specialists to play with a small or bigger group. The amount of game components is highly dependent on the number of players.

Puzzle pieces (Game principle: Objective, Constraints, Success criteria & Play)
The amount of puzzle pieces is dependent on the complexity and number of players. Through tests, the amount is determined. Per phase 60 puzzle pieces are available within 5 puzzles, which makes 12 pieces per puzzle. The 5 puzzles can be divided into 4 pieces, which make 20 small puzzles. The 20 small puzzles and the 60 pieces are equally divided between the players.

The size has been iterated upon to make them easy to handle and recognize. Furthermore, the shape has been iterated upon. The current scenario puzzle pieces are squared to make sure the reality is represented and create complexity in exchanging the pieces, because all pieces are the same but belong to another puzzle. In the scenario where the BgZ is included, the puzzle pieces are standardized by shape, colour and category. Exchanging the pieces will be easier since communicating about the pieces is more efficient. The pieces are presented in figure 30.

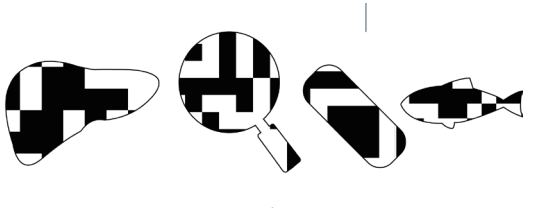


Figure 30. Puzzle pieces

Colours (Game principle: Constraints & Play)
The colours of the puzzle pieces should be easily distinguished to evoke effective communication without confusion about the colour.

Material & manufacturing
Lastly, brainstorming has been done about what material should be used to manufacture the game. Therefore, wood is chosen because the game should be repeatable. Furthermore, wood can be painted in the desirable colours. In addition, laser cutting is used to manufacture the game because precision is needed to make the puzzle pieces and engraving is possible to engrave text and the QR-code. See figure 31 for the way the puzzle is manufactured. Afterwards, the game elements are painted.

Figure 31. Laser cutting manufacturing

4.5 Detail design: De Weg(iz) naar de BgZ

Now that iterations have been performed and design decisions have been made and incorporated into the game, the final concept is presented. See figure 32 and 33. The game is explained in appendix 4D.

In addition, to transfer the game to RdGG and VWS all technical documents are presented in appendix 4E. This will provide the required information to be able to further develop the game and manufacture more copies if desired.

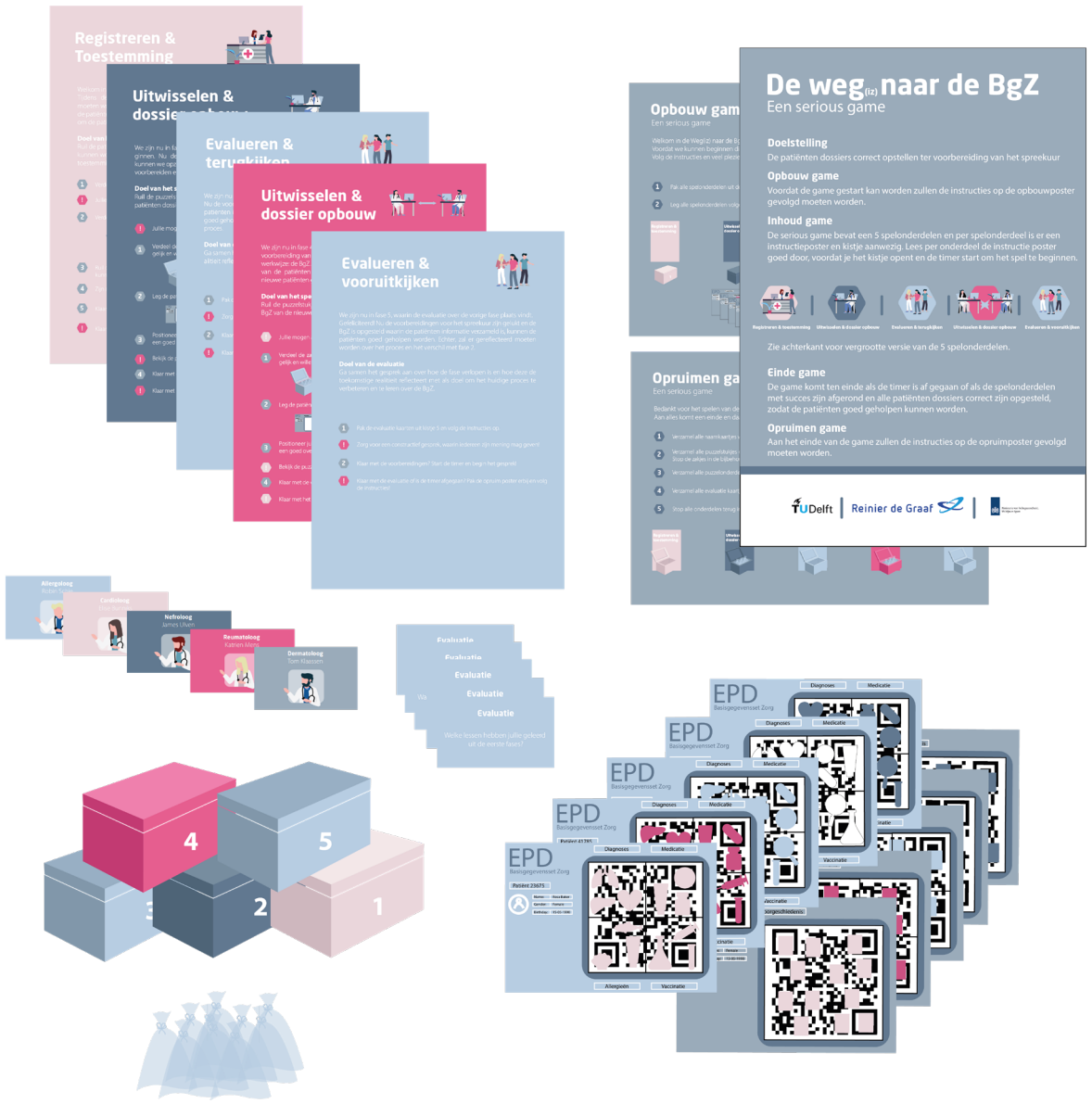


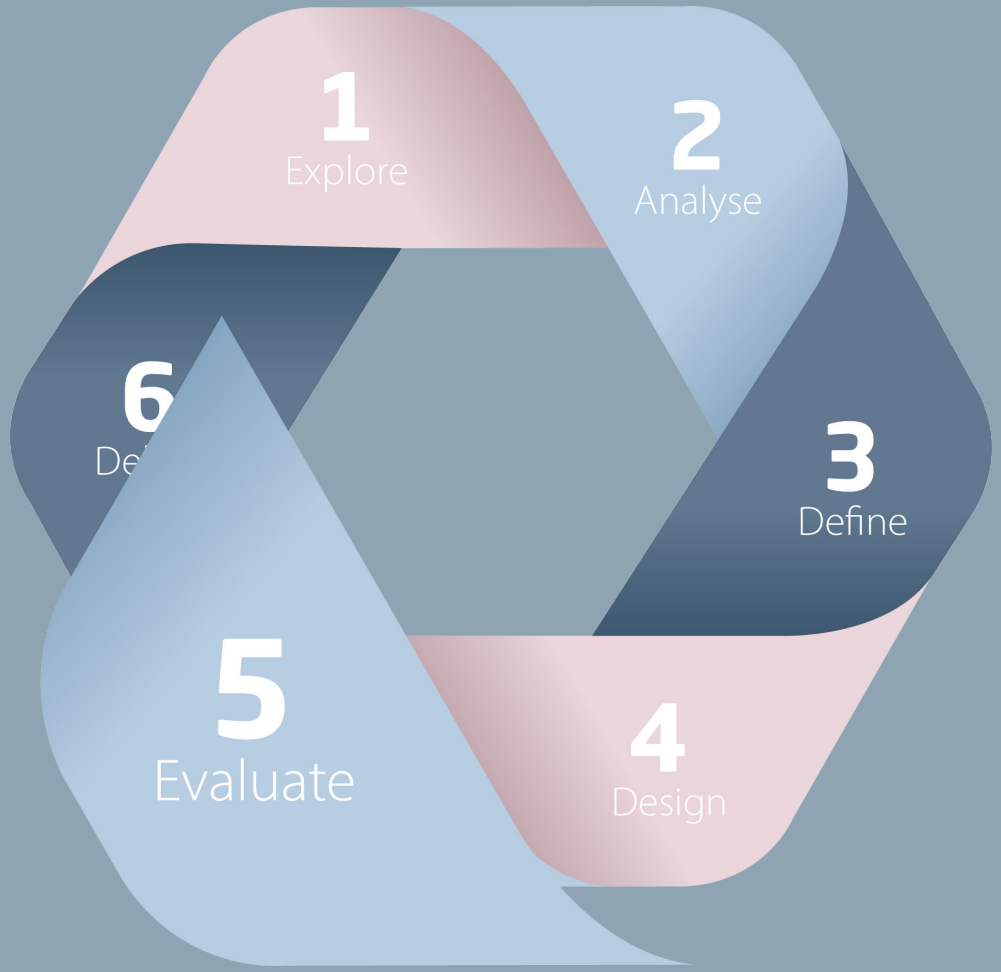
Figure 32. Detailed design illustration

Figure 33. Physical product

Chapter 5

Evaluate

To evaluate the final concept of the serious game various evaluation methods are utilized to verify whether the product meets the design criteria and user's needs. Therefore, a product evaluation based on observations is performed (paragraph 5.1) and focus groups are organized were surveys and groups discussions are conducted (paragraph 5.2). Both qualitative and quantitative insights are derived.



5.1 Product evaluation

A product evaluation related to the criteria defined in paragraph 3.3 and 4.2 is performed. The criteria are evaluated upon through the means of scoring each criterion on a scale between 1-10 (1 = low performance, 10 = excellent performance). Each score will be substantiated with examples derived from observations during the evaluation sessions and the designer's perspective. The purpose of these evaluations is to provide qualitative and quantitative insights into the game's strengths and weaknesses for further developments.

5.1.1 Design criteria

Each design criteria defined in paragraph 3.3 has received a score between 1 and 10, and a brief explanation is given to substantiate this score. (figure 34)

Design criteria 1
It was noted that the game serves as a streamlined representation of the BgZ exchange, necessitated by the need for simplicity in addressing theoretical components comprehensively. The primary emphasis of the game is on enhancing user experience and understanding of the BgZ. However, to further enrich users' knowledge about the BgZ, an additional educational component may be considered. In the evaluation, this aspect was scored at 7 based on the outlined criteria.

Design criteria score

#	The design should ...	Score
1	... educate users on the topic of transmural digital information exchange, according to the BgZ	7
2	... be user-friendly and intuitive to use.	9
3	... increase engagement.	7
4	... reflect theory into reality to be able to apply gathered knowledge and experience in reality.	7
5	... evoke collaboration between users.	9
6	... be accessible for a diverse audience.	9
7	... encourage users to communicate and share their perspectives.	8
8	... motivate and inspire for change and contribution to a future-proof healthcare system.	7

Figure 34. Scoring the design criteria

Design criteria 2
In the course of testing and evaluation sessions, participants engaged with the game effortlessly, navigating through its challenges intuitively even in the absence of explicit directions. The puzzles, designed to be both challenging and easily comprehensible due to their simplicity, garnered a positive evaluation for user-friendliness. The clear and responsive nature of the puzzles contributed to a user-friendly experience, earning a score of 9 in the assessment.

Design criteria 3
Aligned with this observation, every participant demonstrated full engagement throughout the game, actively acquiring knowledge about the BgZ. This marked a notable improvement in engagement compared to previous instances where specialists lacked prior knowledge about the BgZ. It is noteworthy, however, that measuring engagement in the actual implementation of the BgZ remains challenging at this stage. The game serves as the initial step in raising awareness, with the anticipation that it will catalyze engagement in the future. Consequently, this criterion has been assigned a score of 7.

Design criteria 4
The game's current approach of reflecting theory through experiential learning provides participants with valuable insights into the BgZ exchange. However, it's essential to acknowledge that relying solely on experiential elements may not be sufficient to seamlessly translate this game experience into practical reality. To enhance the practical application and impact on the work of medical specialists, it is recommended to incorporate additional theoretical components. This strategic integration of theory can serve as a guiding framework, facilitating a more effective and practical transfer of knowledge from the game to real-world activities.

Design criteria 5
The fundamental structure of the game revolves around collaborative competition within a time-constrained environment. Participants actively engage in exchanging puzzle pieces, fostering a high degree of collaboration among them. Consequently, this criterion has received a score of 9 in the evaluation.

Design criteria 6
The game was successfully executed with a diverse participant group, including individuals with both medical and non-medical backgrounds. Its accessibility was attributed to the simplified medical components and explanations incorporated into the game design. Notably, no inquiries arose during the gameplay, and based on observations, all participants comprehended the game's objective intuitively. Consequently, this criterion has been awarded a score of 9 in the assessment.

Design criteria 7
The instructional posters provided for each phase of the game explicitly emphasize the necessity for participants to engage in discussions and strategize to accomplish the objectives. Moreover, the inclusion of two reflective phases encourages collective reflection and the sharing of perspectives to enhance or align viewpoints through discussions. While effective, it was noted that the questions posed during these reflective phases could benefit from improvement to stimulate more in-depth discussions and elicit additional insights. As a result, this criterion has been assigned a score of 8 in the evaluation.

Design criteria 8
The contrasting scenarios presented in the game,one involving a complex situation unsolvable within 10 minutes, and the other showcasing the consistently efficient resolution of the BgZ exchange within 5 minutes, proves to be a motivational and inspiring element seen within the tests. This experience serves as a catalyst for contributing to the implementation of the BgZ, aligning with the urgent call for efficiency in the medical field where time constraints are paramount. While the positive encounter in the game is anticipated to stimulate awareness and inspire active contributions to the future healthcare system, it is acknowledged that the game alone focuses on raising awareness, and additional measures should be incorporated to ensure medical specialists can actively contribute. Recognizing the current lack of a measurable metric due to the game serving as an initial step in evoking contributions, a score of 7 has been assigned to this criterion.

5.1.2 Game design criteria

Each game design criteria defined in paragraph 4.2 has received a score between 1 and 10, and a brief explanation is given to substantiate this score. (figure 35)

Game design criteria 1
It was evident that the game's focal point on puzzles with clear and attainable objectives, coupled with integrated learning goals, facilitated a profound understanding of the underlying purpose. Hence, a score of 9 was assigned as participants consistently demonstrated clarity and success in achieving the defined objectives throughout all tests.

Game design criteria 2
It became apparent that while the instruction posters outlined clear constraints, questions arose during tests and evaluation sessions regarding the specific application of rules to certain game elements. This indicated a need for a more concise explanation to guide participants in adhering to the rules. Consequently, a score of 7 was assigned, signaling room for improvement and potential enhancements in this aspect of the game.

Game design criteria score

#	The design should ...	Score
1	... have an achievable outcome/objective.	9
2	... have clear constraints (such as rules).	7
3	... have clear success criteria and indicate when objectives are achieved.	8
4	... should have clear success criteria based on participant experiences.	9
5	... include intrinsic rewards.	7
6	... include extrinsic rewards.	8
7	... ensure a balanced distribution of rewards.	8
8	... prioritize a sense of play.	7
9	... balance between challenges and player abilities.	8
10	... include competition with a positive dynamic.	9
11	... include a simplified reality.	7
12	... serve a dual purpose of clarity and learning.	8

Figure 35. Scoring the game design criteria

Game design criteria 3

The QR-code within the game served as a self-explanatory element, signifying the completion of the game when the QR code puzzle was successfully solved. Moreover, participants could scan the QR-code, leading them to a reward that acknowledged their success. Additionally, during reflection phases, statements and questions guided users toward the success criteria, promoting a deeper understanding of the purpose of the puzzles. Consequently, a score of 8 was granted to signify the effectiveness of these elements.

Game design criteria 4

The success criteria were effectively integrated based on participants' experiences. The inclusion of two scenarios within the game allowed participants to undergo both a failed and a successful game, providing them with firsthand experience and a tangible sense of the success criteria. This experiential approach enabled participants to grasp the deeper meaning of the game. As a result of this effective design, a score of 9 was granted to acknowledge the success of incorporating participants' experiences into the success criteria.

Game design criteria 5

It was observed that intrinsic rewards were effectively incorporated. The game's realistic setting allowed participants to recognize the current situation and envision how the BgZ could enhance it. This recognition, as per literature, serves as an intrinsic reward. Participants acknowledged the game's authenticity, perceiving it as a reflection of reality, which contributed to their satisfaction in feeling heard and seen. While this aspect was well-received, other intrinsic rewards were not prominently recognized, leading to a score of 7.

Game design criteria 6

Extrinsic rewards played a significant role during the testing and evaluation sessions. Success in solving puzzles and surpassing time constraints, along with the inclusion of unlockable content in the first phase, contributed to a sense of extrinsic reward when participants accessed the next level. Additionally, the QR-code served as a form of extrinsic reward, congratulating participants upon scanning. Feedback from tests and evaluations indicated that the accomplishment of finishing the puzzle in the second game was rewarding in itself, especially considering the initial unsuccessful attempt. The QR-code was recognized as a confirmation, resulting in a granted score of 8 for the effective incorporation of extrinsic rewards.

Game design criteria 7

The serious game successfully established a clear distribution of rewards. The game design encouraged participants to exchange puzzle pieces and concurrently work on their individual puzzles. This collaborative approach was further emphasized by the interconnected nature of their small puzzle pieces contributing to a larger puzzle. This interdependence on other participants created a sense of dependency, amplifying the rewards when everyone succeeded and contributed to each other's success. Consequently, a score of 8 was granted to recognize the effective establishment of a clear distribution of rewards within the game.

Game design criteria 8

It was observed that the game primarily focused on achieving learning goals rather than prioritizing play. The incorporation of puzzle pieces within the game was identified as a representation of play. Consequently, a score of 7 was granted, reflecting the balance between the serious intent of achieving learning goals and the playful element introduced through puzzle pieces.

Game design criteria 9

A commendable balance was achieved between the players' abilities within the designated timeframe and the challenge presented to finish the puzzle. The deliberate design choices resulted in a consistent pattern where the first scenario consistently ended in failure, while the second scenario consistently led to success. This observed pattern demonstrated a clear equilibrium between the challenge posed and the participants' abilities. Despite the simplicity of the puzzle, it effectively served its intended purpose beyond initial expectations. Consequently, a score of 8 was granted, recognizing the successful establishment of a balanced and purposeful gaming experience.

Game design criteria 10

It was noted that a positive dynamic was intentionally cultivated. This positive dynamic necessitated a healthy sense of competition, exemplified by the incorporation of time pressure – a reflection of the daily challenges faced by medical specialists. Additionally, fostering collaboration was emphasized, as participants needed to work together, encouraging teamwork to successfully complete the tasks. The intentional design of the game aimed to mirror the collaborative nature of reality. The observed positive dynamic in all tests, where participants actively engaged in teamwork, led to the acknowledgment of a successful implementation, warranting a score of 9.

Game design criteria 11

The serious game incorporates a simplified representation of reality, acknowledging the evolving nature of the BgZ's reality still under development. This developmental aspect introduced certain uncertainties to the serious game. Recognizing the inherent complexity in attempting to mirror an evolving reality, a score of 7 was granted. Despite the complexities, the game successfully serves as an approximation to reality, aligning with the intended purpose of providing participants with a valuable and insightful experience.

Game design criteria 12

The serious game effectively simplifies reality, presenting clear scenarios that were well understood by participants during each test. The game facilitates learning by allowing participants to experience new theoretical concepts through play. Additionally, reflective moments encourage participants to consider the value and impact of their experiences in the context of reality. Recognizing the success in achieving these objectives, a score of 8 was granted. The game serves as a valuable tool for experiential learning and reflection, aligning with its intended purpose.

5.2 User feedback

Through 5 user feedback sessions qualitative and quantitative feedback has been collected to evaluate the product upon the design criteria defined in paragraph 3.3 and the learning goals of the game defined in paragraph 4.2, with the purpose to validate the effectiveness of the serious game in terms of usability and meeting user expectations. Furthermore, the strengths and weaknesses can be discovered for further improvements of the game to enhance the user experience and discover opportunities regarding the implementation of the game within the context. (Figure 36)

Figure 36. Evaluation sessions: Policymakers (left) and Physicians (right)

5.2.1 Data collection

Each evaluation session followed the set-up illustrated in figure 37.

The sessions started with a brief presentation of the legislative framework and introduction to the research and serious game. Afterwards, the game was played, and the participants were observed regarding the design criteria and the game design criteria. These outcomes are presented in paragraph 5.1. After finishing the serious game, a survey evaluation was filled out by the participants and a group discussion was started to gather feedback regarding future improvements. These discussions were recorded, and the most fruitful insights are presented. Lastly, all participants are thanked and further information regarding the final phases of this project is provided.

However, 2 out of the 5 sessions were performed with 5 organizational employees, and 10 policymakers, wherefor only the interactive group discussion was performed, and the survey evaluation was excluded. The survey, included in appendix 5A, was specifically designed to address the user requirements of medical specialists. As a result, the survey was employed exclusively in the 3 other sessions, involving 15 medical specialists or physicians in training. The survey includes 10 statements, to which participants should rate on a 7-point Likert-Scale (Sullivan & Artino, 2023) if they agree (7) or not (1), and 2 open questions for feedback and suggestions. The filled in surveys are presented in appendix 5C.

The interactive group discussion was semi-structured to ensure freedom for the participants to provide feedback and suggestions. Several questions, appendix 5B, were used to structure and inspire the session.

5.2.2 Data analysis

The collected data from the surveys will be analyzed through box plot and frequency distribution graphs, by calculating the mean and standard deviations, to identify patterns and wherefor possible strengths and weaknesses of the serious game can be identified.

The interactive group discussions notes and recordings are analyzed and the most fruitful will be presented.

Figure 37. Evaluation session set-up

5.2.3 Results

Survey results

The results in table 4 & 5, show an overall positive perception regarding the survey questions. 6 out of 10 questions have a mean between 5-6, 3 have a mean of 6 or higher and only 1 question shows a mean of 4.47. In line with this, the standard distribution of all questions lies between 0 and 1.5, with the majority between 1-1.5, which show that the answers of participants are relatively close to the mean, which suggests that overall, the participants have an equal opinion.

Interestingly, the question with a 4.47 mean is about applying the obtained knowledge and experience into reality. The outcomes suggest that participants can't yet apply the knowledge into reality, which might indicate that further improvements should be made to create a more tangible or practical aspect to be able to translate the game towards reality. Furthermore, the lowest scoring question is about whether the game contributes to the learning goals. This mean is lower than expected, however the learning goals weren't discussed during the evaluation sessions due to a lack of time and were only presented in the survey and on the other page of where the question is presented. In addition, it is interesting that the questions related to the learning goals can be interpreted with a positive perception, while the question with the lowest mean is an overarching question. This describes a potential bias by means of questions arrangement.

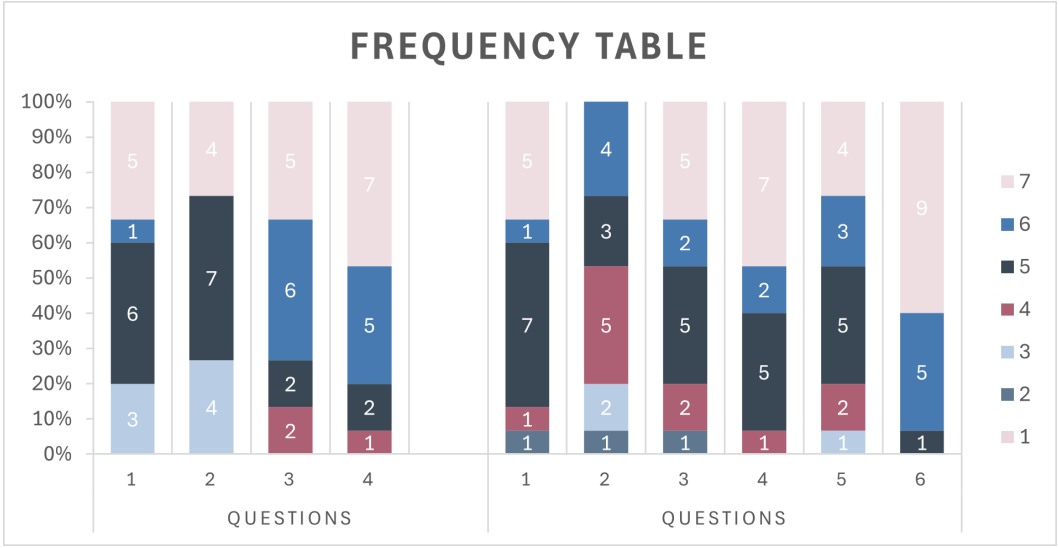


Table 4. Frequency table: answers of the survey questions rated on a Likert-Scale

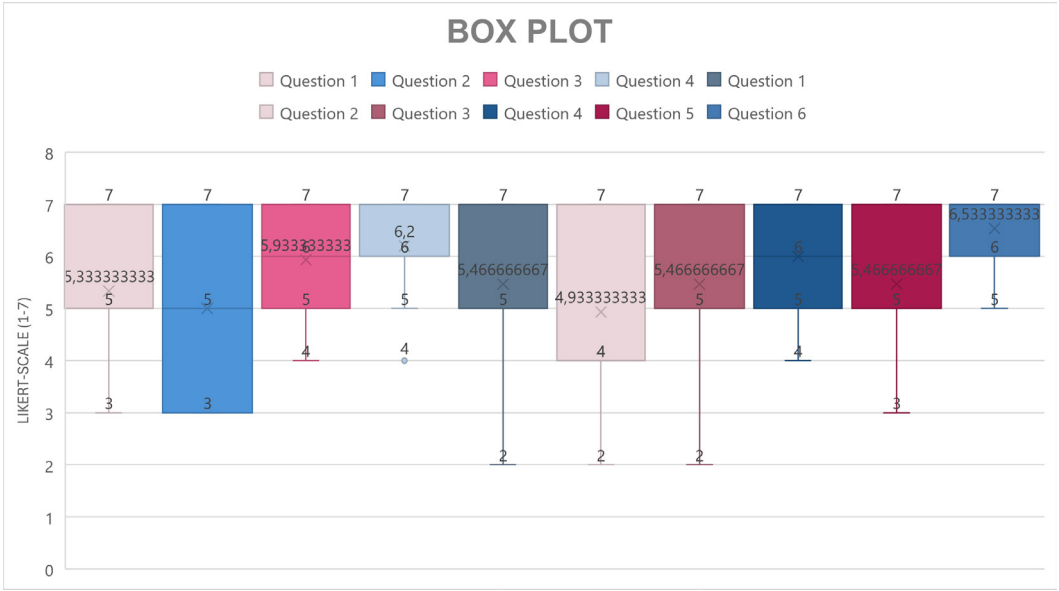


Table 5. Box splot: answers of the survey questions rated on a Likert-Scale

Interactive group discussions

During the discussions, valuable insights and suggestions for the future were unveiled. The discussion outcomes will be presented per group.

Medical specialists & physicians in training

Participants expressed overwhelmingly positive sentiments about the game, highlighting their enjoyment and enthusiastic engagement during the experience. The key takeaway was the enhanced awareness of the BgZ and Wegiz, concepts that were previously unfamiliar to the participants. The game effectively conveyed the perception of increased efficiency attributed to the BgZ, with participants emphasizing the urgency to standardize practices. Notably, participants found it easier to locate relevant information, aligning with the desires of physicians in real-world scenarios.

"The game is much more fun because interactive learning is so much better than a boring presentation. This also sticks much better."

Despite the positive reception, participants voiced a need for clearer guidance on applying acquired knowledge in real-world situations. They emphasized the requirement for more in-depth information and specific training or presentations to facilitate compliance with standards. Participants also expressed the need for a helpdesk to bridge the gap with policymakers, as they perceived policymakers to be somewhat distant. The game was lauded as a fun, visual, and interactive learning method, deemed more memorable than traditional presentations.

"The awareness of the need to frame and categorize information into the EPD for others is now very much present."

In conclusion, participants recognized the game's ability to realistically represent their challenges, making it a valuable tool for aligning perspectives and fostering collaboration among physicians. The findings underscore the positive impact of the game on awareness and highlight areas for further refinement to maximize practical applicability.

Organizational employees

The overall reception of the game is again highly positive, with participants expressing that the game effectively depicts reality. The sense of urgency for everyone to contribute towards embracing the BgZ was emphasized, fostering awareness for change, supported by observations of a more efficient flow in the second game. The game emerged as a valuable tool for educating physicians on the significance of accurately filling in information boxes to facilitate the creation and exchange of the BgZ. A tangible comparison between the two scenarios highlighted the benefits and expectations of the BgZ, showcasing improved communication and efficiency through standardized information.

Participants stressed the importance of playing the game in an interdisciplinary group, involving specialists, assistants, organizational employees, and other staff members. This approach encourages group discussions, reflection, and agreement-making for the future. Participants conveyed the idea that the game serves as a catalyst for healthcare employees to collaborate towards a better future with the BgZ.

"It is really important to play the game with a interdisciplinary team, to start the conversation with each other and work together on this transformation."

Concerning the game's content, participants emphasized the need for a game leader to provide oversight and ensure the game's value. They suggested enhancing the clarity of game components, specifically directing players toward the purpose of each component and the underlying rationale for the exercises.

Policymakers

The policymakers exhibited notable enthusiasm and active engagement with the game. They expressed a clear understanding of what physicians might encounter daily, gaining valuable insights into the realities of their work. Policymakers found the depiction of the BgZ within the game to be effective, making the concept tangible and easily

comprehensible. The collaborative aspect of the game and the importance of collective contribution to the BgZ cause were strongly emphasized. The observed benefits included a more efficient workflow in the second scenario and a sense of working for the benefit of others. Policymakers recognized the potential utility of the game for the Ministry of Health, Welfare and Sport (VWS) as a tool to engage physicians, gather input, and build support for the BgZ.

"Gaining insights in each other's perspective is so valuable and this game does exactly that."

A suggested improvement was the need for a storytelling approach tailored for policymakers, providing a clear explanation and narrative to enhance their understanding of the game. Policymakers also recommended addressing the risks of the first scenario more explicitly, possibly using the reflective phase to explore these aspects. Additionally, introducing roles and patient perspectives could be enhanced for a more comprehensive experience.

5.2.4 Limitations

The potential for bias in the survey results exists due to the arrangement of questions, where learning objectives and corresponding questions are presented on opposite sides of the page. This layout might have led participants to answer questions without clear alignment with the objectives. Additionally, variations in the interpretation of questions or responses based on personal perspectives could contribute to response variability. The survey format's limitation in allowing detailed explanations of participants' experiences and opinions may impact the nuanced interpretation of the data. To minimize the risk of socially desirable responses, the survey is administered anonymously, providing a level of confidentiality to encourage more candid participant feedback. Lastly, the time constraint during the evaluation session might have led to rushed responses, which might influence the data collection.

Furthermore, the recorder and social pressure might have led to socially desirable responses during the group discussions. The significance of providing honest answers for the benefit of the game was emphasized.

5.3 Conclusion

In conclusion, the serious game dedicated to educating and engaging participants in the concepts of BgZ and Wegiz has demonstrated overall effectiveness in achieving its intended objectives. The game's emphasis on clear and attainable learning goals, represented through puzzles, has led to a profound understanding among participants. The user-friendly design, seamless navigation, and high engagement observed during testing underscore the success of the game's approach.

The survey results, as depicted in Table X and X, indicated an overall positive perception among physicians, aligning with the positive outcomes derived from interactive group discussions. Participants expressed unanimous positivity, recognizing the game as an effective and valuable tool that meets user requirements and expectations. However, valuable insights from discussions also revealed areas for refinement, particularly in enhancing theoretical components to bridge the gap between game experience and practical application.

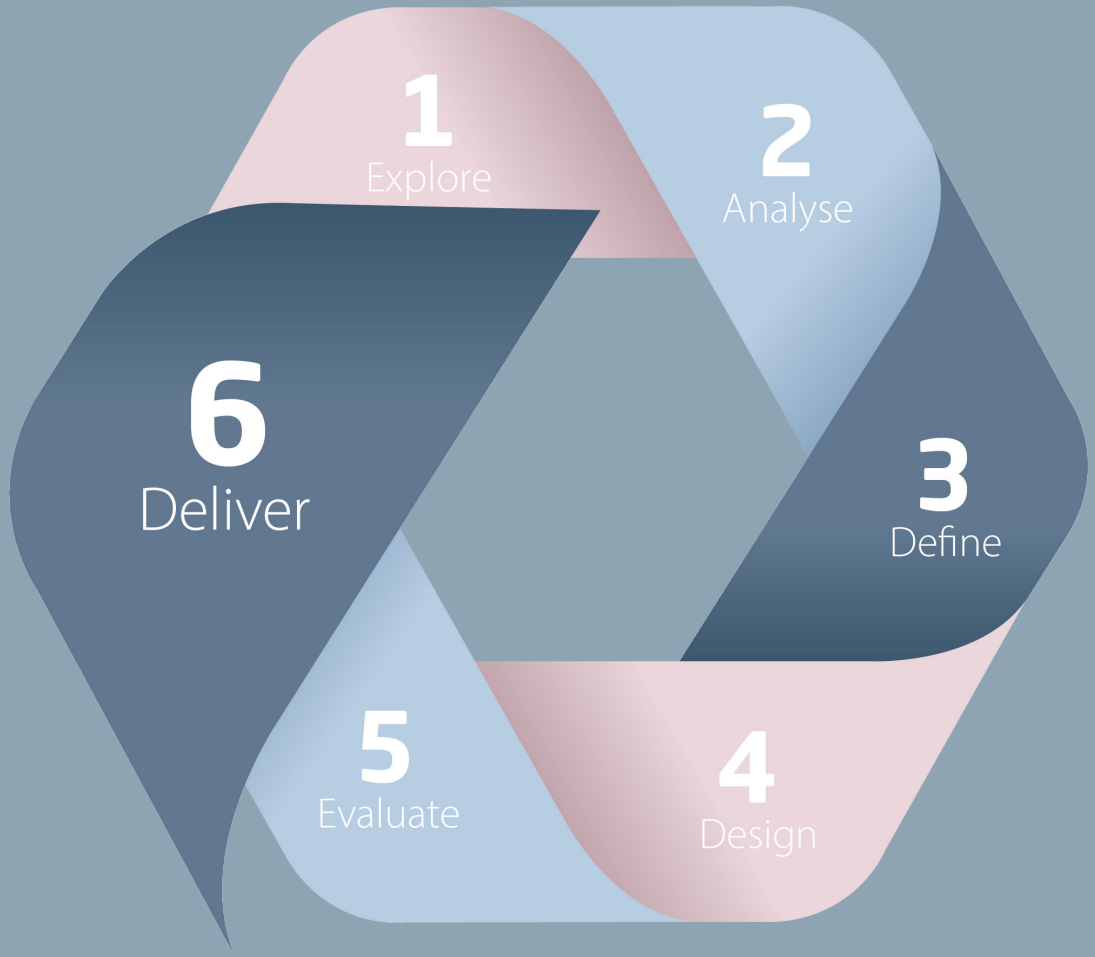
Noteworthy is the positive impact on awareness and collaboration, with the game simplifying complex concepts, positioning it as a valuable tool for experiential learning. Despite some limitations identified, the overall validation of the game as an effective and engaging tool to contribute to the understanding and adoption of BgZ in the healthcare domain is evident.

The group discussions further highlighted the game's success in meeting set criteria, as physicians acknowledged its positive influence on their awareness of BgZ and the urgency for change. The experiential nature of the game effectively conveyed the challenges and benefits associated with BgZ. Collaboration and collective reflection emerged as crucial factors in driving the transition toward BgZ, aligning with the game's focus on teamwork. Furthermore, the insights derived from the discussions with organizational employees and policymakers are valuable to create a interdisciplinary approach, with the purpose to algin perspectives. The game already serves this purpose according to the participants, however the implementation within an interdisciplinary context is required.

While the positive reactions, of the participants in the different target groups, validate the game's efficacy, valuable suggestions and feedback have been provided for further improvement. Incorporating a story-telling approach, explaining game components through visuals, and introducing reflective questions to prompt consideration of practical theory are recommended enhancements. The game, thus, stands validated as a useful tool that not only raises awareness but empowers medical specialists to actively engage and contribute to the crucial changes required for the implementation of BgZ. Furthermore, the game plays a role in fostering connections among various stakeholders in the medical environment, offering a glimpse into each other's perspectives and experiences. Therefore, the game passed the challenge of connecting policymakers and healthcare providers as well.

Chapter 6
Deliver

Within the deliver phase, the final product will be presented, with the final adjustments made with regards to the evaluation phase (paragraph 6.1). Furthermore, recommendations regarding further developments and the implementation of the game are provided as well as, research suggestions and future recommendations (paragraph 6.2).



6.1 Final product

The final adjustments have been made with regard to the evaluation sessions in the evaluate phase and therefore, the final product is presented below and in appendix 6A. Furthermore, a detailed description of the features of the serious game are discussed regarding desirability, viability, and feasibility,

Figure 36. Final Product

6.1.1 Overview of the serious game: De weg(iz) naar de BgZ

The serious game is designed to involve medical specialists directly in the implementation journey of the Basisgegevensset Zorg (BgZ) within the healthcare ecosystem. The game consists of two scenarios. The first scenario represents the current organization of digital information exchange and the second scenario represents the future scenario when making use of the BgZ, in order to compare and experience the difference. This comparative journey serves to instill a profound awareness among medical specialists about the urgency to implement the BgZ and the pivotal role they play. Interposed between these scenarios are reflective moments, fostering discussions on the implications, opportunities, risks, and challenges inherent in both systems. These reflective moments are strategically designed to empower medical specialists, encouraging their active involvement in shaping the BgZ implementation. The discussions revolve around thought-provoking questions and statements, aiming to illuminate ways in which the acquired knowledge and experiences can be translated into tangible enhancements in their daily practices, fostering a proactive adaptation to the BgZ.

6.1.2 Key features

Facilitating awareness & Positive experience

The serious game cultivates an awareness of the imperative need to integrate the BgZ into the healthcare ecosystem, particularly targeting medical specialists. Through an immersive gameplay experience, participants traverse a comparative journey, gaining insights into the efficiency advantages offered by the BgZ. The game strategically integrates the standardized features of the BgZ, establishing an efficient and uniform workflow for all users. This approach aims to elicit a positive response to the BgZ, ultimately nurturing a heightened awareness of the urgency surrounding its implementation.

Educative game play

The game provides an interactive and engaging learning experience, fostering accelerated comprehension. By incorporating educational elements into the gameplay, participants not only enhance their understanding but also ensure a lasting impact, where practical experience seamlessly intertwines with theoretical knowledge. This distinctive feature underscores the game's commitment to effective and memorable learning. This will enhance the engagement of medical specialists in the implementation process of the BgZ.

Guidance and anticipation to change

The reflective moments incorporated in the game provide the player with the opportunity to reflect on the experience, which will enhance the learning experience. The thought-provoking questions and statements aim to evoke discussion about how to apply the acquired knowledge and experiences into practice. Encouraging players to anticipate change within the game is a strategic approach, emphasizing the value of guidance rather than imposing change abruptly. This deliberate method aims to instill a sense of readiness and understanding among participants, making them more receptive to the implementation of the BgZ. By fostering anticipation, the game contributes to a smoother transition, for the successful integration of the BgZ.

Involve medical specialists

By actively involving medical specialists through creating awareness, fostering positive experiences with the BgZ, and guiding them toward change, the game empowers these professionals to play a proactive role in the transformation of the BgZ. This participation enables them to prepare and acquire knowledge in advance, encouraging thoughtful consideration and input for future developments. The game serves as a motivator for players to be actively engaged and contribute to the ongoing evolution of the BgZ.

Fostering interdisciplinary collaboration

The game's realistic simulation serves as an effective tool to align perspectives by offering participants an immersive experience in each other's professional worlds. Beyond individual perspectives, the game acts as a catalyst for connecting various disciplines, including policymakers, medical professionals, and organizational employees. This collaborative approach illuminates the path toward establishing a cohesive environment for collectively shaping the development of the BgZ. The game marks the initial phase in the strategy for BgZ implementation.

6.1.3 Desirability, viability and feasibility

Desirability

Feedback from user testing sessions indicates a positive user experience and a desirability at multiple levels of the healthcare system to evoke connection within the macro, meso and micro levels. The evaluation of the game indicates that it serves as an desirable intervention to facilitate the implementation of the BgZ.

The positive user experience revealed through extensive user testing sessions across various levels of the healthcare system underscores the game's effectiveness and desirability. Therefore, the game operates seamlessly within the macro, meso, and micro levels which is an additional benefit. This resonates with stakeholders' wishes at different levels, emphasizing the game's ability to foster connections. The evaluation outcomes further confirm the game to be a desirable intervention, positioned strategically to navigate the complexities of implementing the BgZ. The game is a valuable catalyst for promoting widespread acceptance and engagement within the healthcare ecosystem regarding the implementation of the BgZ, which was the desired outcome.

Viability

The serious game addresses a critical need in education and awareness of the BgZ for medical specialists to contribute and engage in the process. Its potential impact on information exchange practices positions it as a valuable tool for medical professionals, organizations and VWS.

Furthermore, the game is adaptable and scalable, which ensures its continues relevance in the dynamic of implementing the BgZ, which will be a lengthy and complex process. The price to manufacture the final game is approximately €100,-. However, the prototype is hand made and therefore more expensive than the manufacturing of large quantities if desired. Therefore, the game is a meaningful tool in the short- and long-term.

Feasibility

The final product, as presented above, shows a new way of dealing with research outcomes and shows it is possible to reach the objective. The physical product also substantiate the feasibility of the product. Extensive user testing has been conducted to ensure seamless performance and therefore the game is validated as feasible. In addition, the recommendations will provide insights into a smooth integration of the game.

Figure 37. Phase 1 of the game

Figure 38. The game

Figure 39. Phase 2 of the game

Figure 40. Phase 4 of the game

Figure 41. Phase 3 and 5 of the game

Figure 42. Detail of the game

6.2 Recommendations

Lastly, after the final adjustments are made and the game is delivered to RdGG and VWS, recommendations regarding the further development and the implementation of the game are provided. Furthermore, research suggestions and future recommendations are presented regarding the results of the entire research of the implementation of the BgZ in the healthcare environment.

6.2.1 Development & implementation

The iterative development process has shaped the serious game to align with user requirements, and while additional evaluation sessions are advised for further optimization, the game is deemed ready for implementation in healthcare environments, as the first step within the implementation process of the BgZ. To enhance its effectiveness, the following recommendations are proposed:

Recommendations for RdGG

Develop training materials

1. • Create comprehensive training materials regarding the theory of the BgZ to acquire knowledge to apply in reality.
   • Foster collaboration between VWS and RdGG to ensure the training content aligns with both contexts.

Integration into training initiatives

2. • Incorporate the serious game into exisiting training programs, workshops and onboarding activities.
   • Advocate for mandatory participation among all healthcare staff to maximize the impact

Centralized organization

3. • Centralize the organization of training sessions that include the serious game to ensure consistency
   • Provide facilitator training to empower the game leader(s) to effectively lead the game.

Pilot testing

4. • Conduct pilot programs to test the game's effectiveness in different settings, including specialist departments and interdisciplinary setting.
   • Evaluate the game's impact and adjust and iterate where needed.

Feedback mechanism

5. • Establish a centralized system for collecting and documenting feedback from participants during the game play.
   • Write reports with detailed insights and feedback to share with VWS and other stakeholders to contribute to the development of the BgZ.

6. Alignment with collective strategy
   • Encourage the development of a collective strategy rising, facilitated by the serious game.
   • Promote the collective strategy organization-wide to ensure alignment in the process of implementing the BgZ.

Recommendations for VWS

1. Integration within VWS
   - Advocate for the integration of the serious game within VWS to bridge the gap between policymakers and healthcare providers.
   - Organize workshops within VWS to familiarize policymakers working on the Wegiz and BgZ with the healthcare environment.

2. Manufacturing & promotion (VWS)
   - Manufacture the game in large quantities and sell/spread the game within the healthcare ecosystem. Or organize serious gaming sessions for healthcare stakeholders to experience on site.
   - Position the game as an educational tool for hospitals and emphasize its role as a starting point for digital transformation in healthcare, fostering awareness and facilitating a user-centered approach.
   - Promote the game within VWS and the healthcare system as a tool to foster awareness of collaborative initiatives in the healthcare system.

Recommendations for collaboration between VWS & RdGG

1. Connection between stakeholders
   - Integrate the game into feedback sessions where policymakers and healthcare stakeholders play the game together to evoke collaboration.
   - Facilitate discussions to align perspectives, address concerns, and make collective arrangements towards the implementation of the BgZ and the digital transformation.

2. Develop the game
   - Conduct more evaluation sessions to collect insights for developments of the game.
   - Develop, improve or adjust the game where necessary.

6.2.2 Research suggestions & future recommendations

This project has derived many insights into the implementation of the BgZ into the medical environment and the factors that can be expected to influence the process. Therefore, a roadmap is illustrated with the possible steps towards the implementation of the BgZ, with all factors and opportunities integrated. The roadmap is based on the outcomes of the semi-structured interviews and evaluation sessions and categorized within macro, meso and micro level to provide a concise overview. This roadmap is an inspirational tool to provide tangible opportunities that can be beneficial for the change process of digital transformation and to guide a collaborative approach by connecting all stakeholders and their perspectives.

The roadmap also serves as a guide towards the future and to suggest research opportunities.

See appendix 6B for the full roadmap.

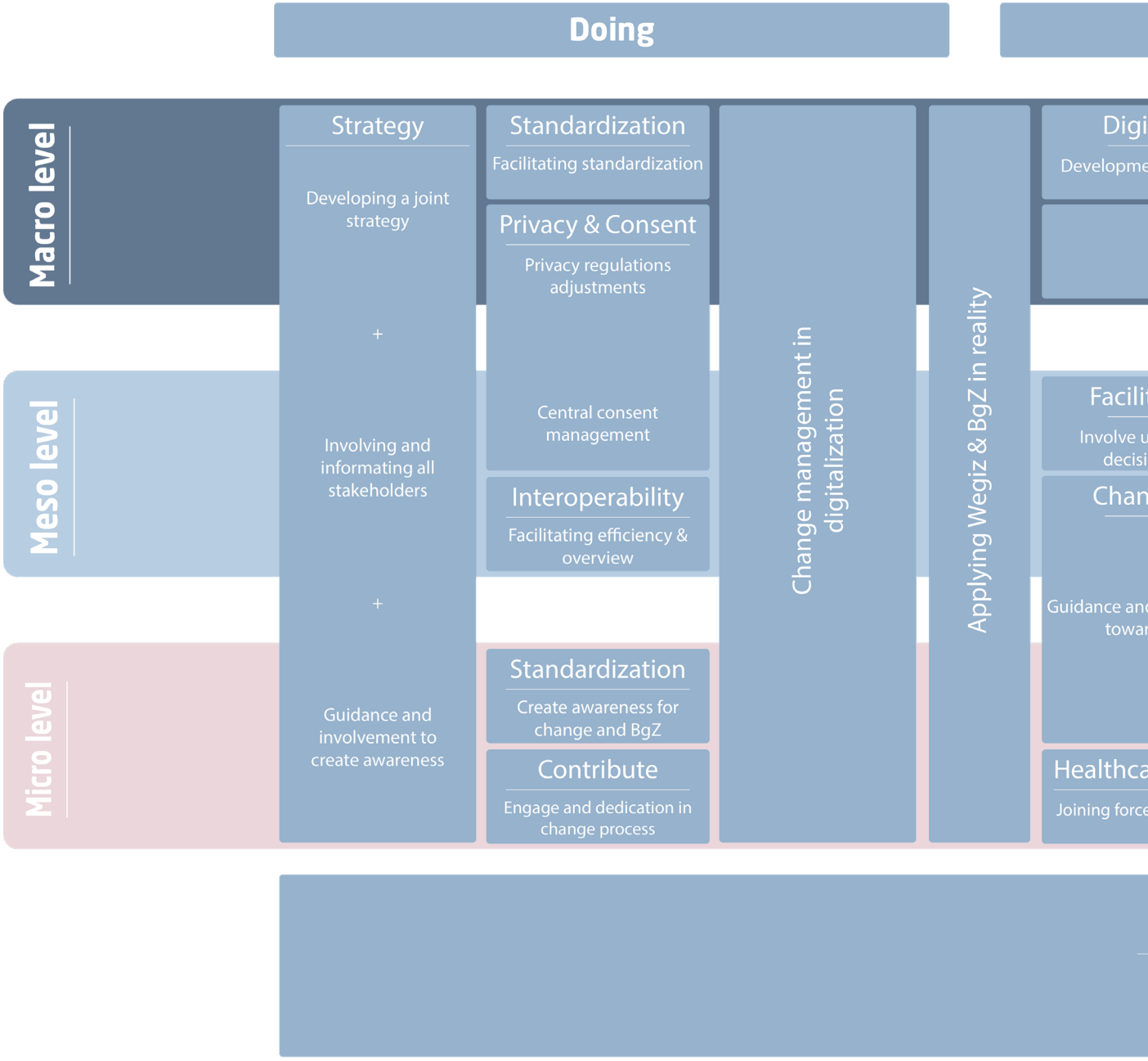
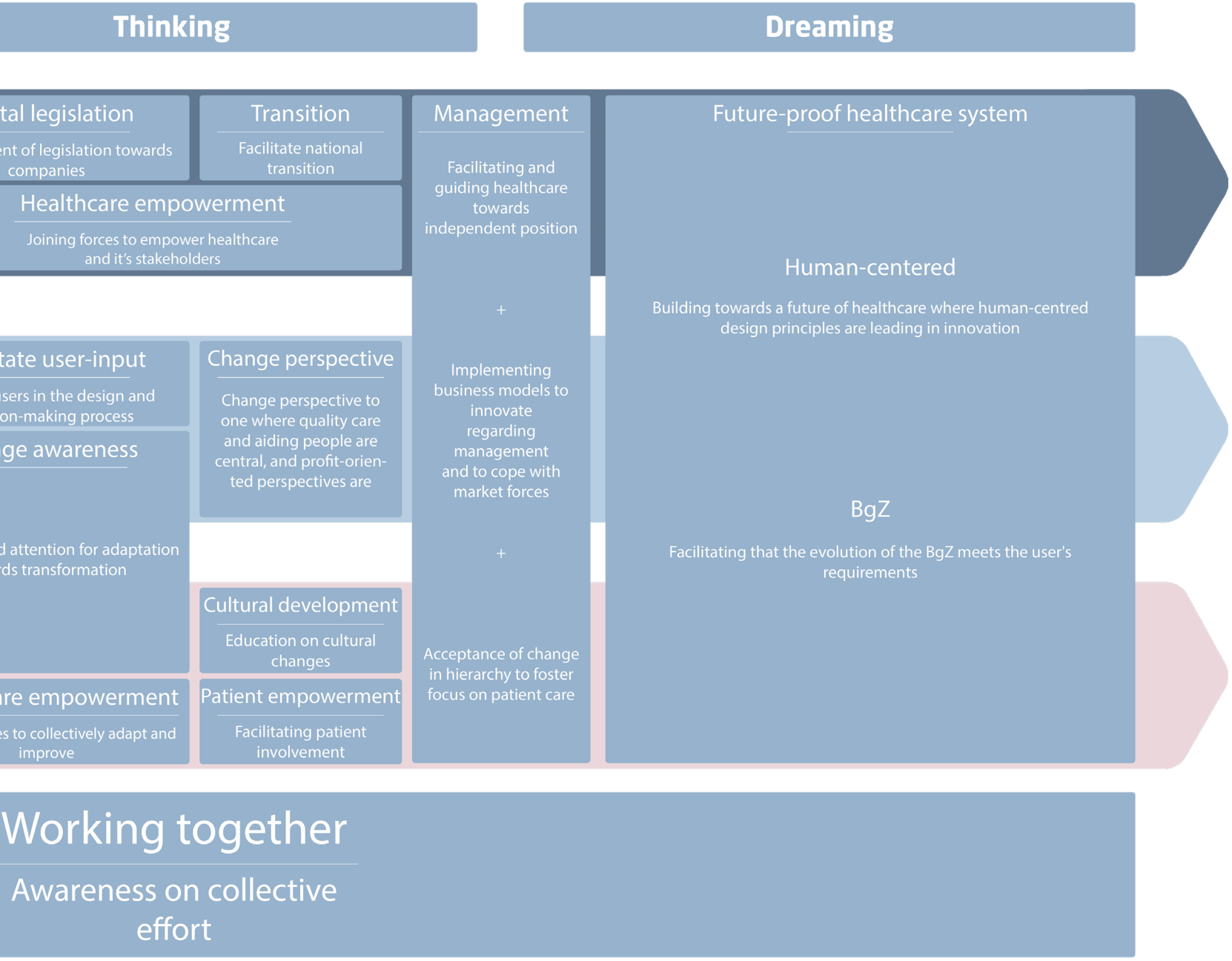


Figure 39. Roadmap towards the future of digital transformation in healthcare



The roadmap represents 3 horizons (doing, thinking, and dreaming) of a possible future within the healthcare system regarding digital transformation. The map can serve as a timeline towards change, that consists of steps to be taken within the 3 levels (macro, meso and micro) separately or in collaboration (overlapping blocks). The bottom box represents the urgency to work together and incorporate a integral approach within the levels.

The first horizon, doing, focusses on short-term activities and transitions to optimize the current situation. Thinking, represents the medium-term opportunities and activities to explore novel ideas for future growth. Lastly, dreaming represents long-term visionary thinking to prepare for innovation and shaping the future with disruptive ideas.

The game is the first step within the doing horizon.

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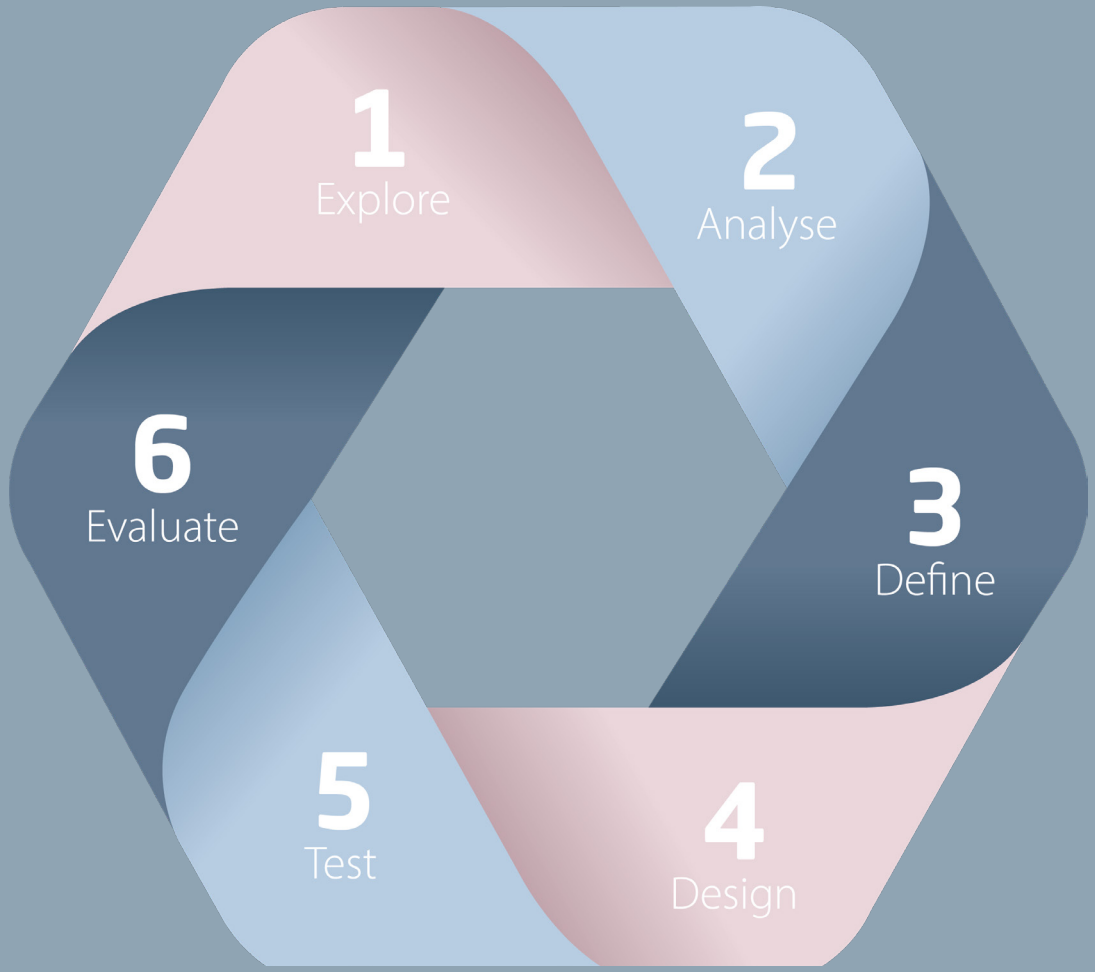
Appendices



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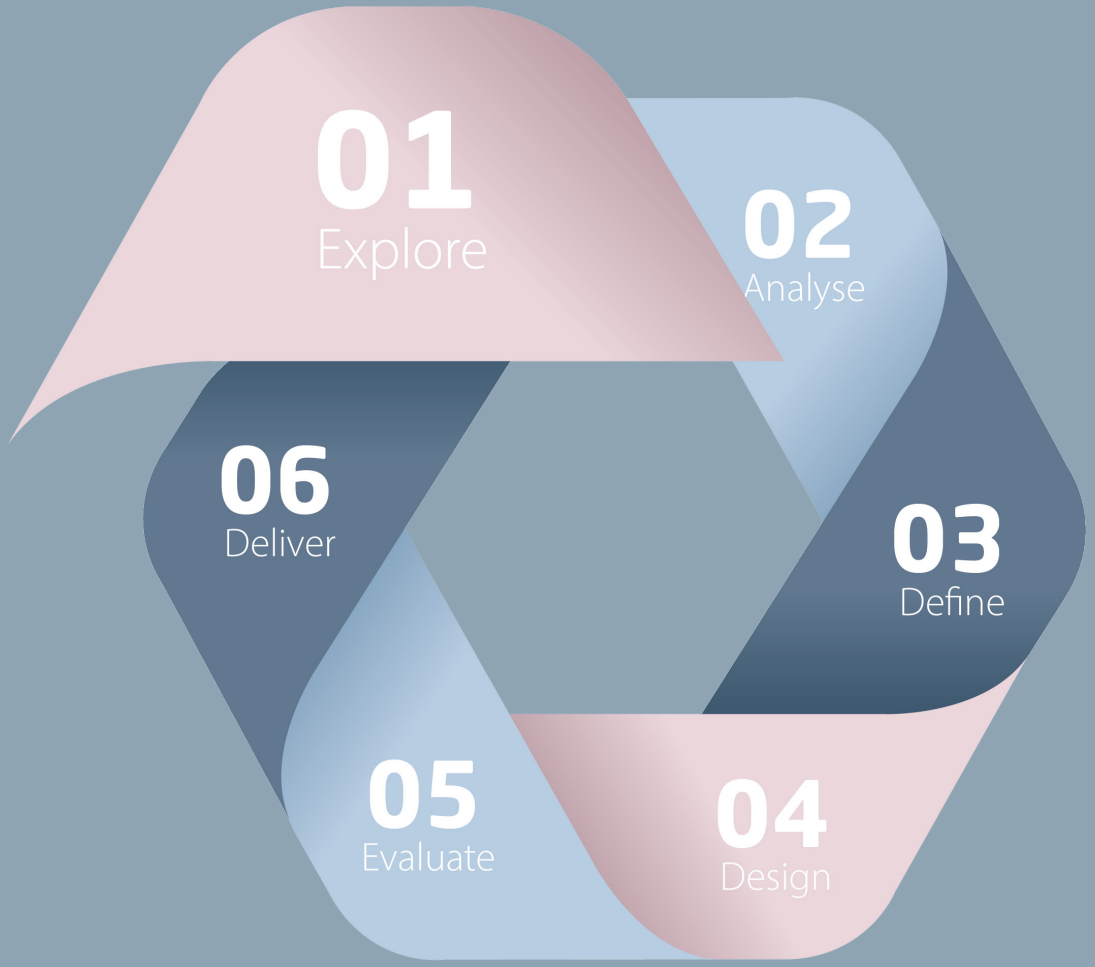
Chapter 1

Appendix 1



1A Interview guide

Interview guide informal interviews with general practicioners

Interview General Practitioner (GP)

The interview with general practitioners is set up to gather insight in the activities, responsibilities and pain points a doctor experiences during their workday with help of digital aids. Since the general practitioner is an important stakeholder in the healthcare domain and ecosystem, which is bound to digitalization, it is important to understand what GPs need from this changing working environment to maintain continuity and quality of care for their patients. In addition to this, it is important to understand what GPs need to decrease the pressure that is on them and deal with the increasing demand for care and shortage of staffing.

Introduction

Welcome and thank you very much for participating in this interview. We will be talking about your day-to-day activities, responsibilities and pain points you experience during your work as a GP. This will mainly be about digital information exchange that is incorporated within the systems you work with and changing legislation that is introduced by the ministry of health, the Wegiz and BgZ.

Please, be aware that all information will be handled carefully and will remain private. Your personal details won't be mentioned anywhere, and what you tell me will stay confidential.

So please feel free to answer honestly and truthfully, since this will influence my research, there is no right or wrong.

Interview questions

Introduction

1. Can you tell me something about yourself? Who are you, and what do you do?
2. Why did you become a doctor? And what is your goal as a doctor?
3. What does a normal working day look like for you? Describe each activity briefly in a chronological order.
4. Which activities are highly necessary for your work to be successful? And why?
5. Which activities are not necessary for your work to be successful? And why?
6. Do you experience any problems/frustrations during your work? And why?
7. What does the current healthcare system looks like with regard to digital information exchange?

Digitalization

1. What activities are not fit for digital information exchange or digital work in general?
2. What are your experiences with digital information exchange?
3. What are the advantages and disadvantages of digitalization within healthcare, and why?
4. What impact does digital information exchange make on your patients?

Wegiz & BgZ

1. Are you familiar with the Wegiz law and BgZ? If yes, what can you tell about it?
2. How do you feel/think about this Wegiz law and BgZ? And why?
3. What are your experiences with the Wegiz/BgZ?
4. What do you need from it and what does the patient need indirectly from it through your care?

Future

1. If everything were digital in the future, what would you need from this digital system for your work to be successful?
1. How does a digital environment influence your work as a doctor?

EPD & PGO

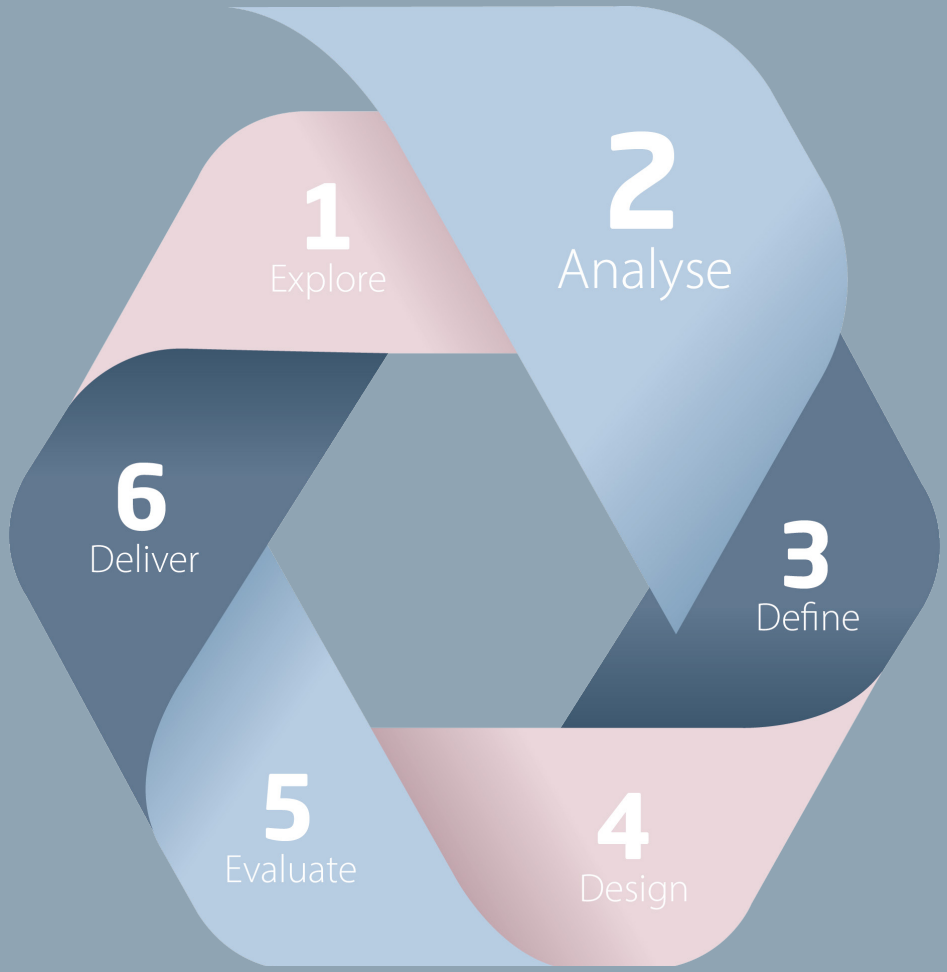
1. How many HIS system have you worked with? Which?
2. What are your experiences with these systems?
3. What do you know about a PGO? Persoonlijkegezondheidsomgeving

Outroduction

Do you have anything to add to this interview? Do you have any questions?

Chapter 2

Appendix 2



2A Semi-structured interview guide

Interview guide semi-structured interviews with medical specialists, organizational employees, and patients

Interview protocol

Formal introduction

Firstly, welcome and thank you very much for participating in this research.

Throughout this study, we will delve into the digitization of information exchange during consultations in the examination room between patients and healthcare professionals. Digital information exchange can play a crucial role in providing the best possible care. With this research, we aim to understand the needs and perspectives of both healthcare providers and patients regarding effective digital information exchange.

I would like to ask you to sign this informed consent letter, granting permission to store and process the information you share during this research. Additionally, I would like to inquire if you have any objections to recording this conversation. The recording will only be used to transcribe the conversation into text, and it will be deleted thereafter. I would like to emphasize that the information you share will remain private and treated with utmost care. Your personal data will not be stored anywhere and will remain confidential. Therefore, please feel free to provide honest answers, as this will significantly influence the research. Moreover, there are no right or wrong answers.

Introduction

The healthcare sector is under immense pressure, and various causes contribute to this strain. From within the healthcare sector, there is a plea to the government to improve healthcare and alleviate the pressure. Digitalization has been proposed as a key factor in this improvement, with a specific focus on digital information exchange. To address this, a new law has been enacted—the Wegiz, Electronic Data Exchange in Healthcare Act. This law mandates healthcare to exchange information digitally. Integral to this is the BgZ, Basic Healthcare Dataset, which contains crucial and relevant patient information shared among healthcare providers. The objective is to have the right information in the right place at the right time to provide optimal care to the patient.

However, the implementation of this law, and consequently the BgZ, brings about significant changes. The existing systems in healthcare are not yet ready for this transformation. This research aims to identify the factors influencing the implementation of this law and the BgZ in the examination room. The focus of the research is on the interaction within the examination room.

Do you have any questions thus far?

Physician & Organizational employees

We will address various themes, with the overarching theme being digital information exchange.

Wegiz/BgZ

1. Are you familiar with Wegiz and BgZ? If yes, could you explain what they are?
2. If not, could you provide a brief explanation?
3. What are your perspectives on them? What advantages/opportunities/challenges/risks do you see?

Digital Information Exchange

1. How would the perfect digital information exchange experience look like for you, and why?
2. What factors are most important in achieving this? Why?
3. What would you need from Wegiz and BgZ to facilitate this perfect experience?

Interoperability

1. How does the lack of interoperability influence your work experience?
2. What problems or challenges do you currently face?
3. How would you like to see these problems resolved?

Overview

1. What strategies/processes/tools do you use to maintain an overview of the patient journey and the amount of information involved?
2. From your perspective, what changes or improvements could be made in digital information exchange to provide a better overview of patient information?
3. Are there specific features or functionalities that you believe would significantly increase the physician's overview during consultations?

Efficiency (Documentation Burden & Time Management)

1. What factors contribute to an efficient consultation?
2. What problems or challenges do you currently experience, and what factors contribute to them?
3. How would you like to see these problems resolved?

Standardization

1. How do you view standardization?
2. What factors influence standardization, and why?
3. What problems or challenges do you see in standardization?
4. How would you like to see these problems resolved?

Patient Empowerment

1. How do you view patient empowerment?
2. What factors currently influence patient empowerment?
3. What problems or challenges do you experience in this regard?
4. How would you like to see these problems resolved?
5. How do you perceive the role of the patient in the healthcare process? Could this role change, and if so, how and why?

Usability Software

1. How is the experience in terms of usability with current software systems in healthcare?
2. What problems or challenges do you experience, and why?
3. How would you like to see these problems resolved?

Journey Map

Questions for feedback: What is accurate and what is not?

Closing

Thank you for the valuable information and your time.
Do you have any final comments or questions?

Patient

Overview in Patient Data/Healthcare Process

1. What does having an overview in your healthcare process mean to you, and how do you create it?
2. How do you prepare for a consultation with a medical specialist? Do you use the internet?
3. What does a perfect consultation look like for you?
4. How do you use your preparation/overview in the conversation?

Remembering

1. How do you remember the information during a consultation? Do you write it down, repeat it in your head?
2. What would help you remember the information? What makes it easier?

Patient Journey

1. Do you have an overview of your healthcare process, and how do you achieve it?
2. How important is insight into your healthcare process?
3. Would an overview in the healthcare process help you? Why? For preparation, understanding?

Communication

1. What communication channels of information are already in place from the hospital to you?
2. Do you have a preference for a particular communication method? Why?

3. Are you familiar with the PGO/patient environment hospital? How, and what is it?
4. Is the PGO/patient environment hospital intuitive for you?
5. How does accessing your PGO/patient environment hospital help you? What does it do for you?

Exchange

1. How do you think the exchange of your patient dossier takes place?
2. Have you given consent for data exchange? Why or why not?
3. To what extent do you expect a medical specialist to be aware of your medical background in the examination room?

Digital Skills

1. How digital are you? On a scale of 1-10 (1=digiphobe, 10=digiphile).
2. To what extent are you willing to develop digital skills? Why, and for what purposes would you want to possess these skills?
3. What are your expectations regarding the digital skills of a physician?

Journey Map

Questions for feedback: What is accurate and what is not?

2B Participant information letter

Information letter for participation in semi-structured interview research

Proefpersoneninformatie voor deelname aan wetenschappelijk onderzoek

Digitalisering voor verbinding van zorg & beleid in de spreekkamer

Officiële titel: Digitalization to connect healthcare & policy for patientcare.

Inleiding

Geachte heer/mevrouw,

Met deze informatiebrief willen we u vragen of u wilt meedoen aan wetenschappelijk onderzoek. Om mee te doen is uw schriftelijk toestemming nodig en meedoen is geheel vrijwillig. U ontvangt deze brief omdat u in behandeling bent in het Reinier de Graaf Gasthuis. Dit onderzoek wordt uitgevoerd door het Reinier de Graaf Gasthuis (RdGG) en de TU Delft.
Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u uitleg over wat het onderzoek inhoudt. U leest hier om wat voor onderzoek het gaat, wat het voor u betekent, en wat de voor- en nadelen zijn. We willen u vragen alle informatie goed door te lezen.

Stel uw vragen

U kunt uw beslissing nemen met de informatie die u in deze informatiebrief vindt. Lees deze informatie goed en rustig door. Verder kunt u:
- Vragen stellen aan de onderzoeker die u deze informatie geeft
- Praten met uw partner, familie of vrienden over dit onderzoek.
- U kunt de onafhankelijk arts, die aan het einde van deze brief genoemd wordt, vragen voor aanvullende informatie.
- Verder informatie over meedoen aan wetenschappelijk onderzoek is te vinden op www.rijksoverheid.nl/mensenonderzoek.

Na het ontvangen van deze brief krijgt u de tijd om te bedenken of u mee wilt doen aan het onderzoek. Als u wilt meedoen, kunt u het toestemmingsformulier invullen dat u vindt in bijlage b.

1. Algemene informatie

Dit onderzoek wordt uitgevoerd door het Reinier de Graaf Gasthuis (RdGG). De onderzoeker, een afstudeerstudent aan de Technische Universiteit Delft voert het onderzoek uit in het RdGG.

De deelnemers aan dit onderzoek zijn:
- 5 tot 10 patiënten verschillende zorgpaden die behandeld worden in het RdGG
- 5 tot 12 zorgverleners die patiënten behandelen in het RdGG
- 5 tot 12 medewerkers in het RdGG die meewerken aan het digitaal maken van de zorg

De medisch-ethische toetsingscommissie LDD heeft dit onderzoek beoordeeld.

2. Wat is het doel van het onderzoek?

Het doel van dit onderzoek is verbetering van de zorg voor patiënten. De verbetering is gericht op het digitaal maken van de zorg en de informatieuitwisseling en het contact tussen patiënten en zorgverleners. Er wordt eerst een overzicht gemaakt van het zorgproces, een zogenaamde ‘patient journey map’. Zo’n patient journey map laat de stappen zien die patiënten doorlopen tijdens hun behandeling. Ook toont het contacten met verschillende zorgverleners. Met zo’n journey map wordt het gebruik van digitale mogelijkheden en de manier waarop informatie wordt uitgewisseld onderzocht. Voorbeelden van digitale mogelijkheden zijn het gebruik en het inzien van uitslagen in het patiëntenportaal, videobellen of het gebruik van e-consulten. Er wordt onderzocht wat wensen en behoeften zijn van patiënten en zorgverleners op het gebied van digitalisering. De journey map laat mogelijkheden zien in de zorg voor digitalisering en informatie-uitwisseling.

3. Wat is de achtergrond van het onderzoek?

Er gaat steeds meer digitaal, deze mogelijkheden zijn er ook steeds meer in het ziekenhuis. Echter, in de spreekkamer zijn niet alle patiëntgegevens automatisch bekend. Digitale informatie-uitwisseling kan helpen bij het bieden van zo goed mogelijke zorg, Met dit onderzoek kijken we wat patiënten en hun zorgverleners nodig hebben voor goede digitale informatie-uitwisseling en wat ze hiervan vinden. Ook als u geen digitale middelen gebruikt, willen we graag weten wat u vindt.

Opzet van het onderzoek

De methode van deze studie is ontworpen als een kwalitatieve, exploratieve studie, bestaande uit interviews en focusgroepen. Dat betekent, dat we niets veranderen aan hoe we voor u zorgen en hoe u met ons in contact kunt komen. We maken er alleen een goed overzicht van en vragen u gericht wat u ervan vindt. Door deze studiemethode te gebruiken, kunnen er met relatief weinig deelnemers betrouwbare resultaten verkregen worden.

4. Hoe verloopt het onderzoek?

4.1 Hoelang duurt het onderzoek?

4.1.1 U bent patiënt:

Doet u mee met het onderzoek? Dan duurt dat in totaal ongeveer 30 minuten. Het onderzoek bestaat uit een interview met de onderzoeker.

(U kunt hoofdstuk 4.1.2 overslaan en verder lezen bij hoofdstuk 4.2)

4.1.2 Voor zorgverleners binnen het RdGG en medewerkers binnen het RdGG die meewerken aan het digitaal maken van de zorg:

Bent u (zorg)medewerker in het RdGG en doet u mee met het onderzoek? Als u deelneemt aan het interview duurt dat in totaal ongeveer 30 minuten. Als u deelneemt aan de focusgroep duurt dat 45 tot 60 minuten.

4.2 Stap 1: Bent u geschikt om mee te doen?

Om mee te kunnen doen aan dit onderzoek is het volgende belangrijk:

1. U berijpt, leest, schrijft en spreekt Nederlands
2. U bent ouder dan 18 jaar
3. U bent onder behandeling in het Reinier de Graaf Gasthuis

Of

U bent een zorgverlener in het Reinier de Graaf Gasthuis

Of

U bent een medewerker in het Reinier de Graaf Gasthuis en werkt mee aan de digitalisering van de zorg.

4.3 Stap 2: Onderzoeken

4.3.1 U bent patiënt:

U wordt gebeld door de onderzoeker met de vraag of u mee wil doen aan het onderzoek. Als u mee kan en wil doen met het onderzoek zal een datum en tijdstip afgesproken worden waarop het interview plaatsvindt.

Interview

Het interview zal maximaal 30 minuten duren. Het interview wordt gepland voor of na een van uw afspraken in het RdGG, zodat u niet extra hoeft te reizen. Tijdens het interview worden vragen gesteld. Deze vragen gaan over hoe u de zorg ervaart en op welke manier u gebruik maakt van de digitale hulpmiddelen die worden aangeboden en over wat u vindt van de manier waarop u informatie ontvangt tijdens uw behandeling. De vragen zullen gaan over de volgende onderwerpen:

- De onderdelen binnen uw behandeling
- Het contact in het RdGG
- Digitale informatie uitwisseling
- Digitale ondersteuning in de zorg

(U kunt hoofdstuk 4.3.2 overslaan en verder lezen bij hoofdstuk 5)

4.3.2 U bent zorgverlener binnen het RdGG en/of medewerker binnen het RdGG die meewerken aan het digitaal maken van de zorg:

Dan bent u per e-mail benaderd door de onderzoeker met de vraag of u mee wil doen aan het onderzoek. U kunt ervoor kiezen om deel te nemen aan een interview of focusgroep. U kunt ook aan beide activiteiten deelnemen. Tijdens het interview en de focusgroep worden vragen gesteld over uw ervaringen rondom de zorg voor patiënten met behulp van digitale hulpmiddelen of uw ervaringen rondom het digitaal maken van de zorg. Als u mee kan en wil doen met het onderzoek zal een datum en tijdstip afgesproken worden waarop het interview plaatsvindt of zal u meer praktische informatie krijgen over de focusgroep.

Interview zorgverleners

Bent u zorgverlener in het RdGG? Dan zal het interview maximaal 30 minuten duren. U kunt zelf kiezen of u dit interview liever online of op het RdGG wil laten plaatsvinden. Tijdens het interview worden vragen gesteld over uw ervaringen met de zorg voor patiënten met behulp van digitale hulpmiddelen. Ook wordt gevraagd wat u vindt van het digitaal maken van onderdelen van de zorg. De vragen zullen gaan over de volgende onderwerpen:

- De onderdelen binnen uw werk als zorgverlener en de onderdelen binnen een zorgtraject van een patiënt
- De ervaring van interactie met patiënten
- Digitale informatie uitwisseling met patiënt en andere zorgverleners
- Digitale ondersteuning in de zorg

Interview medewerkers digitalisering

Bent u een medewerker in het RdGG die meewerkt aan digitalisering? Dan zal het interview maximaal 30 minuten duren. U kunt zelf kiezen of u dit interview liever online of op het RdGG wil laten plaatsvinden. Tijdens het interview worden vragen gesteld over hoe u het meewerken aan het digitaal maken van de zorg ervaart en wat er volgens u nodig is om de digitalisering in de zorg te laten slagen voor zowel patiënten als zorgmedewerkers. De vragen zullen gaan over de volgende onderwerpen:

- Ervaring met digitalisering in de zorg
- Benodigdheden voor digitalisering van informatie-uitwisseling in de zorg voor patiënt en zorgverlener
- Benodigdheden voor digitalisering van informatie-uitwisseling in de zorg voor algeheel ecosysteem
- Problemen rondom digitalisering in de zorg

Focusgroep

Bent u (zorg)medewerker in het RdGG? Dan zal de focusgroep 45 tot 60 minuten duren. Tijdens de focusgroep wordt de ontwerp interventie besproken die de onderzoeker maakt met resultaten van de interviews. Er worden 5-12 (zorg)medewerkers uitgenodigd om hun ervaringen met de zorg voor patiënten met behulp van digitale hulpmiddelen en hun ervaringen met het digitaal maken van de

zorg te delen. Ook kan in de focusgroep gepraat worden over wat er nodig is om de zorg voor patiënten te verbeteren met behulp van digitale hulpmiddelen en wat het digitaal maken van de zorg tegenhoudt of stimuleert.

5. Wat zijn de voor- en nadelen als u meedoet aan het onderzoek?

U heeft zelf geen direct voordeel van meedoen aan dit onderzoek. Uw deelname zal bijdragen aan verbeteringen van de kwaliteit van zorg voor patiënten.

Nadeel van meedoen aan het onderzoek kan zijn: Deelname aan dit onderzoek zal u 30 minuten extra tijd kosten naast uw normale behandeling. U zal een extra afspraak in het ziekenhuis hebben in vergelijking met de normale behandeling. De afspraak wordt gepland voor of na een geplande afspraak. Zo hoeft u niet extra naar het ziekenhuis te reizen.

6. Als u niet wilt meedoen aan of wilt stoppen met het onderzoek

Wilt u niet meedoen?
U beslist zelf of u meedoet aan het onderzoek. Wilt u niet meedoen? Dan krijgt u natuurlijk dezelfde behandeling als normaal.

Wilt u stoppen met het onderzoek?
Als u meedoet aan het onderzoek, kunt u zich altijd bedenken en stoppen, ook tijdens het onderzoek. Dan krijgt u nog steeds dezelfde behandeling als normaal. U hoeft niet te zeggen waarom u stopt. Wel vragen wij u het meteen te melden aan de onderzoeker als u stopt. De gegevens die tot dat moment zijn verzameld, worden gebruikt voor het onderzoek. Als er nieuwe informatie over het onderzoek is die belangrijk voor u is, laat de onderzoeker dit aan u weten. U wordt dan gevraagd of u blijft meedoen.

7. Wanneer stopt het onderzoek?

Uw deelname aan het onderzoek stopt als

- Voor patiënten: als u klaar bent met het interview
  Voor (zorg)medewerkers in het RdGG: als u klaar bent met het interview of de focusgroep
- U zelf kiest om te stoppen
- De onderzoeker het beter vindt voor u om te stoppen
- Het Reinier de Graaf ziekenhuis, de overheid of de beoordelende medisch-ethische toetsingscommissie, besluit om het onderzoek te stoppen.

Het hele onderzoek is afgelopen als alle deelnemers de interviews hebben afgerond.

Krijgt u de resultaten van het onderzoek?
Wilt u op de hoogte geworden houden van de resultaten van het onderzoek? Na afloop en het verwerken van alle gegevens van het onderzoek, krijgt u van de onderzoeker de belangrijkste uitkomsten van het onderzoek

8. Wat doen we met u gegevens?

Doet u mee met het onderzoek? Wij vragen voor het verzamelen, gebruik en bewaren van uw gegevens uw toestemming. Uw persoonsgegevens worden verzameld en anoniem gebruikt. Al uw gegevens blijven vertrouwelijk.

Welke gegevens bewaren we?

- Uw geslacht
- Uw leeftijd

- Gegevens die we tijdens het interview verzamelen. Deze gegevens zijn anoniem.

Waarom verzamelen, gebruiken en bewaren we uw gegevens?
We verzamelen, gebruiken en bewaren uw gegevens om de vragen van dit onderzoek te kunnen beantwoorden. En om de resultaten te kunnen publiceren.

Hoe beschermen we uw privacy?
Om uw privacy te beschermen maken wij al uw gegevens anoniem. Ook in rapporten en publicaties over het onderzoek kan niemand terughalen dat het over u ging.

Wie kunnen uw gegevens zien?
Sommige personen kunnen wel uw persoonlijke gegevens (leeftijd, geslacht) inzien. Dit zijn mensen die controleren of de onderzoekers het onderzoek goed en betrouwbaar uitvoeren. Personen die ter controle uw gegevens kunnen zien zijn: het onderzoeksteam, een controleur die voor het Reinier de Graaf ziekenhuis werkt en de Inspectie Gezondheidszorg en Jeugd. Deze personen houden uw gegevens geheim. Wij vragen u voor deze inzage toestemming te geven.

Hoelang bewaren we uw gegevens?
In het toestemmingsformulier geeft u toestemming voor het bewaren van uw gegevens. Als u toestemming geeft, worden uw gegevens 15 jaar na het onderzoek bewaard op de onderzoekslocatie. Dit is het RdGG. Uw gegevens worden aan het einde van het onderzoek vernietigd. Uw gegevens kunnen na dit onderzoek ook waarde hebben in ander wetenschappelijk onderzoek in een vergelijkbaar onderzoeksgebied. U kunt op het toestemmingsformulier aangeven of u ermee instemt dat uw gegevens naast bewaard, ook gebruikt mogen worden in ander onderzoek. Als u hier niet mee instemt, kunt u gewoon deelnemen aan het onderzoek.

Kunt u uw toestemming voor het gebruik van uw gegevens weer intrekken?
U kunt uw toestemming voor gebruik van uw persoonsgegevens altijd weer intrekken. Dit geldt voor dit onderzoek en ook voor het bewaren en het gebruik voor het onderzoek in de toekomst. De onderzoeksgegevens die zijn verzameld tot het moment dat u uw toestemming intrekt worden nog wel gebruikt in het onderzoek.

Wilt u meer weten over uw privacy?

- Wilt u meer weten over uw rechten bij de verwerking van persoonsgegevens? Kijk dan op www.autoriteitpersoonsgegevens.nl.
- Heeft u vragen over uw rechten? Of heeft u een klacht over de verwerking van uw persoonsgegevens? Neem dan contact op met degene die verantwoordelijk is voor de verwerking van uw persoonsgegevens. Voor uw onderzoek is dat het Reinier de Graaf Gasthuis. Zie bijlage A voor contactgegevens, en website.
- Als u klachten heeft over de verwerking van uw persoonsgegevens, raden we u aan om deze eerst te bespreken met het iemand uit het onderzoeksteam. U kunt ook naar de Functionaris Gegevensbescherming van het Reinier de Graaf Gasthuis gaan, zie contactgegevens in bijlage A, of de Autoriteit Persoonsgegevens.

9. Krijgt u een vergoeding als u meedoet aan het onderzoek?

U wordt niet betaald voor het meedoen aan dit onderzoek.

10. Verzekering voor proefpersonen

U bent niet extra verzekerd voor dit onderzoek. Want meedoen aan het onderzoek heeft geen extra risico's.

11. Heeft u vragen?

Als u vragen heeft kunt u contact opnemen met de onderzoeker. Wilt u advies van iemand die er geen belang bij heeft? Ga dan naar de onafhankelijke arts. Hij weet veel over het onderzoek, maar heeft niets te maken met dit onderzoek. Als u klachten heeft over het onderzoek, kunt u dit bespreken met de onderzoeker of uw behandelend arts. Wilt u dit liever niet, dan kunt naar de klachtenfunctionarissen van het Reinier de Graaf ziekenhuis gaan. Alle contactgegevens vindt u in bijlage A: Contactgegevens.

12. Hoe geeft u toestemming voor het onderzoek?

U kunt eerst rustig nadenken over dit onderzoek. Wanneer u voldoende bedenktijd heeft gehad, wordt u gevraagd of u wel of niet wilt meedoen aan dit onderzoek. Wilt u meedoen? Dan vragen wij u om het toestemmingsformulier in te vullen dat u bij deze informatiebrief vindt. Met uw toestemming geeft u aan dat u de informatie heeft begrepen en instemt met deelname aan het onderzoek.
U en de onderzoeker ontvangen allebei een getekende versie van deze toestemmingsverklaring.

Dank voor uw tijd.

Met vriendelijke groet,

Hoofdonderzoeker van het Reinier de Graaf ziekenhuis
Dr. P. Kok
Reumatoloog en Chief Medical Information Officer (CMIO)

Uitvoerend onderzoeker van het Reinier de Graaf ziekenhuis en de TU Delft
E.R. Kroon Masterstudent Integrated Product Design, afstudeerstagiaire RdGG

13. Bijlagen bij deze informatie

A. Contactgegevens Reinier de Graaf Gasthuis
B. Toestemmingformulier proefpersoon

Bijlage A: Contactgegevens Reinier de Graaf Gasthuis

Uitvoerend onderzoeker:
Lisa Kroon
Integrated Product Design aan de TU Delft
Reinier de Graaf Groep

Hoofd onderzoeker en verantwoordelijk arts:
Dr. Petra Kok
Reumatoloog, Chief Medical Information Officer
Reinier de Graaf Groep, afdeling Reumatologie

Onafhankelijke arts:
Dr. Rolf Brouwer
Hematoloog
Reinier de Graaf Groep, afdeling Interne Geneeskunde

Klachtenfunctionarissen:
Mw. J. J. J. Dunnewold-de Reus,
Dhr. Ir. M.P. Don,
Digitaal formulier: https://www.reinierdegraaf.nl/algemeen/klachten/klachtenformulier/

Functionaris voor de Gegevensbescherming van de instelling:
Voor meer informatie over uw rechten:
Website Reinier de Graaf Groep over privacy: https://reinierdegraaf.nl/footer/privacy/

2C Informed consent form

Informed consent form to participate in research

Proefpersoneninformatie Digitalization to connect healthcare & policy for patientcare.

Bijlage B: toestemmingsformulier proefpersoon

Behorende bij Digitalization to synchronize health care & policy for patientcare

- Ik heb de informatiebrief gelezen. Ook kon ik vragen stellen. Mijn vragen zijn goed genoeg beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.
- Ik weet dat meedoen vrijwillig is. Ook weet ik dat ik op ieder moment kan beslissen om toch niet mee te doen met het onderzoek. Of om ermee te stoppen. Ik hoef dan niet te zeggen waarom ik wil stoppen.
- Ik geef de onderzoekers toestemming om mijn gegevens te verzamelen en gebruiken. De onderzoekers doen dit alleen om de onderzoeksvraag van dit onderzoek te beantwoorden.
- Ik weet dat voor de controle van het onderzoek sommige mensen al mijn gegevens kunnen inzien. Die mensen staan in deze informatiebrief. Ik geef deze mensen toestemming om mijn gegevens in te zien voor deze controle.

Wilt u in de tabel hieronder ja of nee aankruisen?

Ik geef toestemming om mijn gegevens te bewaren om dit te gebruiken voor ander onderzoek, zoals in de informatiebrief staat.	Ja ☐	Nee☐
Ik geef toestemming om mijn gegevens tot 15 jaar te bewaren op de onderzoekslocatie (het RdGG).	Ja ☐	Nee☐
Ik geef toestemming om mij eventueel na dit onderzoek te vragen of ik wil meedoen met een vervolgonderzoek.	Ja ☐	Nee☐

Ik wil meedoen aan dit onderzoek.

Mijn naam is (proefpersoon): .....

Handtekening: ..... Datum : __ / __ / __

----------Ik verklaar dat ik deze proefpersoon volledig heb geïnformeerd over het genoemde onderzoek.

Wordt er tijdens het onderzoek informatie bekend die die de toestemming van de proefpersoon kan beïnvloeden? Dan laat ik dit op tijd weten aan deze proefpersoon.

2D Interview transcripts

Semi-structured interview transcripts of all participants

See additional appendix.

2E Data analysis

Thematic analysis

Thematica analysis of interview outcomes with medical specialists

All interview transcripts are open, axially and selectively coded, which created thematic clusters and insights regarding the theme.

The results of the thematic analysis is presented in figure E1 (spread over multiple pages). The results are coloured regarding the corresponding level. The legend is presented in figure E2 Afterwards theories are derived from these insights into figure E3 and these theories are compared to discover relations, presented in E4. These relations are substatial to the conclusion and discussion of chapter 2 and the the futher project.

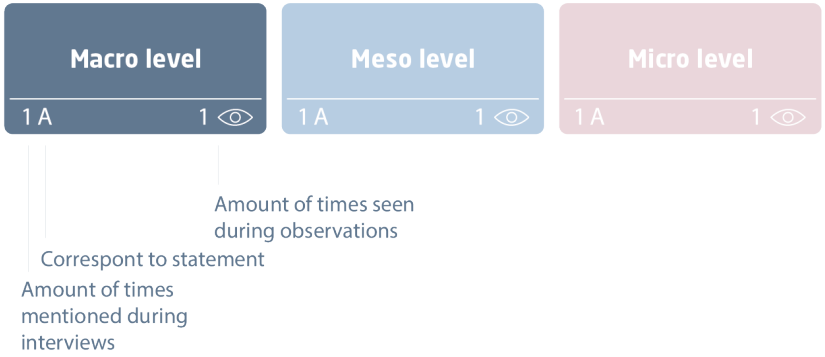


Figure E2. Legend of thematica analysis

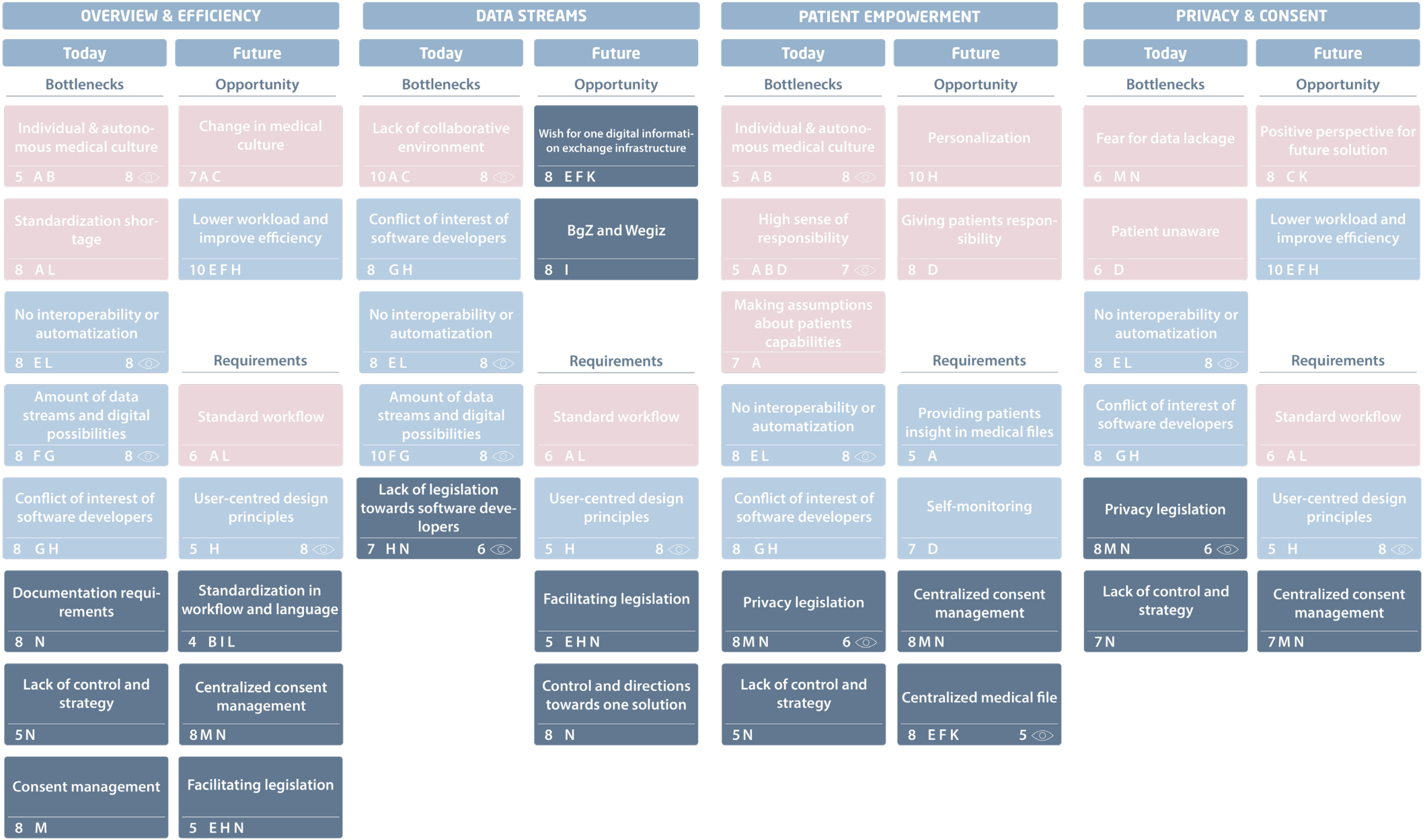


Figure E1. Thematic analysis outcomes

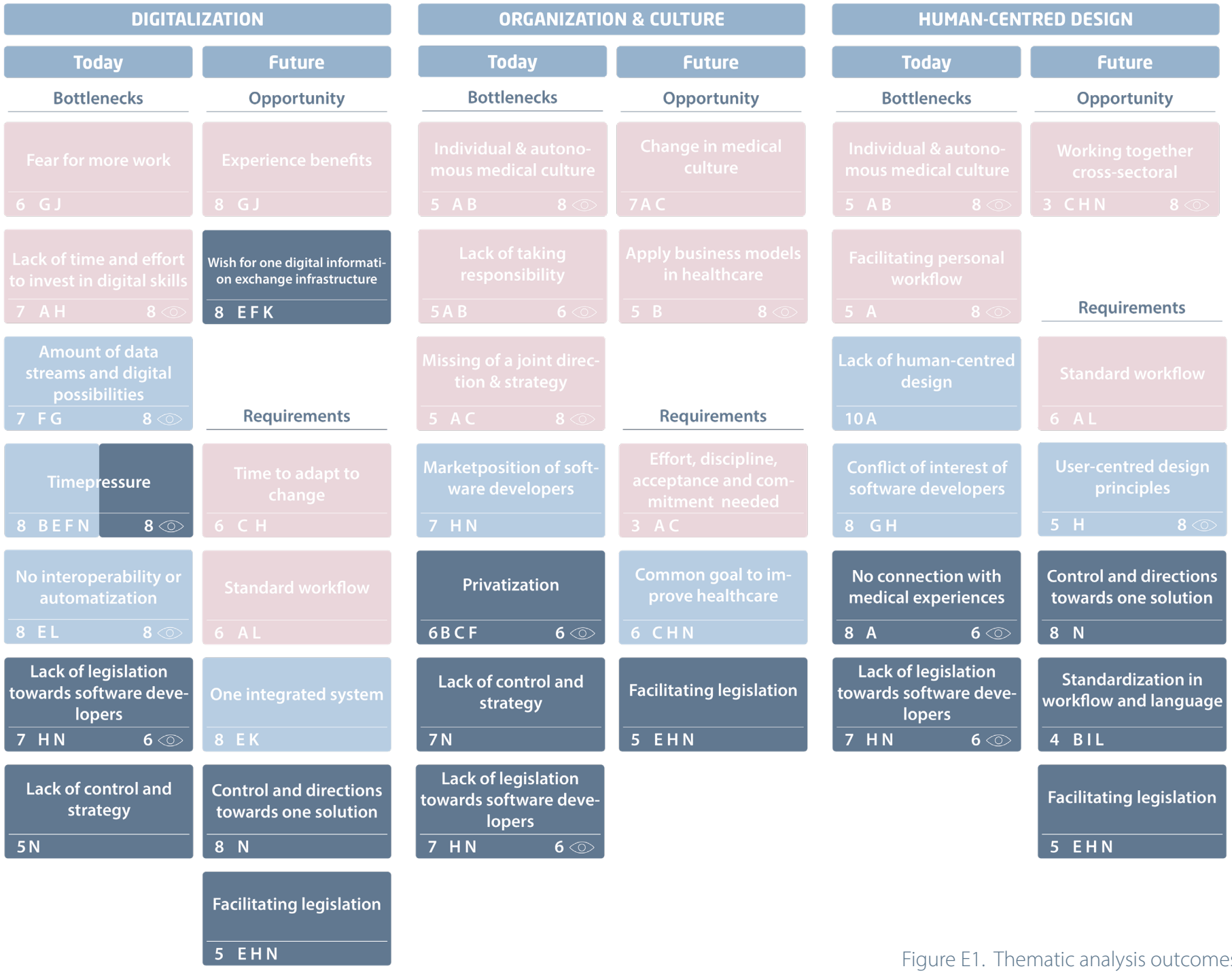


Figure E1. Thematic analysis outcomes

Theories

Micro level

A Unaware of requirement for individual contribution & engagement
B Different workflows increase workload & lack of overview
D Patient responsibility can offer solutions
I Lack of knowledge on wegiz & BgZ
J Lack of experience with successful information-exchange
G Positive and negative attitude towards digital information-echange

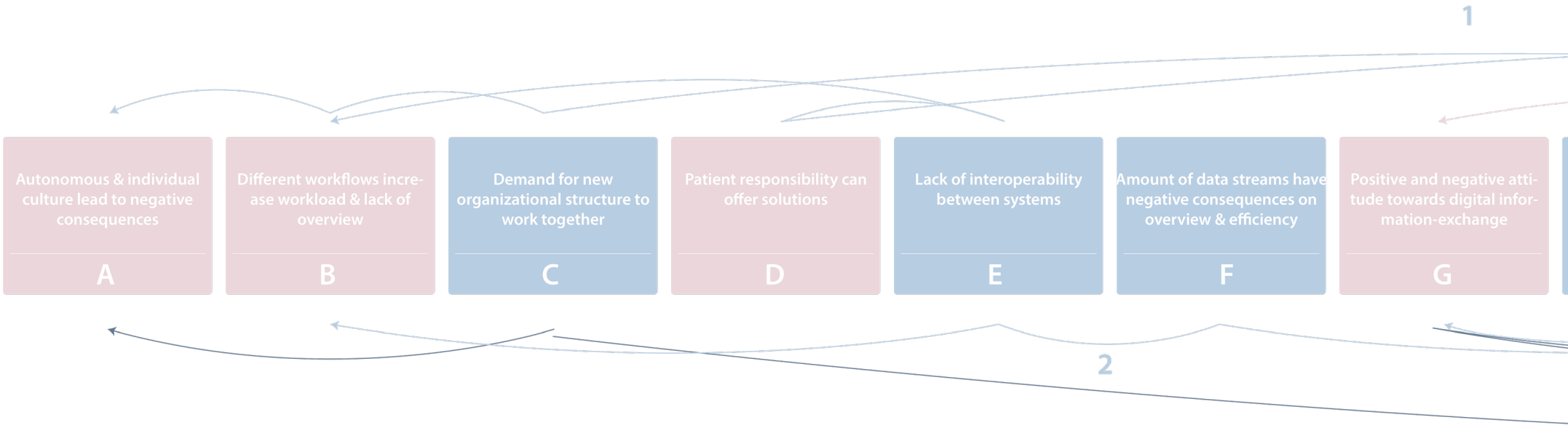
Meso level

C Demand for new organizational structure to work together
E Lack of interoperability between systems
F Amount of data streams have negative consequences on overview & efficiency
H Demand for human-centred design principles

Macro level

K BgZ can offer solutions & advantages
L Demand for standarization to offer solutions
M Demand for centralized consent management
N Demand for less bureaucracy & a collaborative direction and strategy

Figure E3. Theories derived from thematic analysis



Relations

1. Demand for new organizational structure to work together can foster the demand for standarization to offer solutions for the autonomous & individualistic culture that will create solutions for the different workflows and the increasing workload and lack of overview which will evoke efficiency & overview.

2. The amount of data streams have negative consequences on overview & efficiency which create a lack of experience with succesful information-exchange but also increase a negative attitude towards digital information-exchange and worsens the challenges of interoperability and different workflows.

3. The BgZ can offer solutions & advantages through standarization, but the lack of knowledge on the Wegiz & BgZ creates a bottleneck to experience successful informaton-exchange to change attitudes towards it.

4. Less bureaucracy, a collaborative direction and strategy can fill the demand for human-centred design principles that enhance the experience with information-exchange and change attitudes towards standardization offered by the solution of BgZ.

5. Centralized consent management can provide patient responsibility that can offer solutions for efficiency and overview, however interoperability is required to create a standardized workflow, which can fill the need for less bureaucracy and a collective strategy.

6. The BgZ can offer solutions for the amount of bureaucracy & collective direction and strategy by fulfilling the need for a new organizational structure to change the autonomous and individual cultural by working together.

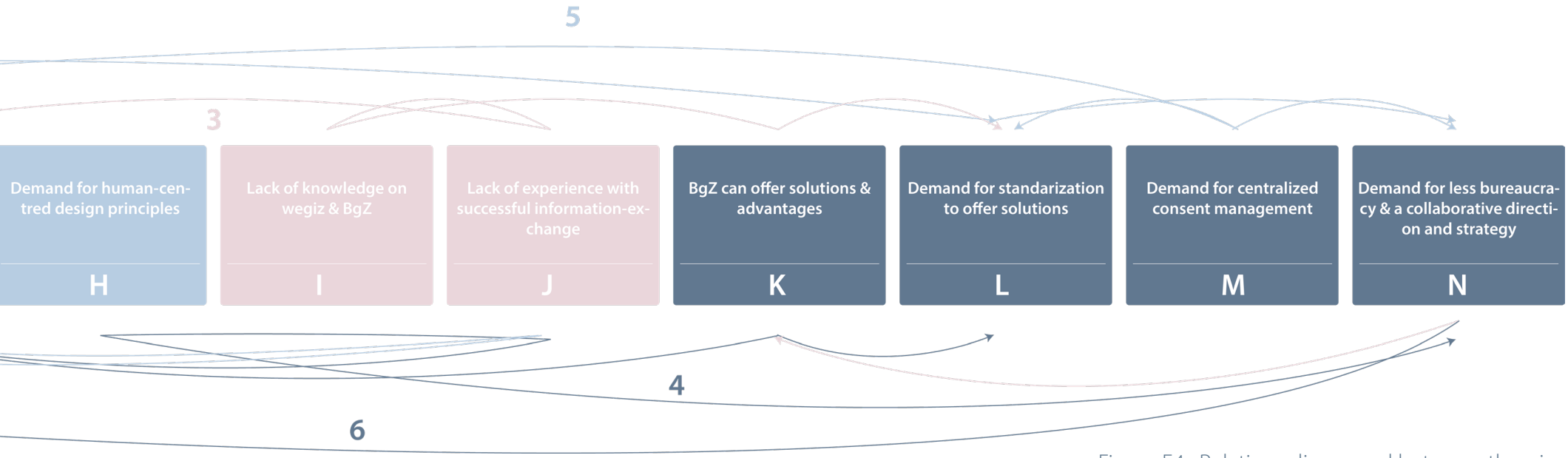


Figure E4. Relations discovered between theories

Thematica analysis of interview outcomes with organizational employees

All interview transcripts are open, axially and selectively coded, which created thematic clusters and insights regarding the theme.

The results of the thematic analysis is presented in figure E5 (spread over multiple pages). The results are coloured regarding the corresponding level. The legend is presented in figure E6 Afterwards theories are derived from these insights into figure E7 and these theories are compared to discover relations, presented in E8. These relations are substatial to the conclusion and discussion of chapter 2 and the the futher project.

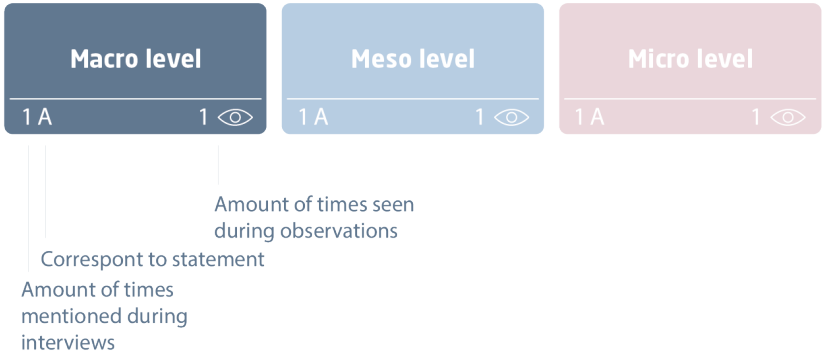


Figure E6. Legend of thematica analysis

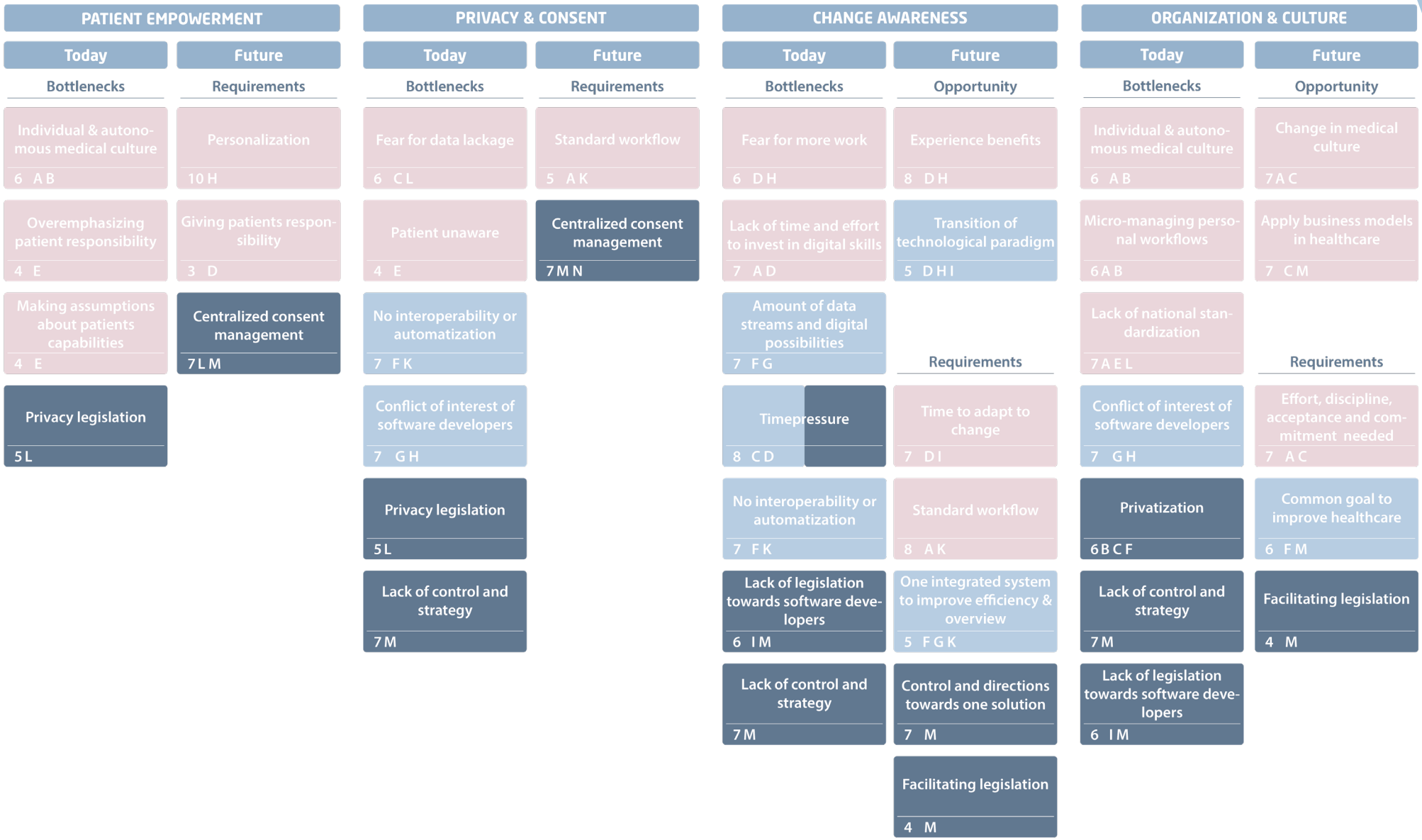


Figure E5. Thematic analysis outcomes

Theories

Micro level

A Cultural change needed to commit, working together & contribute

B Different workflows increase workload & lack of overview

H Positive and negative attitude towards digital information-exchange

E Overemphasizing patient responsibility & expectation

J Lack of knowledge on wegiz & BgZ

Meso level

F Lack of interoperability between systems

G Amount of data streams have negative consequences on overview & efficiency

C Demand for new organizational structure to work together

D Change awareness towards technological transition

I Demand for human-centred design principles

Macro level

K Demand for standarization to offer solutions

L Demand for centralized consent management

M Collective responsibility towards national strategy

N Demand for less bureaucracy & a collaborative direction and strategy

Figure E7. Theories derived from thematic analysis

Relations

1. Cultural change is needed to commit to working together, which will be possible by implementing a new organizational structure that can create a collective responsibility and strategy to solve the issue of different workflows through standardization.

2. The amount of data streams and lack of interoperability create different workflows that increase workload & lack of overview, which has negative influence on the attitude towards digitalization, which can be solved by standardization.

3. Overemphasizing patient responsibility can hinder the importantce of organizing interoperability and the demand for centralized consent management to create seamless exchange of information, the awareness for change requires prioritizing of necessary means for the transition towards digital information-exchange.

4. Less bureaucracy, a collaborative direction and strategy can fill the demand for human-centred design principles that enhance change awareness, which can be evoked by a change of organizational structure to improve the experience with information-exchange and change attitudes towards standardization offered by the solution of BgZ.

5. The BgZ can offer solutions for the amount of bureaucracy & collective direction and strategy and create positive attitude towards digital information-exchange, however the lack of knowledge on BgZ is a bottleneck. By fulfilling the need for a new organizational structure to change the medical culture and change awareness can be implemented.

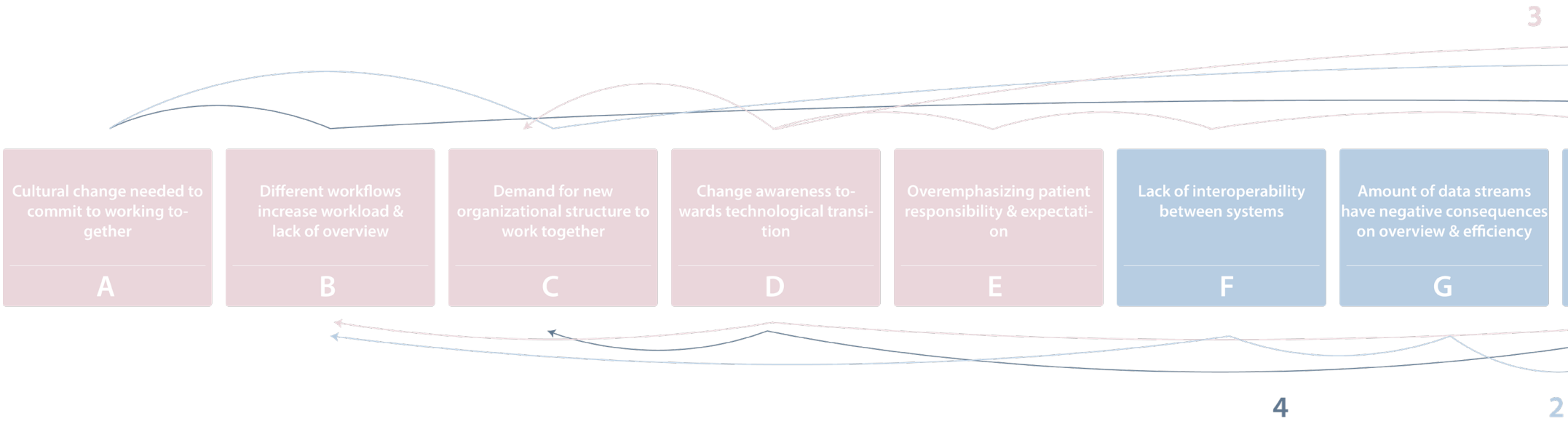
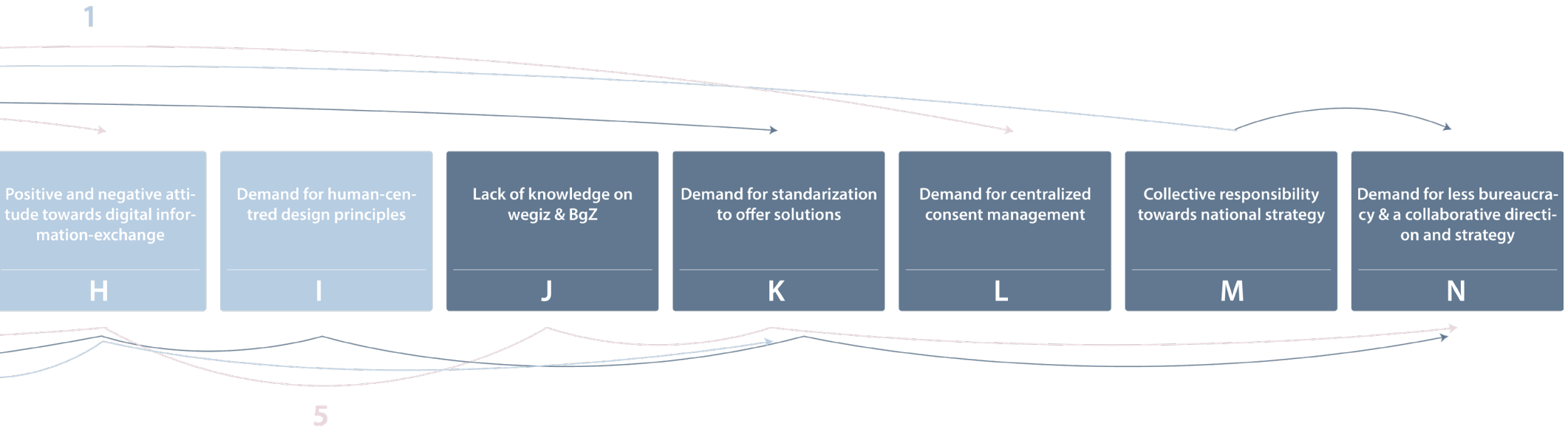
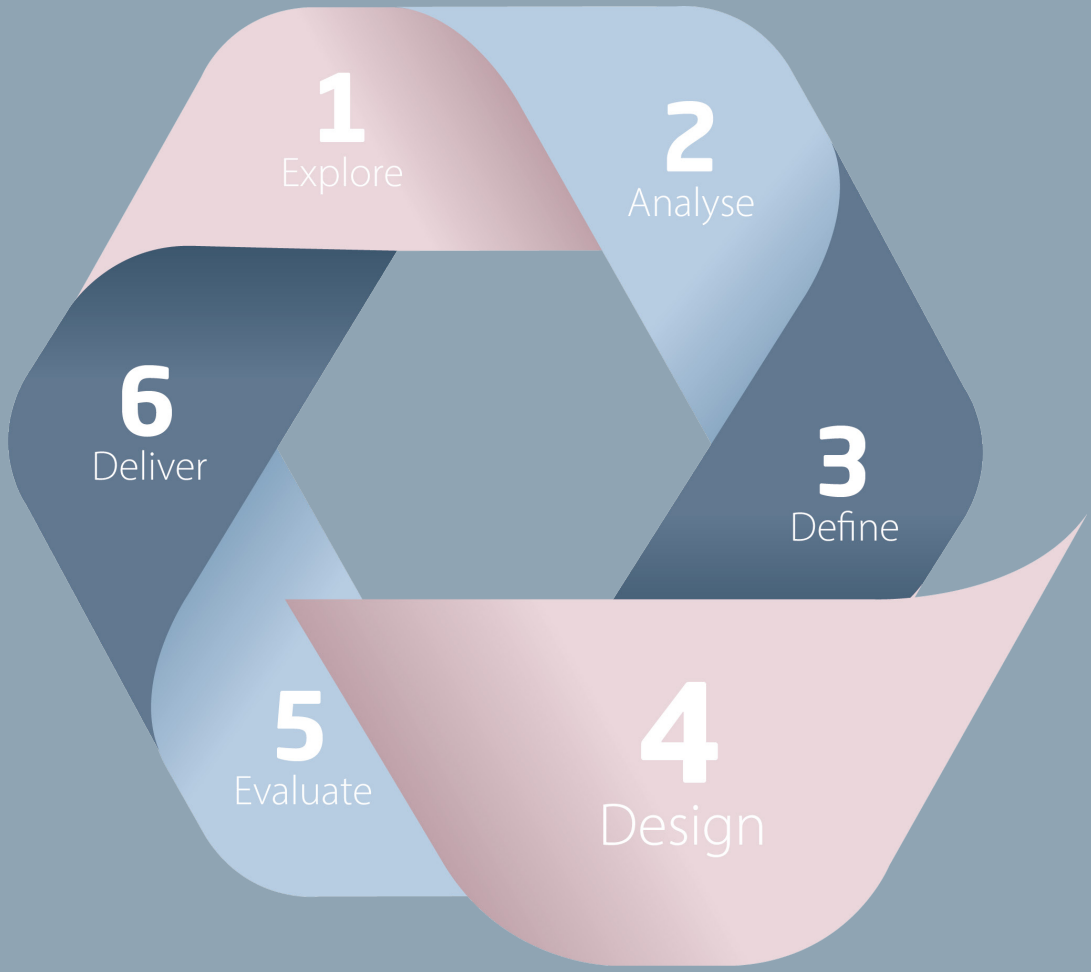


Figure E8. Relations discovered between theories


1
Positive and negative attitude towards digital information-exchange
H
Demand for human-centred design principles
I
Lack of knowledge on wegiz & BgZ
J
Demand for standarization to offer solutions
K
Demand for centralized consent management
L
Collective responsibility towards national strategy
M
Demand for less bureaucracy & a collaborative direction and strategy
N
5

Chapter 4

Appendix 4

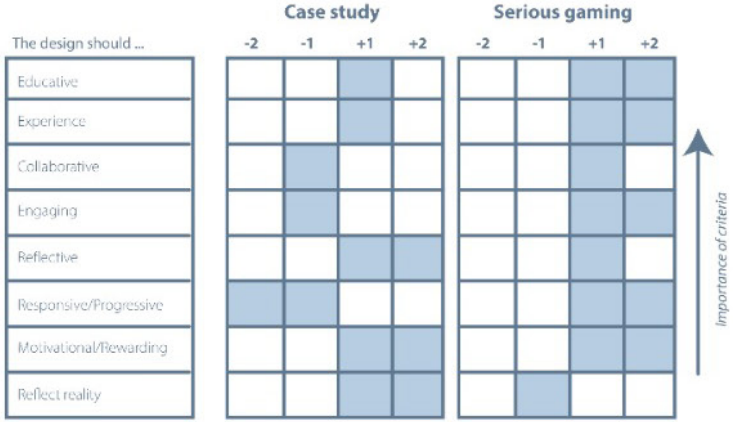


4A Generative brainstorm sessions

Enlarged outcomes of the generative brainstorm sessions

Case study

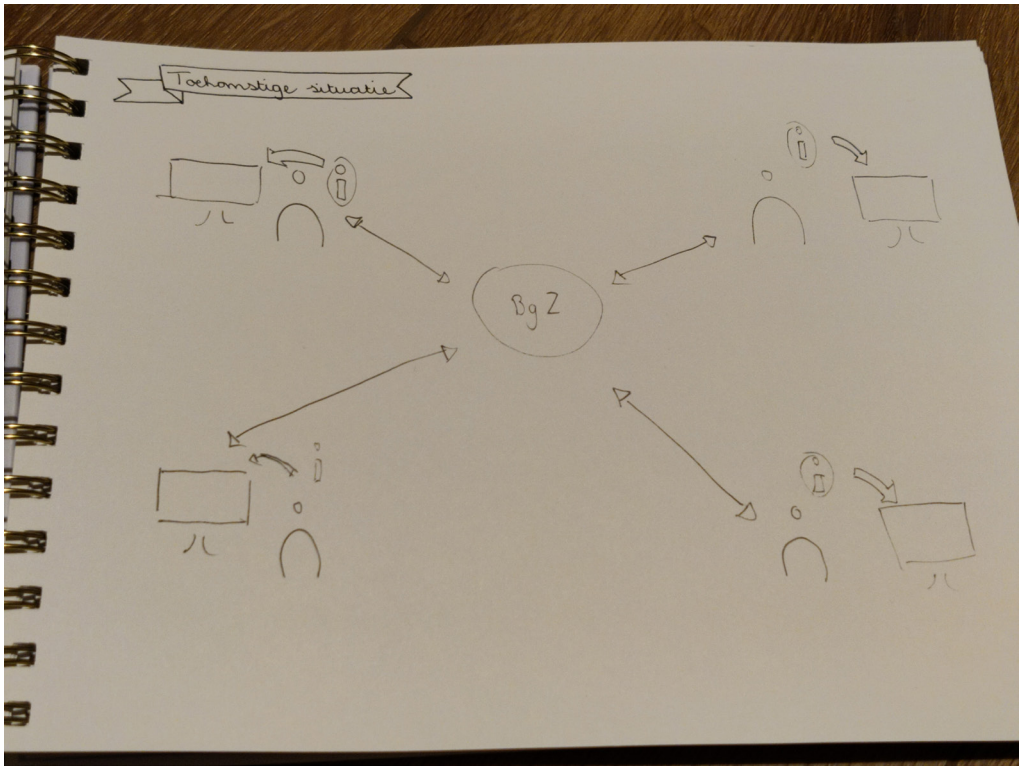
Harris profiel

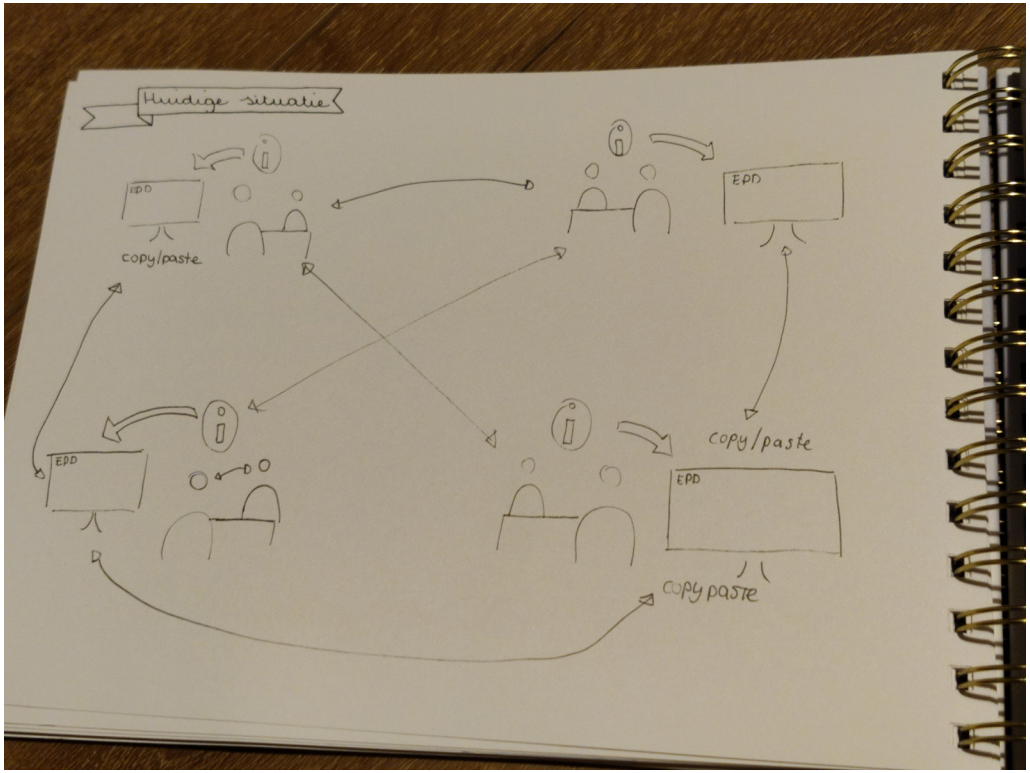


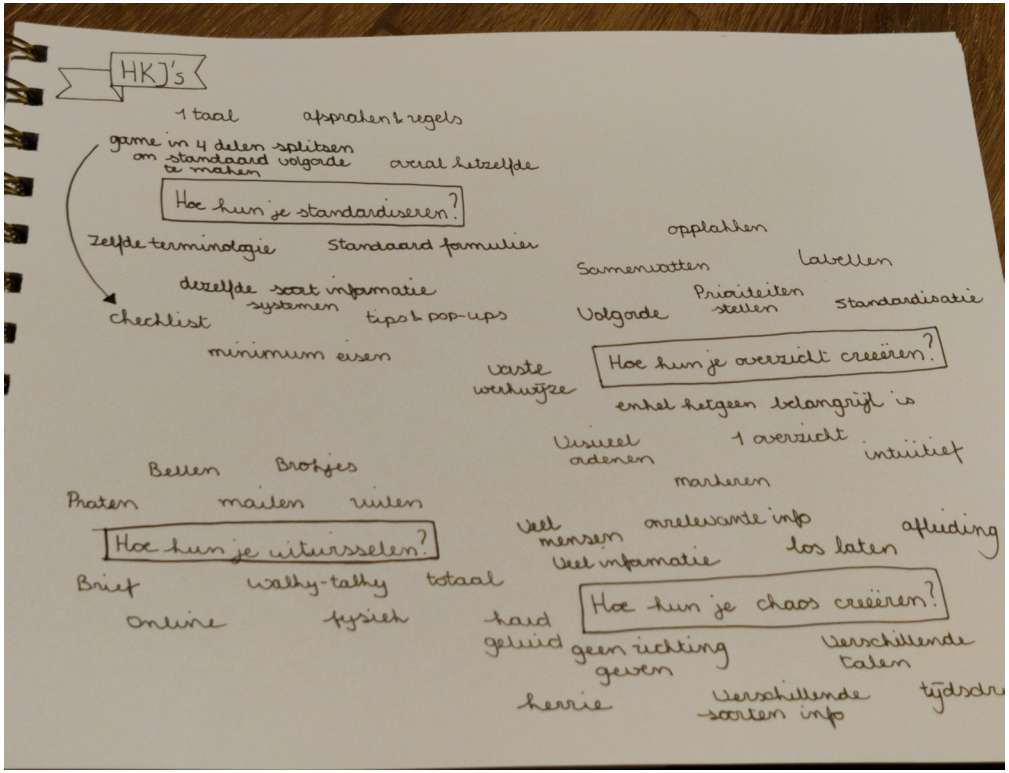
Serious gaming

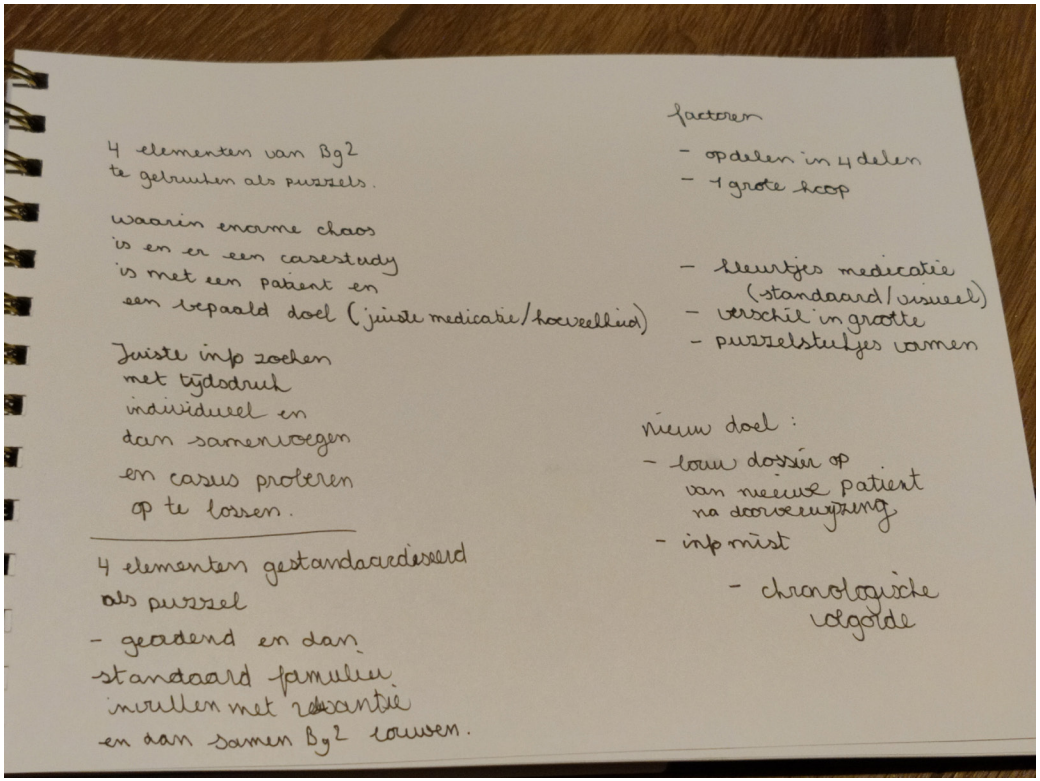
4B Individual brainstorming sessions

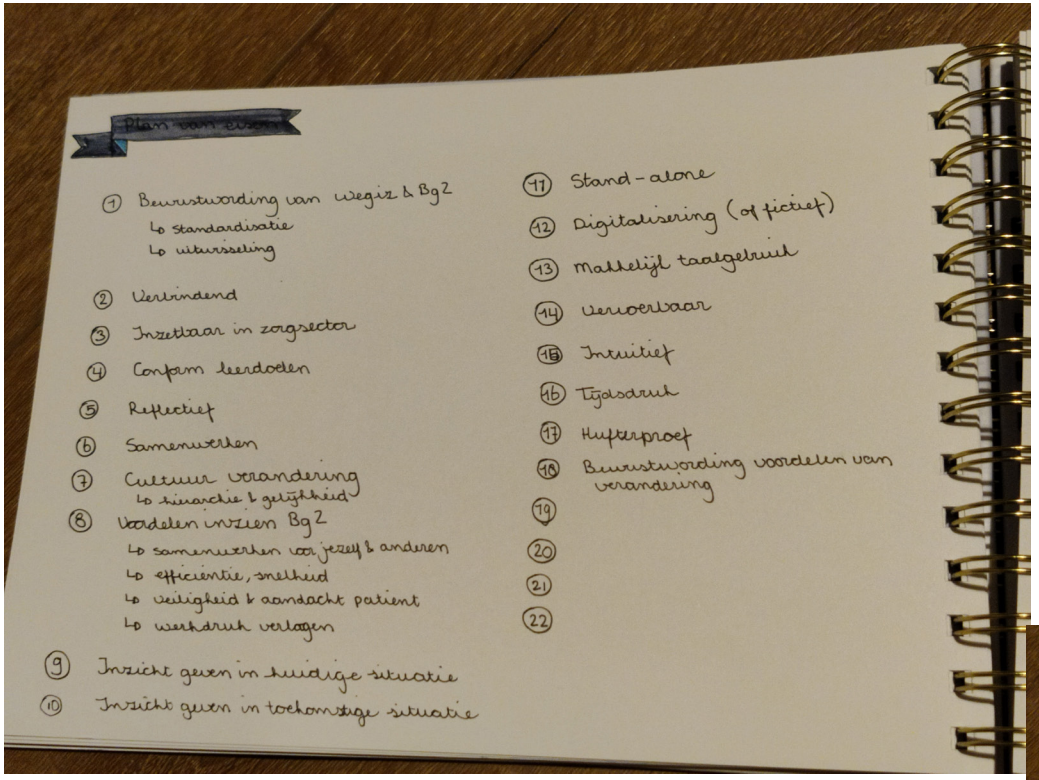
Outcomes of the individual brainstorming sessions

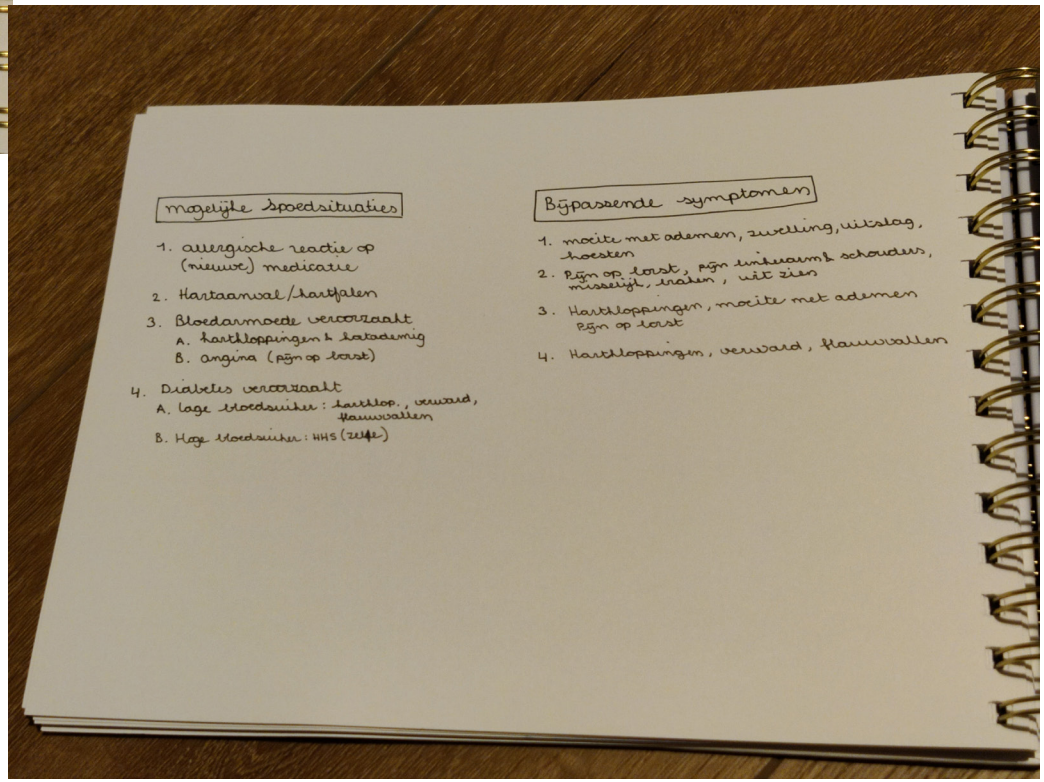


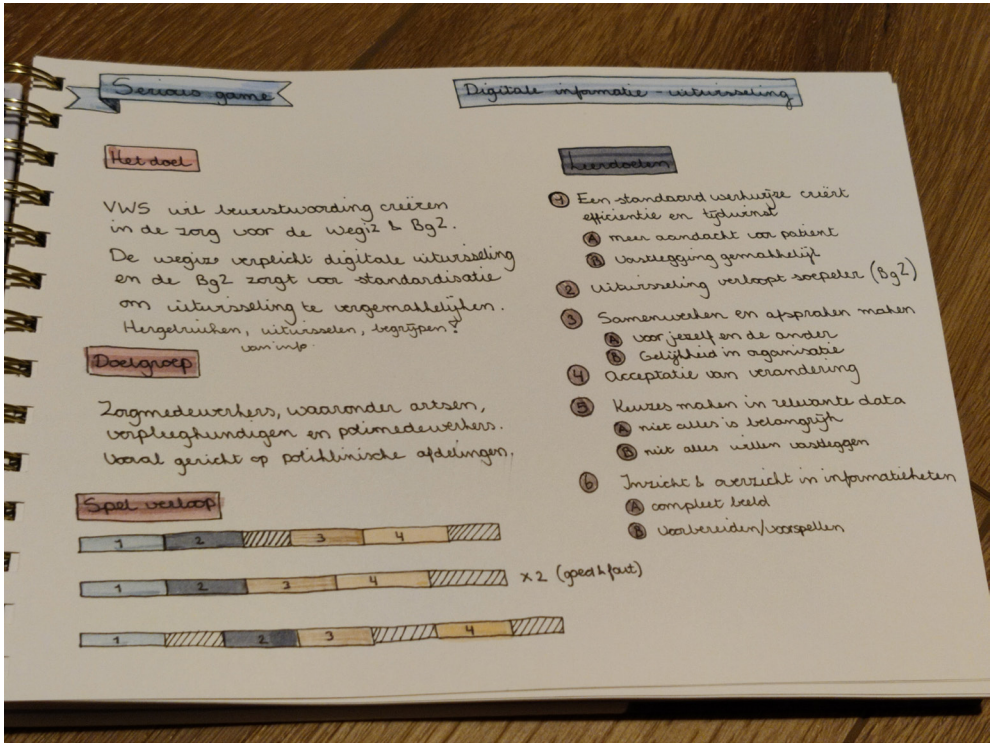


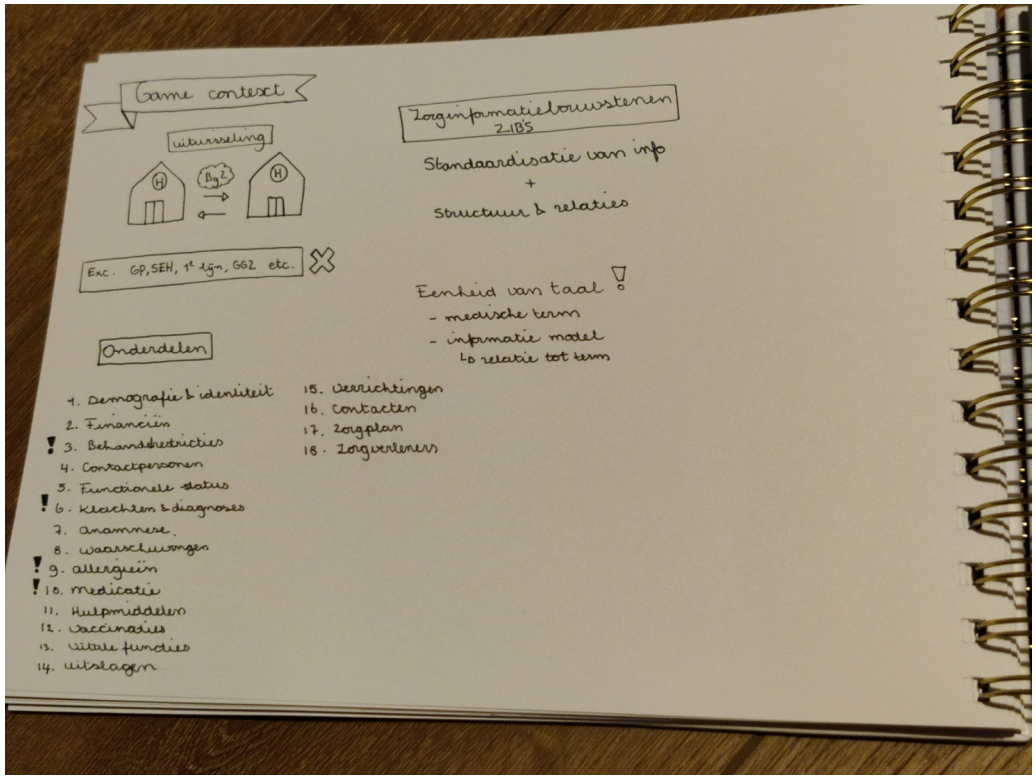

HKJ's
1 taal
afspraken & regels
game in 4 delen splitsen om standaard volgorde te maken
overal hetzelfde
Hoe kun je standardiseren?
Zelfde terminologie
Standaard formulier
opplakken
Samenvatten
Labellen
dezelfde soort informatie
systemen
Prioriteiten stellen
Standardisatie
Volgorde
Checklist
tips & pop-ups
minimum eisen
Hoe kun je overzicht creëeren?
vaste werkwijze
enkel hetgeen belangrijk is
Visueel ordenen
1 overzicht
intuïtief
Bellen
Brokjes
markeren
Praten
mailen
ruilen
Veel mensen
onrelevante info
afleiding
Hoe kun je uitwisselen?
Veel informatie
los laten
Brief
walky-talky
totaal
Hoe kun je chaos creëeren?
Online
fysiek
hard geluid
geen richting geven
Verschillende talen
herrie
Verschillende soorten info
tijdsdr

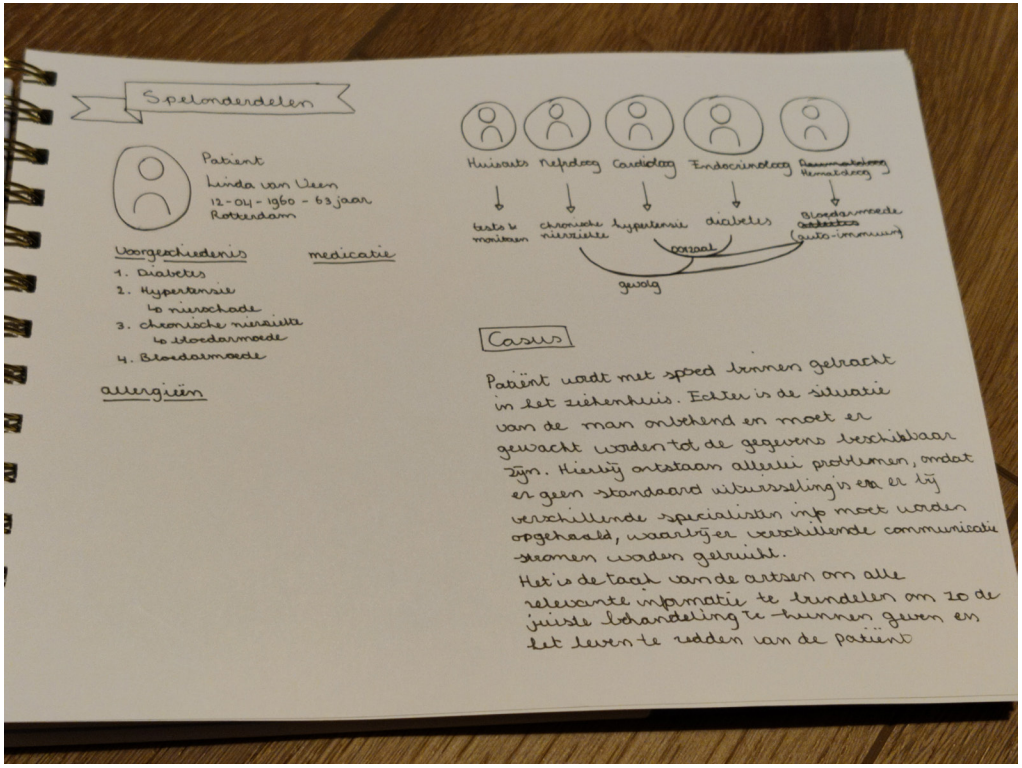

4 elementen van Bg2 te gebruiken als puzzels.
waarin enorme chaos is en er een casestudy is met een patient en een bepaald doel (juiste medicatie/hoeveelheid)
Juiste info zoeken met tijdsdruk individueel en dan samenvoegen en casus proberen op te lossen.
4 elementen gestandaardiseerd als puzzel
- geadend en dan standaard formulier invullen met relevantie en dan samen Bg2 bouwen.
factoren
- opdelen in 4 delen
- 1 grote hoop
- kleurtjes medicatie (standaard/visueel)
- verschil in grootte
- puzzelstukjes vormen
nieuw doel:
- bouw dossier op van nieuwe patient na doorverwijzing
- info mist
- chronologische volgorde

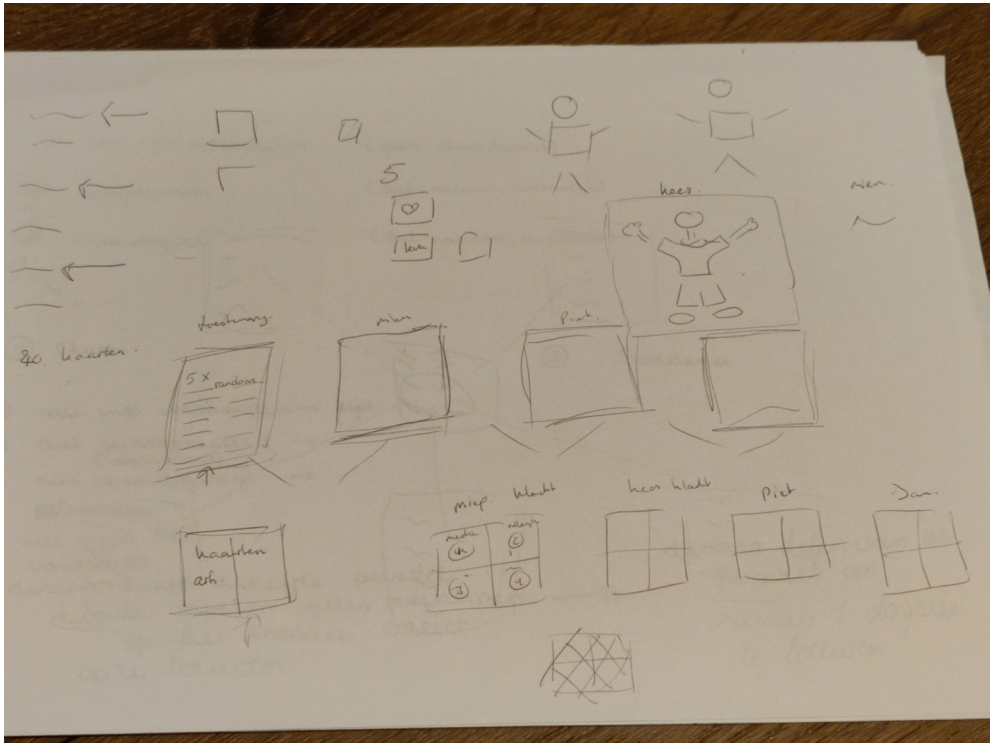

Plan van eisen
1 Bewustwording van wegiz & Bg2
↳ standardisatie
↳ uitwisseling
2 Verbindend
3 Inzetbaar in zorgsector
4 Conform leerdoelen
5 Reflectief
6 Samenwerken
7 Cultuur verandering
↳ hiearchie & gelijkheid
8 Voordelen inzien Bg2
↳ samenwerken v/a jezelf & anderen
↳ efficientie, snelheid
↳ veiligheid & aandacht patient
↳ werkdruk verlagen
9 Inzicht geven in huidige situatie
10 Inzicht geven in toekomstige situatie
11 Stand-alone
12 Digitalisering (officieel)
13 Makkelijk taalgebruik
14 Vervoerbaar
15 Intuitief
16 Tijdsdruk
17 Hufterproef
18 Bewustwording voordelen van verandering
19
20
21
22

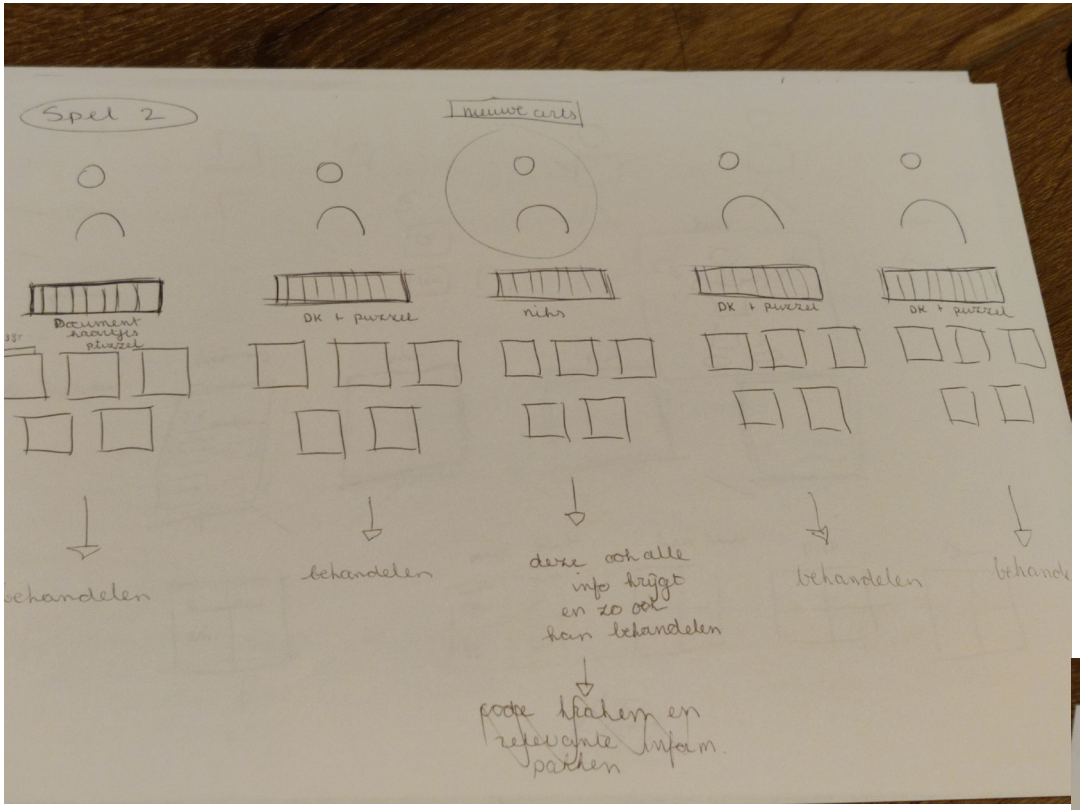

mogelijke spoedsituaties
1. allergische reactie op (nieuwe) medicatie
2. Hartaanval/hartfalen
3. Bloedarmoede veroorzaakt
A. hartkloppingen & lusteloosheid
B. angina (pijn op borst)
4. Diabetes veroorzaakt
A. lage bloedsuiker: lusteloos, verward, flauwvallen
B. Hoge bloedsuiker: HHS (zelfz)
Bijpassende symptomen
1. moeite met ademen, zwelling, uitslag, hoesten
2. Pijn op borst, pijn linkerarm & schouders, misselijk, braken, uit zien
3. Hartkloppingen, moeite met ademen
Pijn op borst
4. Hartkloppingen, verward, flauwvallen

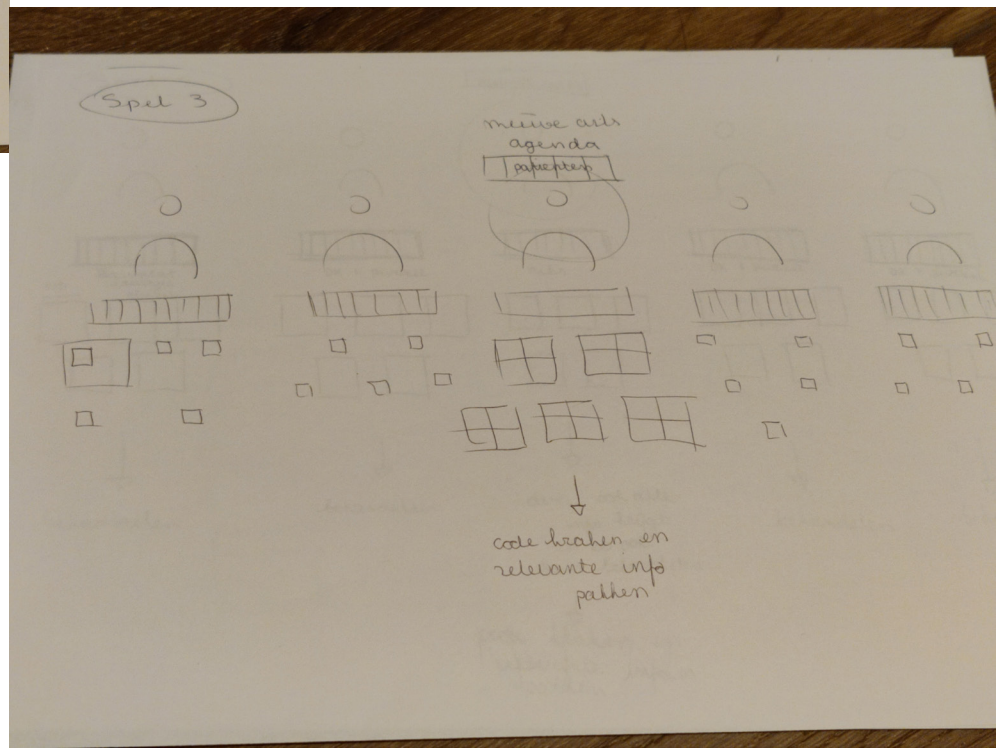

Serious game
Digitale informatie - uitwisseling
Het doel
VWS wil bewustwording creëren in de zorg voor de wegiz & Bg2.
De wegiz verplicht digitale uitwisseling en de Bg2 zorgt voor standardisatie om uitwisseling te vergemakkelijken.
Hergebruiken, uitwisselen, begrijpen?
van info
Doelgroep
Zorgmedewerkers, waaronder artsen, verpleegkundigen en polimedewerkers.
Vooral gericht op poliklinische afdelingen.
Leerdoelen
1 Een standaard werkwijze creëert efficiëntie en tijdwinst
A meer aandacht voor patient
B vastlegging gemakkelijk
2 uitwisseling verloopt soepeler (Bg2)
3 Samenwerken en afspraken maken
A voor jezelf en de ander
B Gelijkheid in organisatie
4 Acceptatie van verandering
5 Keuzes maken in relevante data
A niet alles is belangrijk
B niet alles willen vastleggen
6 Inzicht & overzicht in informatieketen
A compleet beeld
B Voorbereiden/voorspellen
Spel verloop
1 2 3 4
1 2 3 4 x2 (goed & fout)
1 2 3 4

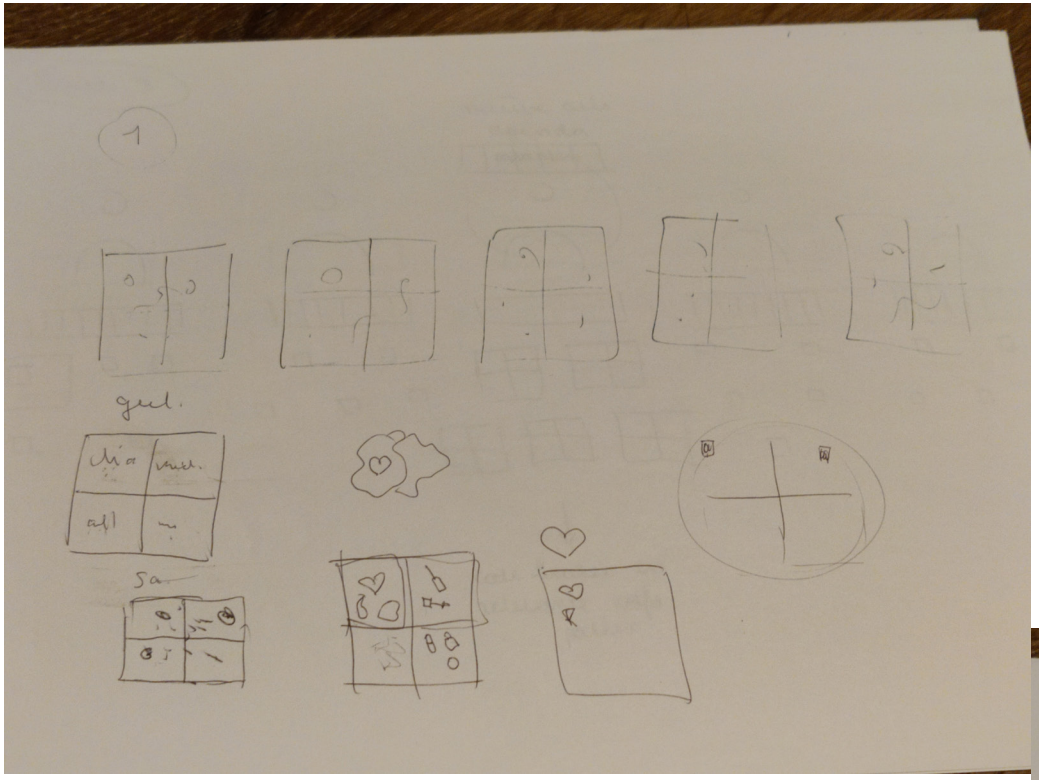

Game context
uitwisseling
Bg2
Exc. GP, SEH, 1e lijn, GGZ etc.
Zorginformatiesystemen
ZIBS
Standaardisatie van info
+
Structuur & relaties
Eenheid van taal
- medische term
- informatie model
↳ relatie tot term
Onderdelen
1. Demografie & identiteit
2. Financiën
3. Behandelrestricties
4. Contactpersonen
5. Functionele status
6. Klachten & diagnoses
7. Anamnese
8. Waarschuwingen
9. allergieën
10. Medicatie
11. Hulpmiddelen
12. Vaccinaties
13. Vitale functies
14. Uitslagen
15. Verrichtingen
16. Contacten
17. Zorgplan
18. Zorgverleners

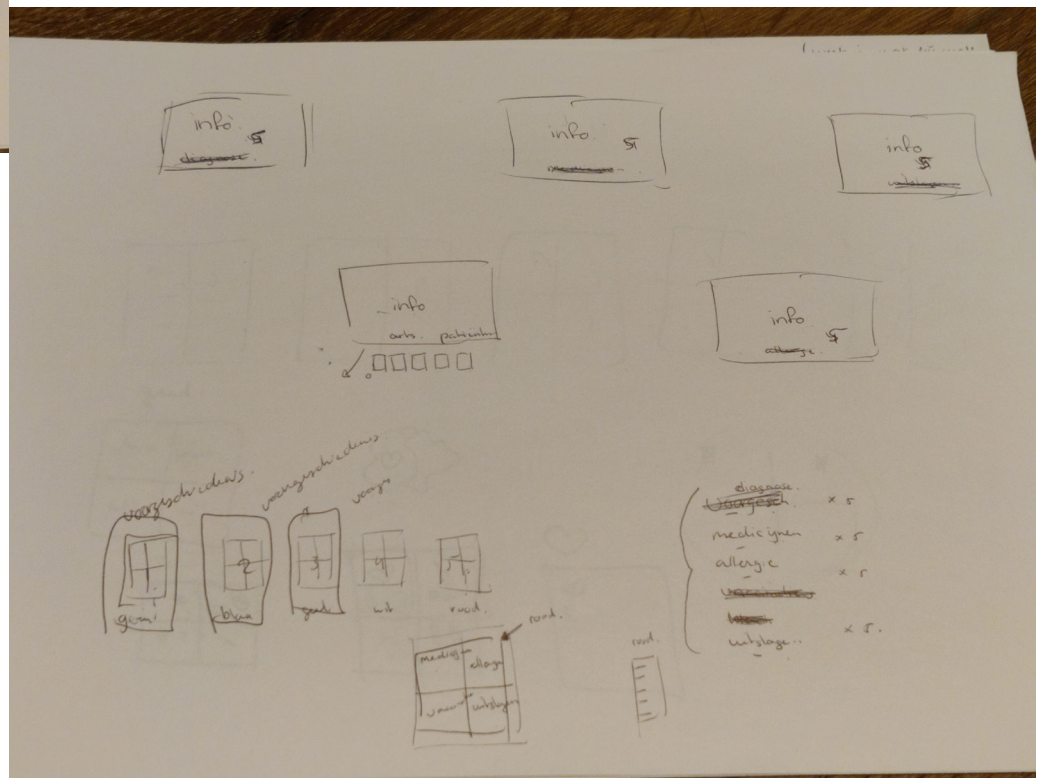

Spelonderdelen
Patient
Linda van Veen
12-04-1960 - 63 jaar
Rotterdam
Voorgeschiedenis
medicatie
1. Diabetes
2. Hypertensie
↳ nierschade
3. chronische nierziekte
↳ bloedarmoede
4. Bloedarmoede
allergieën
Huisarts
Nefroloog
Cardioloog
Endocrinoloog
Hematoloog
tests & monitoren
chronische nierziekte
hypertensie
diabetes
Bloedarmoede
(auto-immuun)
oorzaak
gevolg
Casus
Patiënt wordt met spoed binnen gebracht in het ziekenhuis. Echter is de situatie van de man onbekend en moet er gewacht worden tot de gegevens beschikbaar zijn. Hierbij ontstaan allerlei problemen, omdat er geen standaard uitwisseling is en er bij verschillende specialisten info moet worden opgehaald, waarbij er verschillende communicatie stromen worden gebruikt.
Het is de taak van de artsen om alle relevante informatie te bundelen om zo de juiste behandeling te kunnen geven en het leven te redden van de patiënt

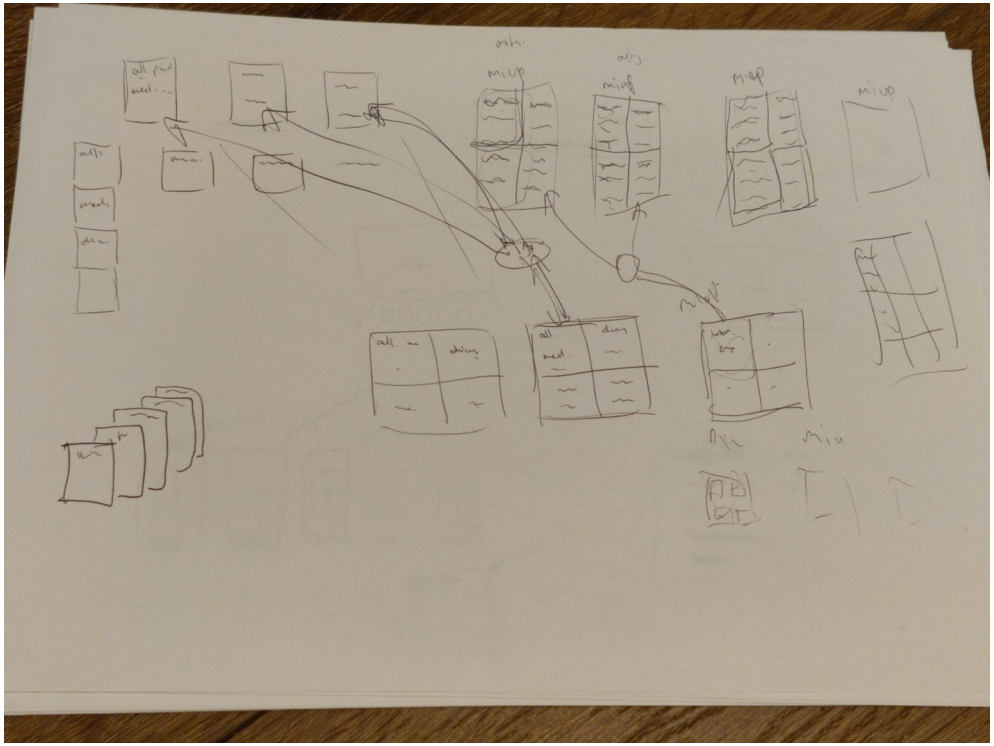

5
kees
nien
toestemming
miep
Piet
40 kaarten
5 x random
miep klacht
kees klacht
Piet
Jan
kaarten
ash


Spel 2
nieuwe arts
Document
DK + puzzel
DK + puzzel
DK + puzzel
behandelen
behandelen
deze ook alle info krijgt en zo ook kan behandelen
behandelen
code kraken en relevante info.
patiënt


Spel 3
nieuwe arts
agenda
papiertje
code kraken en
relevante info
patiënt



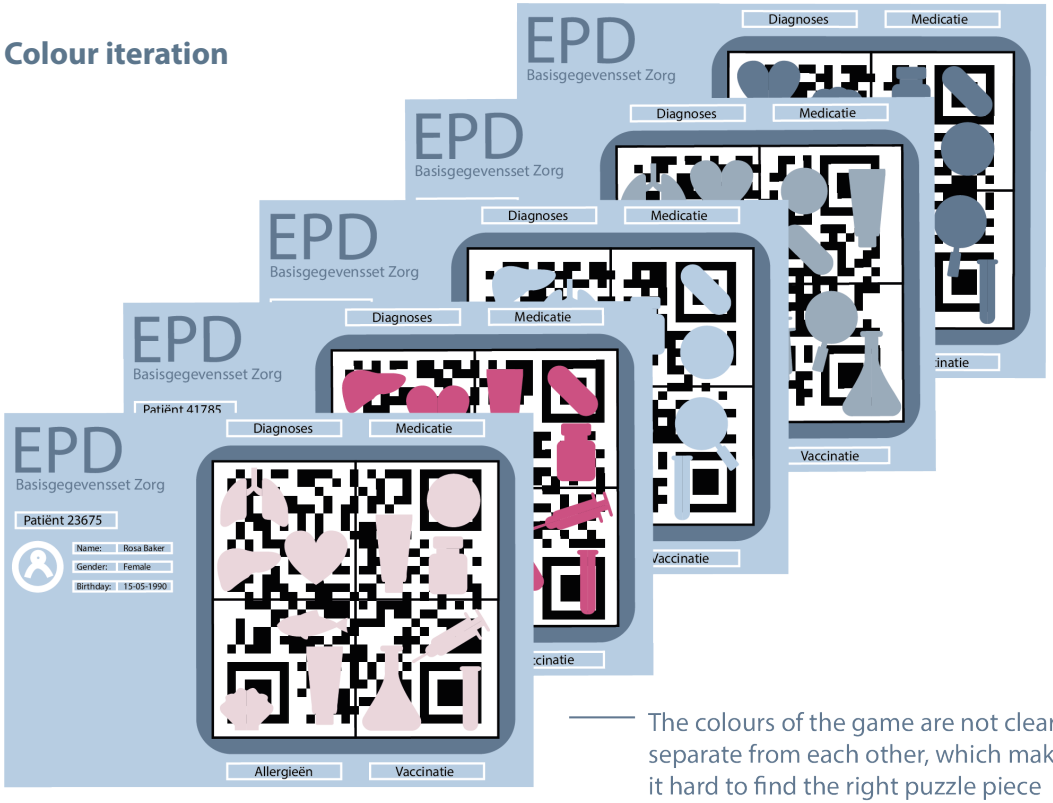

info
info
info
info
info
diagnose
medicijnen
allergie
x 5



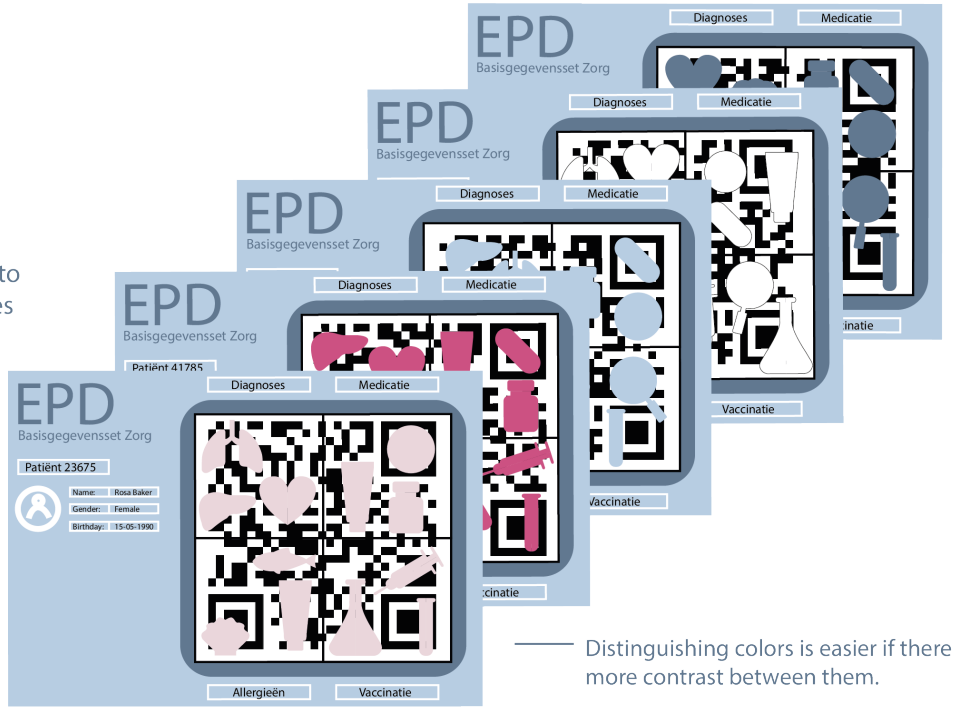
4C Design iteration cycles

Outcomes of the design iteration cycles with participants

Colour iteration



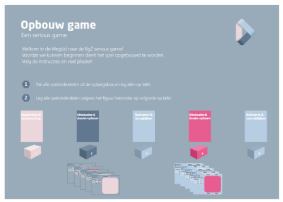
The colours of the game are not clear to separate from each other, which makes it hard to find the right puzzle piece

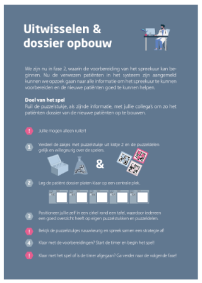


Distinguishing colors is easier if there is more contrast between them.

Game flow iteration

Overview of the game is needed to provide people insight in how the game is build up

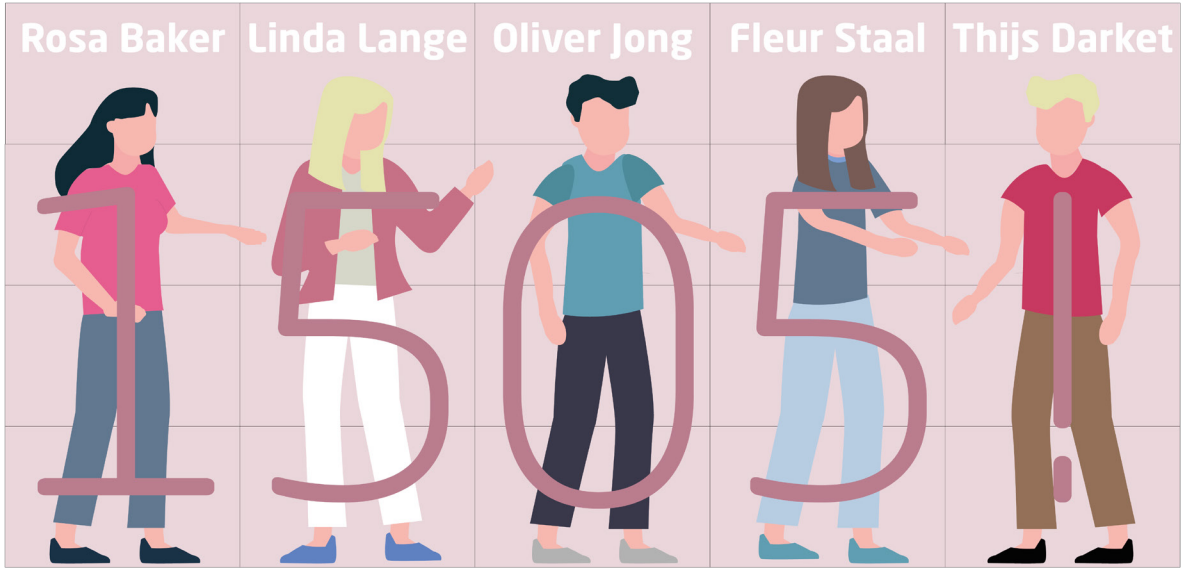




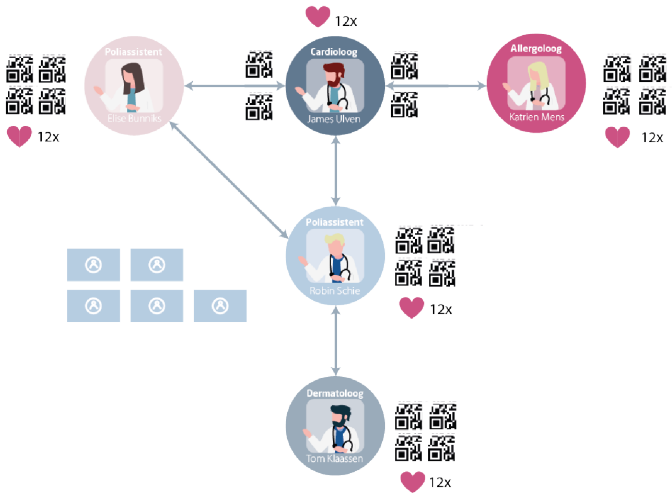
Each phase of the game has it's own instruction posters and a setting up and clear away poster is made as well.

Game flow iteration

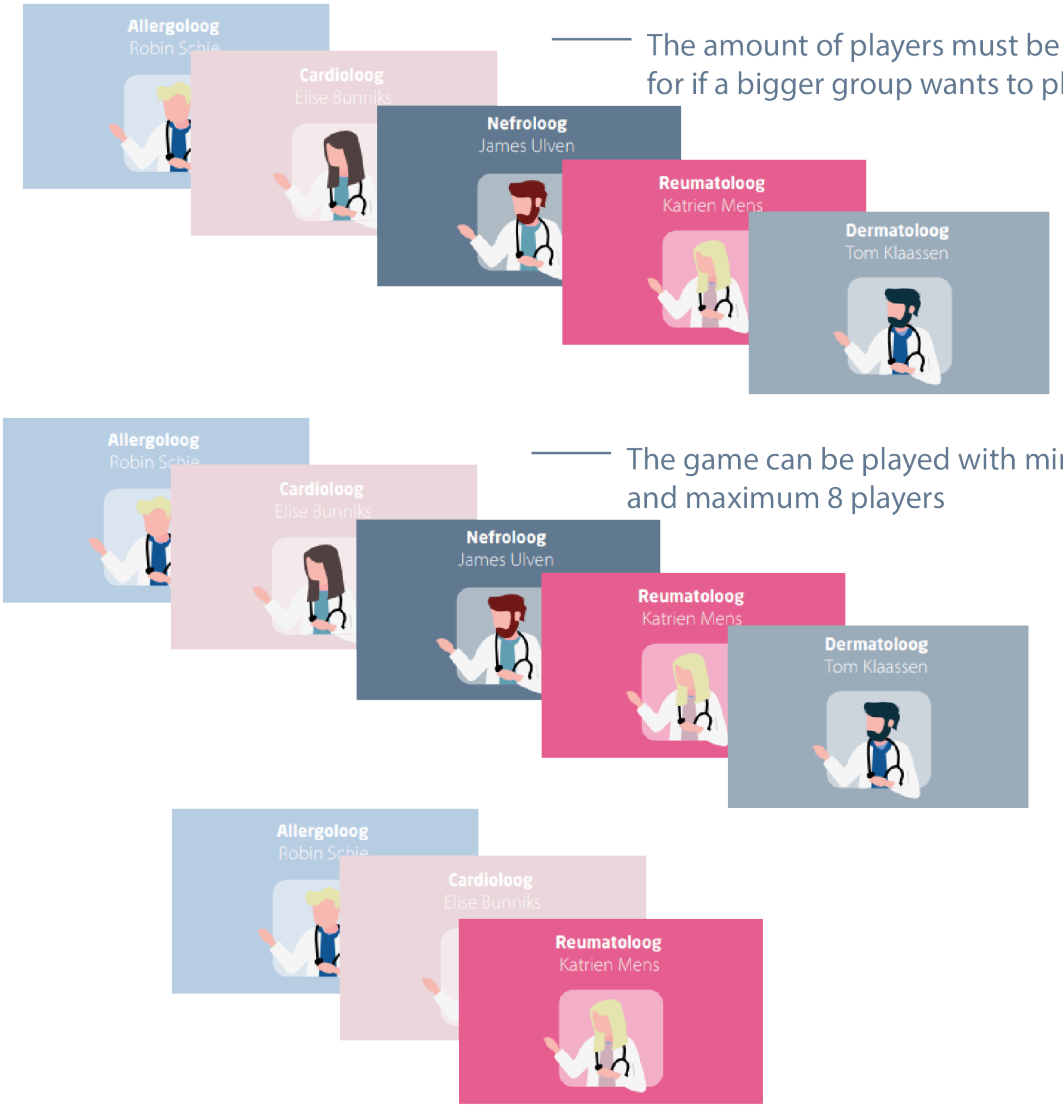
Replace with a simple game to help participants get used to the game elements



Amount of player iteration



Exchanging in a chain could be interesting to test to make the game more complex

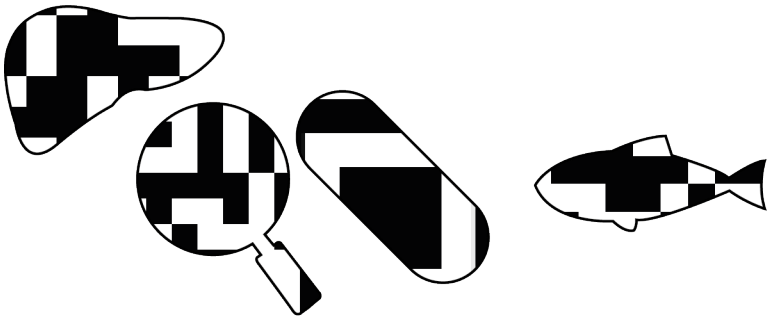


The amount of players must be extendable for if a bigger group wants to play it.

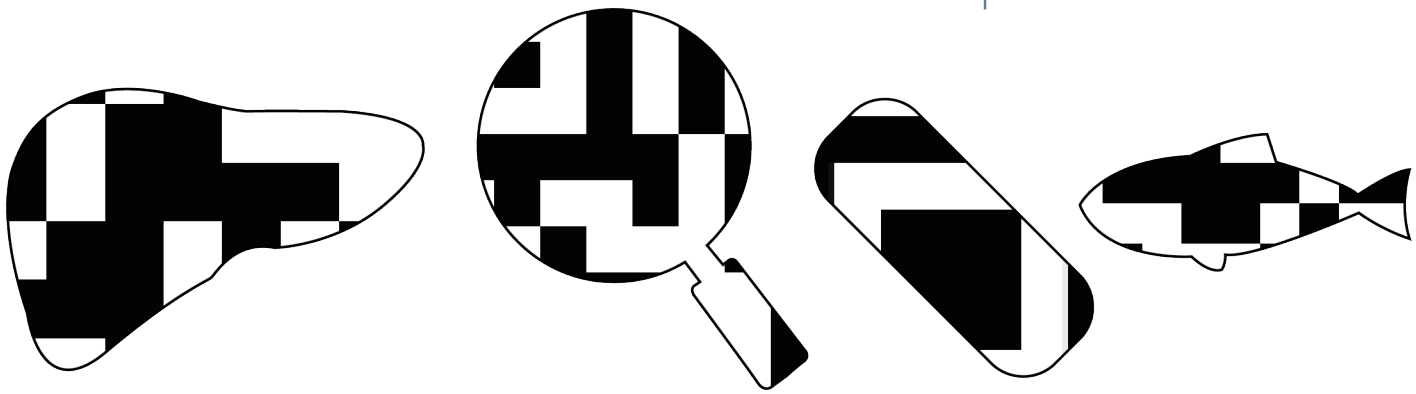
The game can be played with minimal 4 players and maximum 8 players

This is possible because the amount of puzzles and pieces is easy to divide over 4 to 8 players

Puzzle pieces iteration



The puzzle pieces need to be slightly bigger



The amount of puzzle pieces need to be dividable through the amount of players euqally to be able to exchange pieces

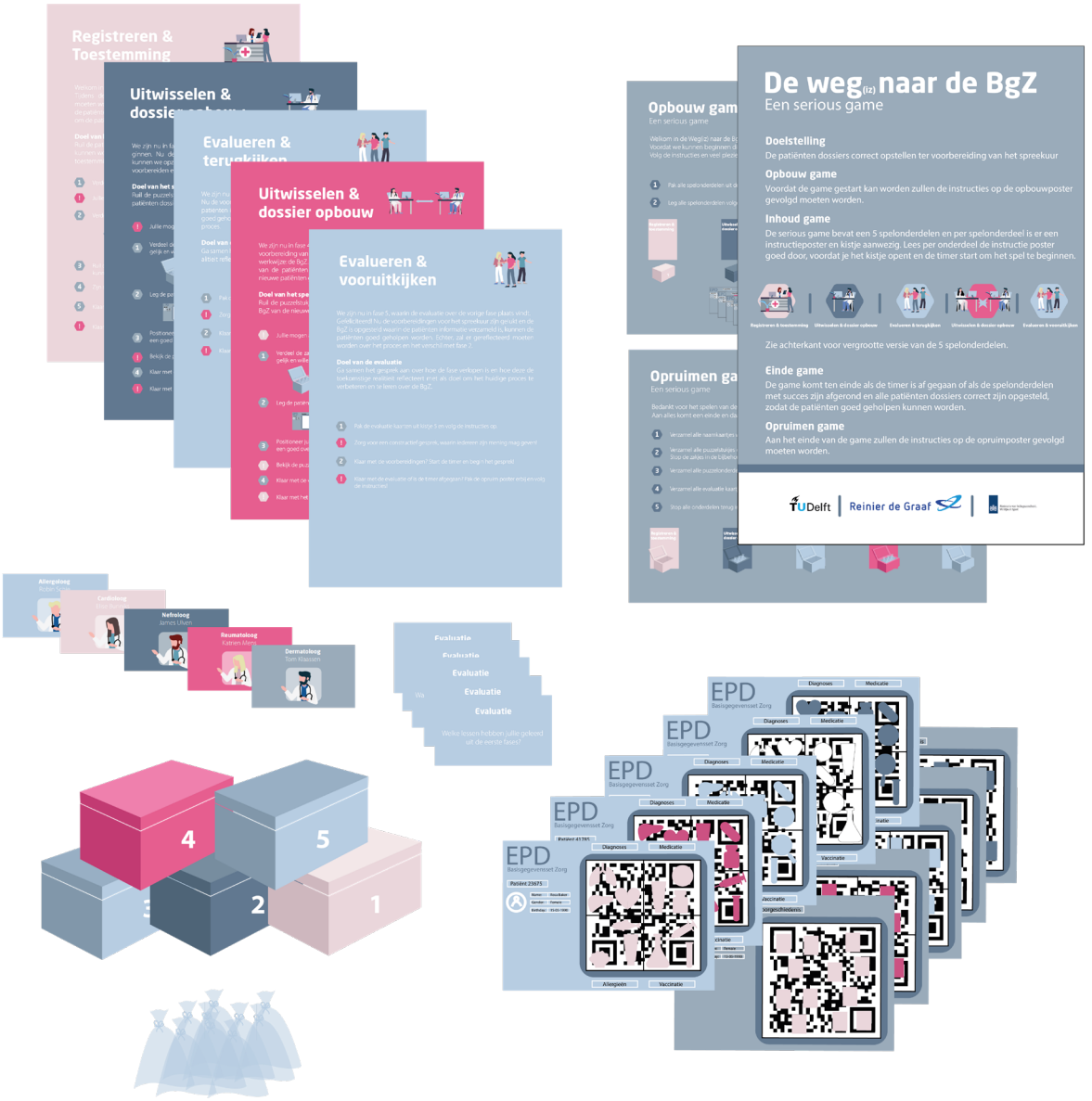
Reward iteration

Include a reward when the QR-code puzzle is solved and scanned

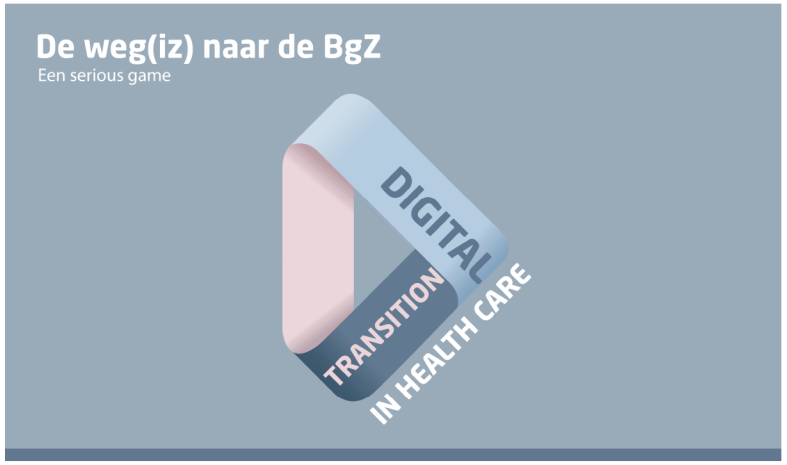
4D Game explanation

The game explained

All game elements are presented and the game is explained.



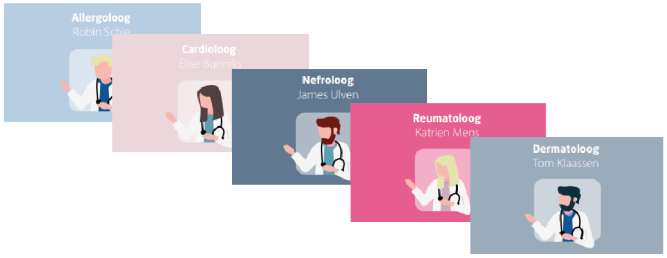
Presentation poster



Game rules and purpose of the game

Name badges for the players

The game can be played by 4-8 players



Game flow

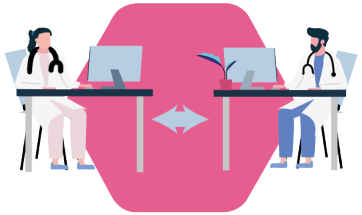
The game is build up of 5 phases with each a different purpose.
Each phase has a different game element that contributes to the goal of the game.

Registreren & toestemming | **Uitwisselen & dossier opbouw** | **Evalueren & terugkijken** | **Uitwisselen & dossier opbouw** | **Evalueren & vooruitkijken**

Registreren & toestemming

Uitwisselen & dossier opbouw

Evalueren & terugkijken

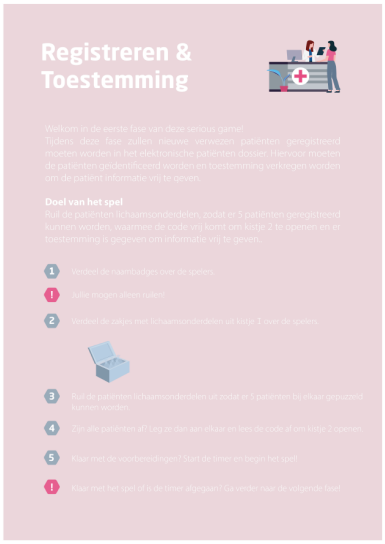


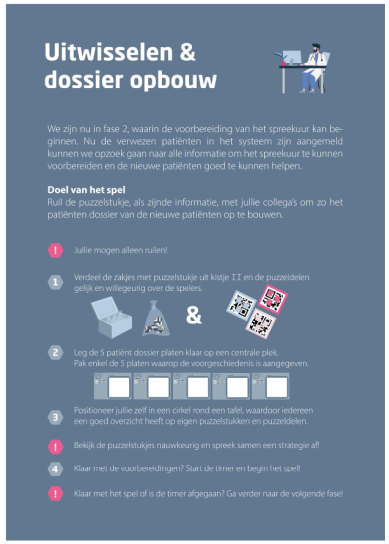
Uitwisselen & dossier opbouw

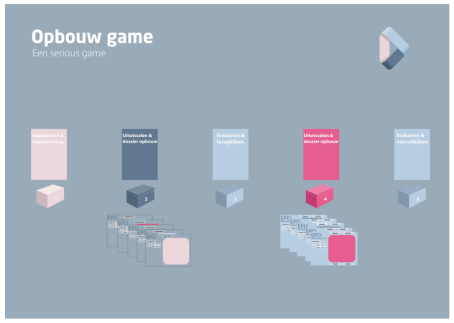
Evalueren & vooruitkijken

Each phase has their own instruction poster

The poster include context and clear instruction about what the purpose of the phase is and the rules of the game.



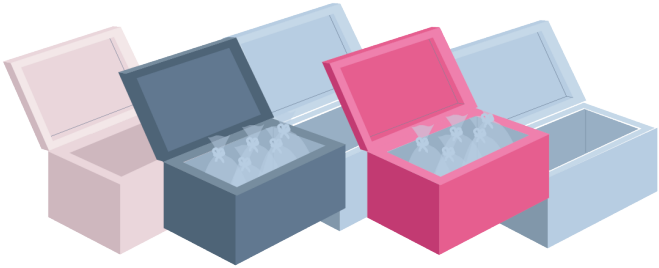




Preparation & clear

These posters include how to build up the game in advance and how to tidy everything up again.

Each phase's game components are collected in a box

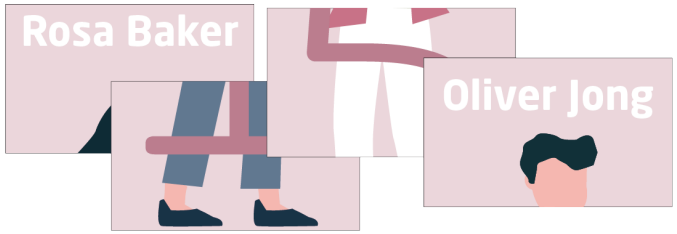


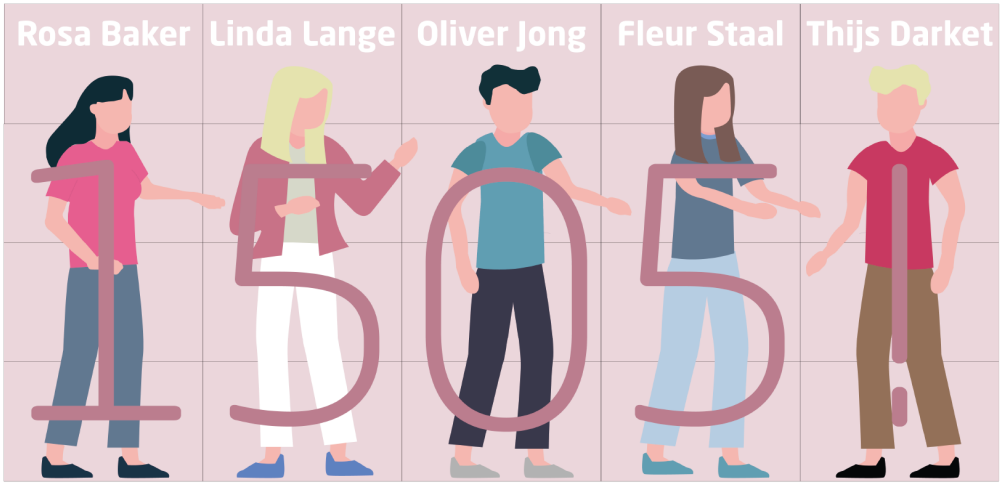
Phase 1

The first phase consists the first game element to prepare and adjust

Game 1

The game represents the process of registering a new patient and therefore identification and consent is required.





All players get an equal amount of cards and the purpose is to exchange cards to finish the puzzle. There are 5 patients to be puzzled. After finishing each patient puzzle, the entire puzzle needs to be made to see the code that is required to unlock the lock of the box of the second phase.

Game elements

- Puzzle pieces can only be exchanged
- A timer is used to create time pressure
- A code
- A lock

Phase 2

The second phase consists of the second game element that represent the current state of digital information exchange.

Game 2

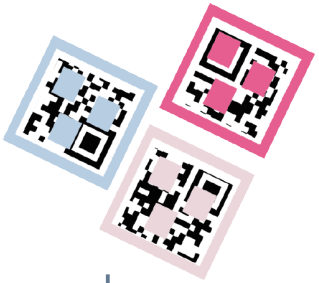
The current situation of digital information exchange is the foundation of this game. Patient information needs to be exchanged between players to be able to fill the patient file and prepare for the consultation with the patient. The puzzle is solved when the QR-codes can be scanned.
The game is designed to fail!

Game components

The game consists of 5 patient files representing 5 patients.
Each file consists of 4 puzzle components with a piece of the QR-code on it. In total there are 20 puzzle components. There are 12 pieces per patient file, so 60 pieces in total.

Each player will get a patient file and 4 random puzzle components (can be of any patient). Each player also gets 12 random puzzle pieces.

The players have to exchange puzzle pieces to finish their puzzle components. If all components are filled they need to be exchanged to the player with the corresponding patient file. (Everything is colour coded).

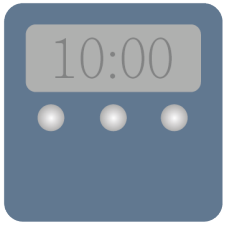


20 puzzle components

60 pieces

5 patient files

The purpose of this game is to represent the current complex situation and experience with information-exchange and the goal is to actually fail this game and not to solve the puzzle within the given time.
The puzzle is complex and the amount of puzzle pieces make it impossible to try each piece and solve the puzzle, but the lesson behind the puzzle is that people must be made aware about the current workflow and how inefficient this actually is.

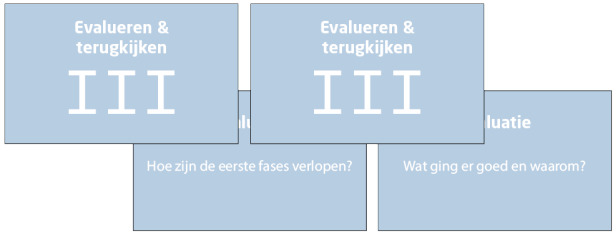


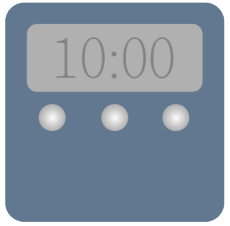
Phase 3 & 5

The 3rd phase is about evaluation of the previous phase and the 5th phase is about evaluation of phase 4 and the comparison with phase 3.

Game 3 & 5

The purpose of the evaluation is to evoke fruitful conversation and discussion about the experience and the awareness that is created about the current and future organization of digital informatio exchange. The players will be triggered to think about how to apply the knowledge and experience of the BgZ into reality and to discuss how they can contribute.

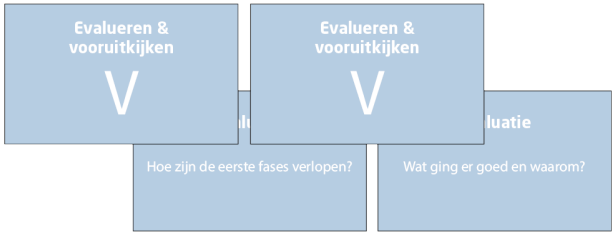




questions and statements of phase 3

Game components

Each phase consists of evaluation questions and statement cards to evoke conversation and discussi-ong.



questions and statements of phase 5

Phase 5

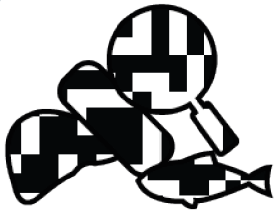
The second phase consists of the second game element that represent the future state of digital information exchange according to the BgZ.

Game 2

The future situation of digital information exchange according to the BgZ is the foundation of this game. Patient information needs to be exchanged between players to be able to fill the patient file to be able to create the BgZ and exchange the data set as a preparation for the consultation with the patients. The puzzle is solved when the QR-codes can be scanned.

The game is designed to succeed!

20 puzzle components



60 pieces

5 BgZ files

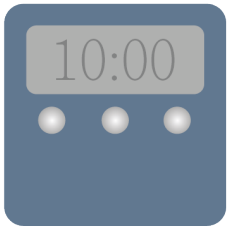
Game components

The game consists of 5 patient files representing 5 patients. Each file consists of 4 puzzle components with a piece of the QR-code on it. In total there are 20 puzzle components. There are 12 pieces per patient file, so 60 pieces in total.

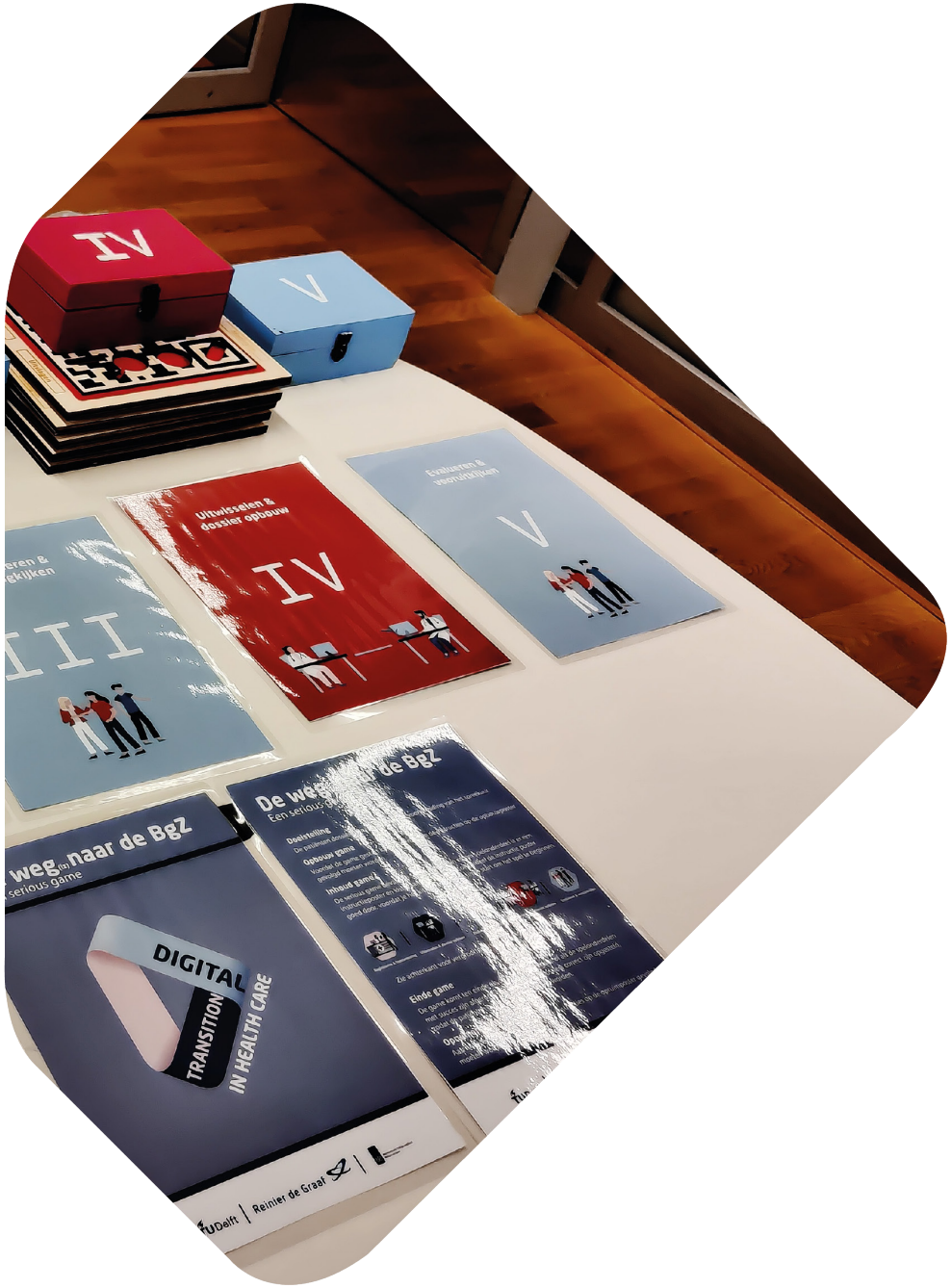
Each player will only get 4 random puzzle components (can be of any patient). Each player also gets 12 random puzzle pieces.
The pieces are now standardized through shape, colour and category according to the BgZ.

The players have to exchange puzzle pieces to finish their puzzle components. If all components are filled they need collectively fill the BgZ of the patients. (Everything is colour coded).

The purpose of this game is to represent the future situation and experience with information exchange and the goal is to succeed in this game and to solve the puzzle within the given time. The puzzle is simple due to the standardized shapes, colours and categories, therefore aksing for the right information is much easier. The lesson behind the puzzle is that people must be made aware about the benefits of the BgZ workflow and standardization to be more efficient and to work together on one dataset.



I
II
III
Uitwisselen &
dossier opbouw
II


IV
V
Uitwisselen &
dossier opbouw
IV
V
DIGITAL
TRANSITION
IN HEALTH CARE
TUDelft | Reinier de Graaf

4E Technical documents

Technical documents of the game

All original files are shared with RdGG and VWS.

The documents are made in adobe illustrator and all components are scaled towards realtisic components. These documents are immediately ready for laser cutting or printing. No adjustments are required.

EPD

Patiënt 89326

Naam	Thijs Darket
Gender	Man
Birthday	31-03-1948

Voorgeschiedenis

EPD

Patiënt 71259

Naam	Oliver Jong
Gender	Man
Birthday	08-01-1995

Voorgeschiedenis

EPD

Patiënt 41785

Naam	Fleur Staal
Gender	Female
Birthday	23-08-1964

Voorgeschiedenis

EPD

Patiënt 23675

Naam	Rosa Baker
Gender	Female
Birthday	15-05-1990

Voorgeschiedenis

EPD

Basisgegevensset Zorg

Patiënt 89326

Naam	Thijs Darket
Gender	Man
Birthday	31-03-1948

Diagnoses Medicatie

Allergieën Uitslagen

EPD

Patiënt 45832

Naam	Linda Lange
Gender	Vrouw
Birthday	03-10-1965

Voorgeschiedenis

EPD

Basisgegevensset Zorg

Patiënt 71259

Naam	Oliver Jong
Gender	Man
Birthday	08-01-1995

Diagnoses Medicatie

Allergieën Uitslagen

EPD

Basisgegevensset Zorg

Patiënt 41785

Naam	Fleur Staal
Gender	Female
Birthday	23-08-1964

Diagnoses Medicatie

Allergieën Uitslagen

EPD

Basisgegevensset Zorg

Patiënt 45832

Naam	Linda Lange
Gender	Vrouw
Birthday	03-10-1965

Diagnoses Medicatie

Allergieën Uitslagen

EPD

Basisgegevensset Zorg

Patiënt 23675

Naam	Rosa Baker
Gender	Female
Birthday	15-05-1990

Diagnoses Medicatie

Allergieën Uitslagen

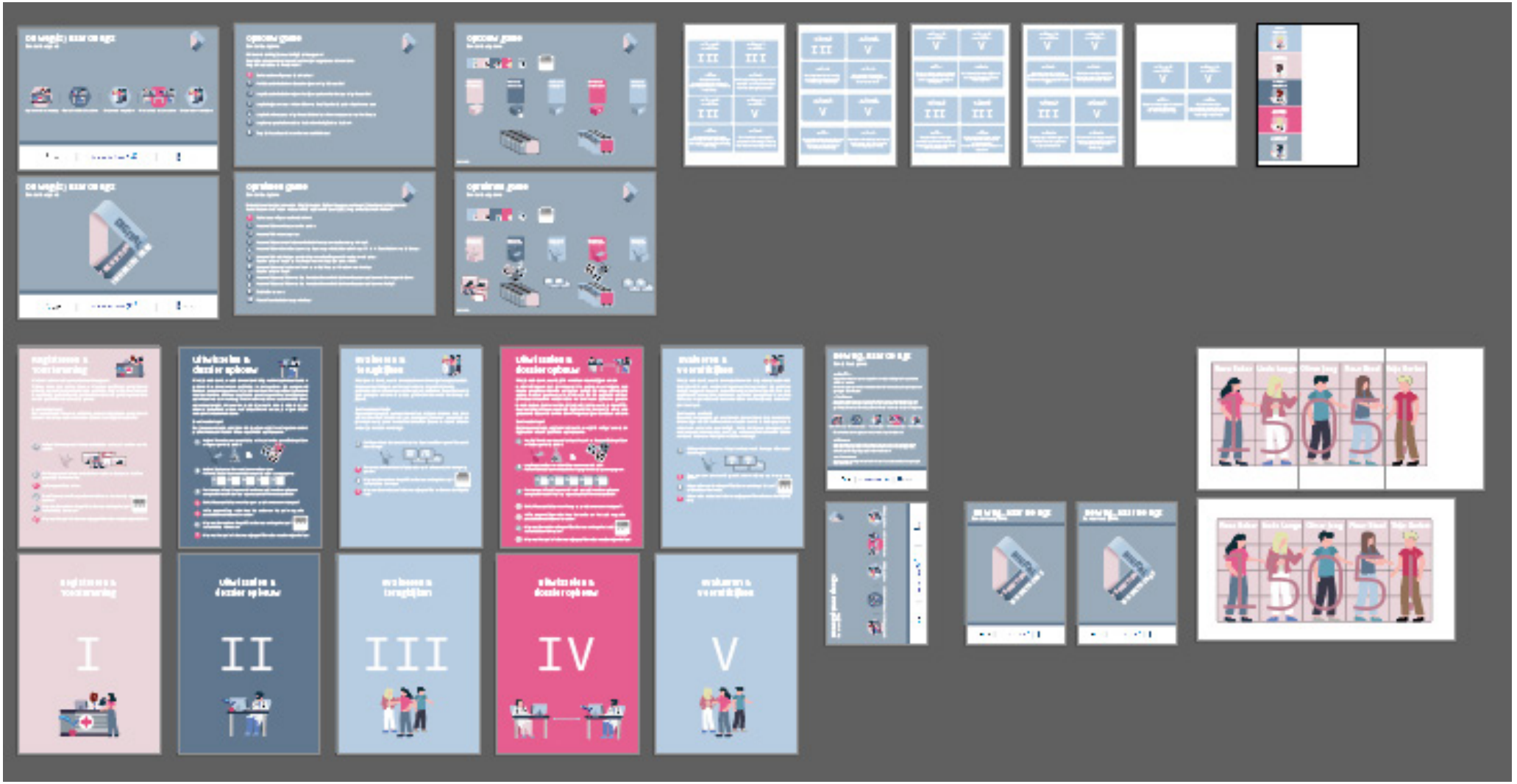
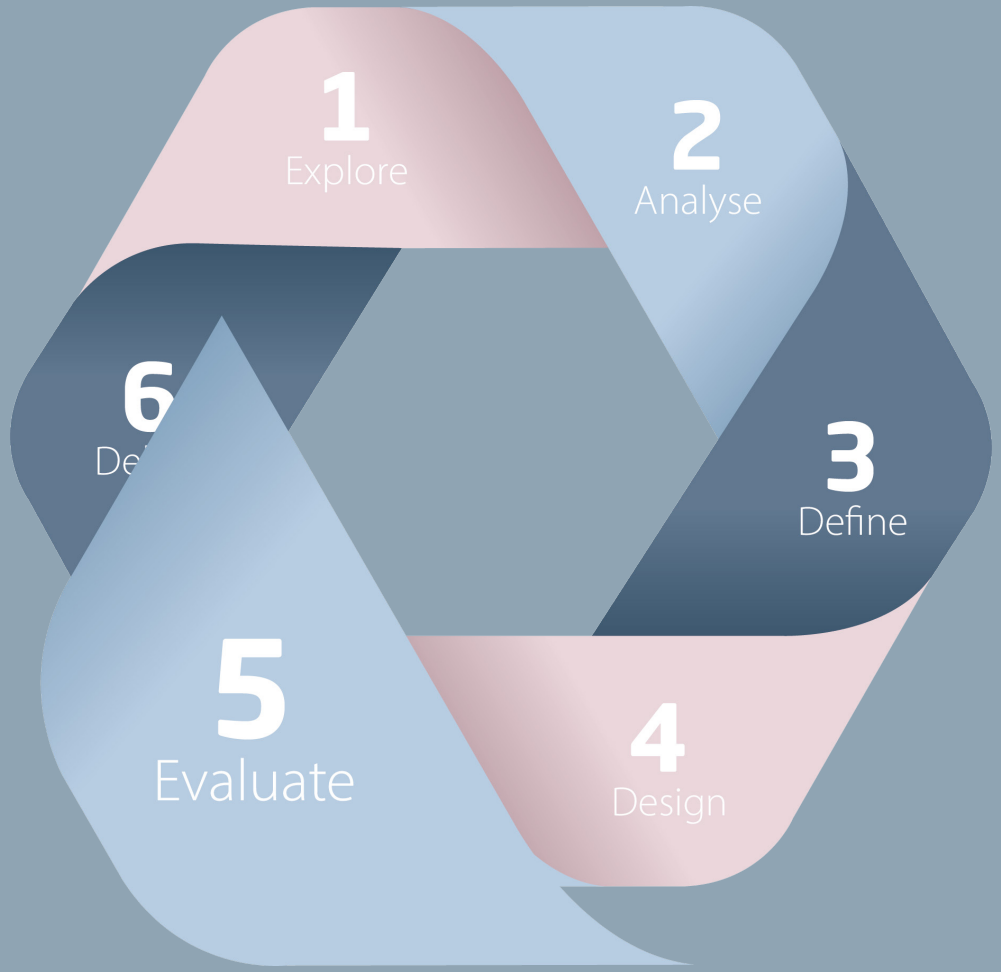


Figure E2 Printable documents

Figure E3 Lay-out of laser cutting boards

Chapter 5

Appendix 5



5A Evaluation survey

Evaluation survey utilized during evaluation sessions with medical specialists

Vragenlijst

Evalueren op de serious game: De Weg(iz) naar de BgZ

Vragenlijst

! Beoordeel alle vragen op een schaal van 1-7 (1 = oneens, 7 = eens)

Algemene evaluatievragen

De game is een effectief leermiddel

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

De game draagt bij aan de leerdoelen

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

De game was gemakkelijk om te begrijpen

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

Ik voelde mij helemaal betrokken tijdens het spel

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

Opmerkingen

Welke aspecten hebben het meest bijgedragen aan het bereiken van de leerdoelen?

Zijn er nog andere opmerkingen, suggesties of feedback?
Wat kan er beter en wat is er al goed?

Vragenlijst

Evalueren op de serious game: De Weg(iz) naar de BgZ

Vragenlijst

Leerdoelen

1. Begrijp de noodzaak van verandering.
2. Toepassing van nieuwe kennis en vaardigheden.
3. Begrijp de noodzaak van bijdrage en samenwerking.
4. Maak feedback en reflectie mogelijk.

! Beoordeel alle vragen op een schaal van 1-7 (1 = oneens, 7 = eens)

Leerdoelen evalueren

Door de game ben ik bij volledig bewust van de noodzaak tot verandering

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

Ik voel mij volledig in staat de opgedane kennis en vaardigheden toe te passen in de praktijk

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

Ik begrijp de noodzaak om bij te dragen aan het veranderproces van de BgZ

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

Ik begrijp de noodzaak om samen te werken in het veranderproces van de BgZ

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

Ik ben gemotiveerd en geïnspireerd om bij te dragen aan de veranderingen naar de BgZ

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

Ik begrijp dat feedback en reflectie belangrijk zijn om toe te passen in de praktijk

○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7

5B Discussion structure

Questions to structure the discussion sessions with participants: medical specialists, organizational employees and policymakers

Discussion points

Learning objective 1:
- How have the scenarios in the game contributed to awareness of the need for change?
- What specific situations have made you realize why change is crucial?
- Are you aware that this need for change is required in reality?

Learning objective 2:
- To what extent did the game help you obtain the BgZ? What did you learn?
- Could you apply the new knowledge and skills in practice? Why or not?
- Can you give an example in which situation this is possible?

Learning objective 3:
- How did the game contribute to the understanding of the time to contribute and collaborate in change processes?
- Are there specific moments in the game that gave you the insight that cooperation is crucial? Which?
- How individual actions contribute to the collective goal? Was this made clear in the game?
- Did this understanding for the need of contribution and collaboration inspire you to do so in reality during the implem

Learning objective 4:
- How have the feedback moments contributed to the awareness of the need to build in moments of reflection?
- Would you apply this insight in reality? How could you set this up yourself?

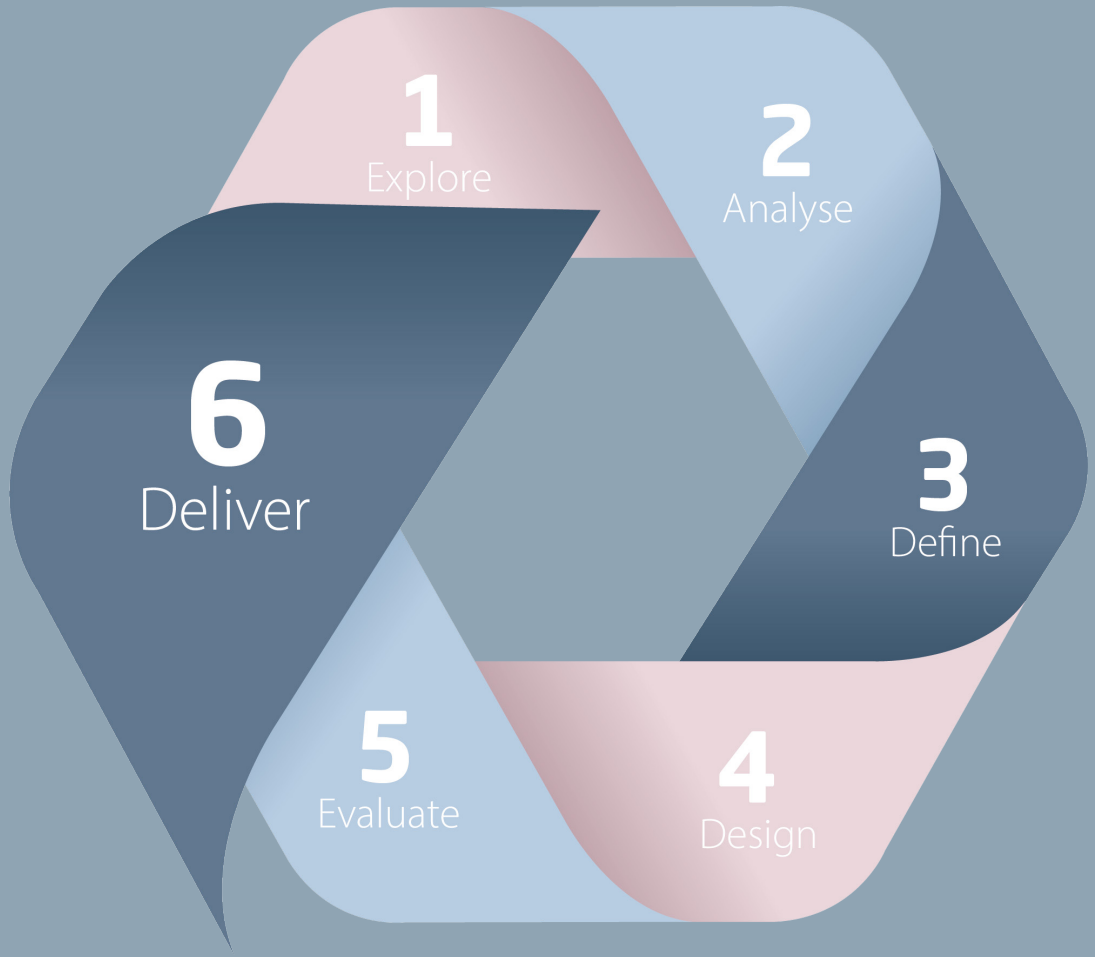
5C Filled in surveys

The surveys filled in by medical specialists or physicians in training

See additional appendix.

Chapter 6

Appendix 6



6A Showcase of the final game

Evaluation survey utilized during evaluation sessions with medical specialists

I
II
III
IV
V
Registreren & Toestemming
I
Uitwisselen & dossier opbouw
II
Evalueren & terugkijken
III
Uitwisselen & dossier opbouw
IV
Evalueren & vooruitkijken
V
Linda Lange
De weg naar de BgZ
Een serious game
DIGITAL TRANSITION IN HEALTH CARE
TU Delft | Reinier de Graaf

IV
Uitwisselen &
dossier opbouw
Doel van het spel

III
V
Evaluatie
Evalueren &
vooruitkijken

II
Uitwisselen &
dossier opbouw
EPD
Patiënt 41785

III
V
I
II
IV
De weg...naar de BgZ
Registreren &
Toestemming
Uitwisselen &
dossier opbouw
Evalueren &
terugkijken
Legenda game

I
Registreren &
Toestemming
Thijs Darket
Fleur Staal

EPD
Voorgeschiedenis
EPD
Patiënt 23675

Diagnoses
Medicatie
Uitslagen
Allergieën
EPD
Medicatie
Diagnoses

EPD
Patiënt 89126
Voorgeschiedenis
EPD
Patiënt 23675
Naam
Rosa Baker
Gender
Voorgeschiedenis
EPD
Patiënt 45832
EPD
EPD
EPD
Basisgegevensset Zorg

Registreren &
Toestemming
De weg naar de BgZ
Een serious game
DIGITAL
TRANSITION
IN HEALTH CARE
EPD
Basisgegevensset Zorg
Patiënt 45832
Patiënt 41785
Patiënt 71259
Voorgeschiedenis
Diagnoses
Medicatie
Allergieën
Uitslagen

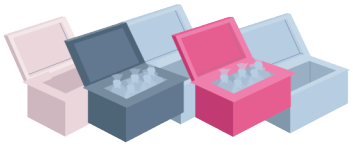
EPD
Basisgegevensset Zorg
Patiënt 23675
Allergieën
Uitslagen

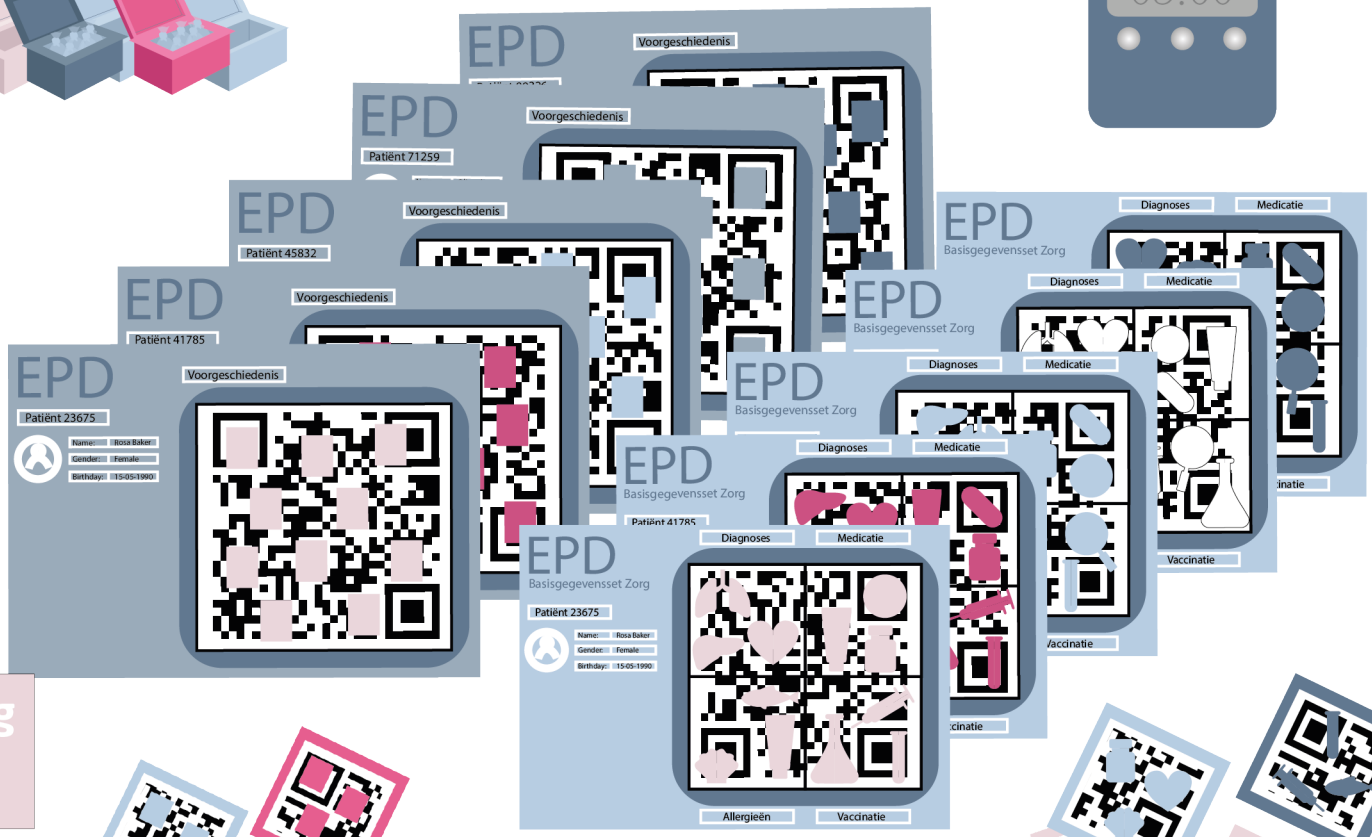
EPD
Basisgegevensset Zorg
Patiënt 89326
Allergieën
Uitslagen
Diagnoses
Medicatie

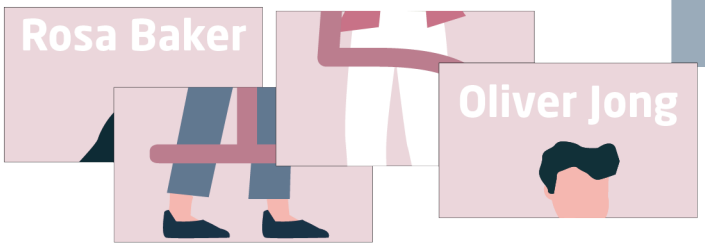
EPD
Patient 71759
Medicatie

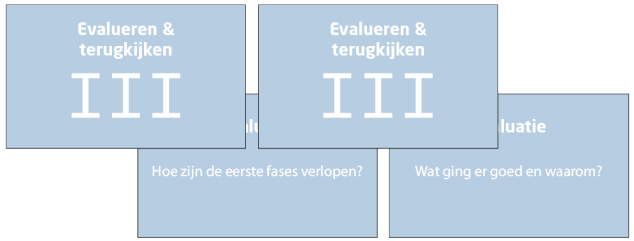
De weg naar de BgZ
EPD
I
II
IV

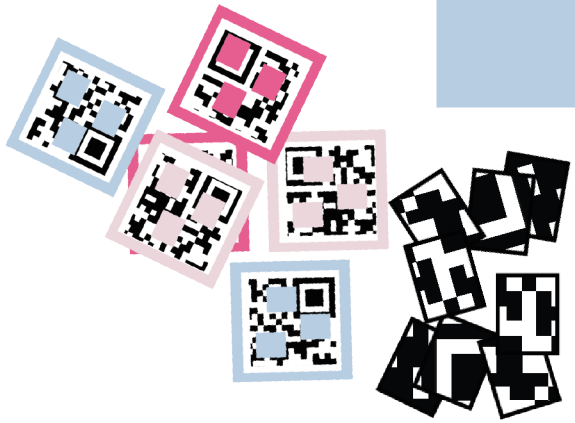
The game: De weg(iz) naar de BgZ

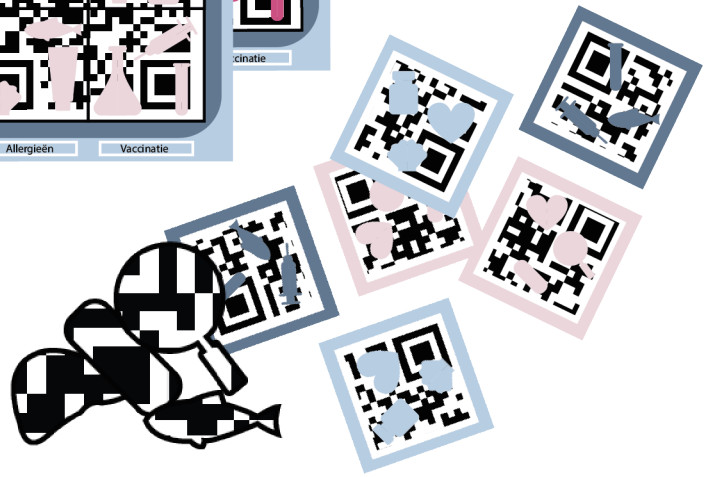












De weg(iz) naar de BgZ
Een serious game

DIGITAL TRANSITION IN HEALTH CARE

TU Delft | Reinier de Graaf | Ministerie van Volksgezondheid, Welzijn en Sport

De weg(iz) naar de BgZ
Een serious game

Doelstelling
De patiënten dossiers correct opstellen ter voorbereiding van het spreekuur

Opbouw game
Voordat de game gestart kan worden zullen de instructies op de opbouwposter gevolgd moeten worden.

Inhoud game
De serious game bevat een 5 spelonderdelen en per spelonderdeel is er een instructieposter en kistje aanwezig. Lees per onderdeel de instructie poster goed door, voordat je het kistje opent en de timer start om het spel te beginnen.

Zie achterkant voor vergrootte versie van de 5 spelonderdelen.

Einde game
De game komt ten einde als de timer is af gegaan of als de spelonderdelen met succes zijn afgerond en alle patiënten dossiers correct zijn opgesteld, zodat de patiënten goed geholpen kunnen worden.

Opruimen game
Aan het einde van de game zullen de instructies op de opruimposter gevolgd moeten worden.

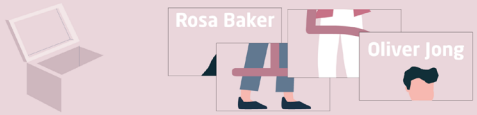
TU Delft | Reinier de Graaf | Ministerie van Volksgezondheid, Welzijn en Sport

Registreren & Toestemming

Welkom in de eerste fase van deze serious game!
Tijdens deze fase zullen nieuwe verwezen patiënten geregistreerd moeten worden in het elektronische patiënten dossier. Hiervoor moeten de patiënten geïdentificeerd worden en toestemming verkregen worden om de patiënt informatie vrij te geven.

Doel van het spel
Ruil de patiënten lichaamsonderdelen, zodat er 5 patiënten geregistreerd kunnen worden, waarmee de code vrij komt om kistje 2 te openen.

2 Verdeel de kaartjes met lichaamsonderdelen uit kistje I random over de spelers.



3 Ruil de patiënten lichaamsonderdelen uit zodat er 5 patiënten bij elkaar gepuzzeld kunnen worden.

! Jullie mogen alleen ruilen!

4 Zijn alle patiënten af? Leg ze dan aan elkaar en lees de code af om kistje 2 openen.

5 Klaar met de voorbereidingen? Start de timer en begin het spel! Jullie hebben 5 minuten!

! Klaar met het spel of is de timer afgegaan? Ga verder naar de volgende fase!

Uitwisselen & dossier opbouw

We zijn nu in fase 2, waarin de voorbereiding van het spreekuur kan beginnen. Nu de verwezen patiënten in het systeem zijn aangemeld kunnen we opzoek gaan naar alle informatie om het spreekuur te kunnen voorbereiden en de nieuwe patiënten goed te kunnen helpen tijdens het spreekuur van later vandaag. Echter moeten jullie als artsen voordat het spreekuur begint hiervoor de juiste informatie zien te vinden bij de andere behandeld artsen van de patiënten om zo je eigen dossier compleet te kunnen maken.

Doel van het spel
Ruil de puzzelstukje, als zijnde informatie, met jullie collega's om zo het patiënten dossier van de nieuwe patiënten op te bouwen.

1 Verdeel de zakjes met puzzelstukje uit kistje II en de puzzeldelen gelijk en willegeurig over de spelers.

2 Verdeel de 5 patiënt dossier platen over de artsen.
Pak enkel de 5 platen waarop de voorgeschiedenis is aangegeven.

3 Positioneer jullie zelf in een cirkel rond een tafel, waardoor iedereen een goed overzicht heeft op eigen puzzelstukken en puzzeldelen.

! Bekijk de puzzelstukjes nauwkeurig en spreek samen een strategie af!

! Jullie mogen alleen ruilen! Aan het einde van het spel mag je de puzzeldelen ook alleen uitwisselen!

4 Klaar met de voorbereidingen? Start de timer en begin het spel! Jullie hebben 10 minuten

! Klaar met het spel of is de timer afgegaan? Ga verder naar de volgende fase!

Evalueren & terugkijken

We zijn nu in fase 3, waarin de evaluatie over de vorige fase plaats vindt. Nu de voorbereidingen voor het spreekuur niet gelukt zijn en de patiënten informatie niet correct verzameld is kunnen de patiënten niet goed geholpen worden. Er zal dus gereflecteerd moeten worden op het proces.

Doel van de evaluatie
Ga samen het gesprek aan over hoe de fase verlopen is en hoe deze de realitieit reflecteert. Het is hierbij van belang dat je de voor- en nadelen bespreekt, maar je je ook bewust wordt van de kansen en risico's die deze werkwijze met zich meebrengt.

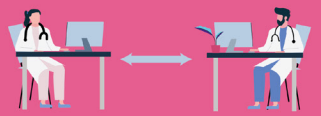
1. Pak de evaluatie kaarten uit kistje III en beantwoord de vragen of bespreek de stellingen.

! Zorg voor een constructief gesprek, waarin iedereen zijn mening mag geven!

2. Klaar met de voorbereidingen? Start de timer en begin het spel! Jullie hebben 5 minuten

! Klaar met de evaluatie of is de timer afgegaan? Ga verder naar de volgende fase!

Uitwisselen & dossier opbouw



We zijn nu in fase 4, waarin jullie een nieuwe kans krijgen om de voorbereiding van het spreekuur uit te voeren, maar volgens een nieuwe gestandaardiseerde werkwijze: de BgZ. Opnieuw zullen jullie opzoek moeten gaan naar alle informatie van de patiënten om het spreekuur te kunnen voorbereiden en de nieuwe patiënten goed te kunnen helpen. Echter werken jullie hierbij niet meer in je eigen EPD, maar werken jullie samen om de BgZ te vullen. Het doel is om zo een gebundeld dataset te creëren die vervolgens uitgewisseld kan worden.

Doel van het spel
Ruil de puzzelstukje, als zijnde informatie, met jullie collega's om zo de BgZ van de nieuwe patiënten op te bouwen.

1. Verdeel de zakjes met puzzelstukje uit kistje IV en de puzzeldelen gelijk en willekeurig over de spelers.

2. Leg de patiënt dossier platen klaar op een centrale plek.
Pak enkel de 5 platen waarop de Basisgegevensset zorg is aangegeven.

3. Positioneer jullie zelf in een cirkel rond een tafel, waardoor iedereen een goed overzicht heeft op eigen puzzelstukken en puzzeldelen.

! Bekijk de puzzelstukjes nauwkeurig en spreek samen een strategie af!

! Jullie mogen alleen ruilen! Aan het einde van het spel mag je de puzzeldelen ook alleen uitwisselen!

4. Klaar met de voorbereidingen? Start de timer en begin het spel! Jullie hebben 10 minuten!

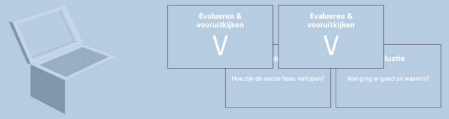
! Klaar met het spel of is de timer afgegaan? Ga verder naar de volgende fase!

Evalueren & vooruitkijken

We zijn nu in fase 5, waarin de evaluatie over de vorige fase plaats vindt. Gefeliciteerd! Nu de voorbereidingen voor het spreekuur zijn gelukt en de BgZ is opgesteld waarin de patiënten informatie verzameld is en deze uitgewisseld kan worden, kunnen de patiënten goed geholpen worden. Echter, zal er gereflecteerd moeten worden over het proces en het verschil met fase 2.

Doel van de evaluatie
Ga samen het gesprek aan over hoe de fase verlopen is en hoe deze de toekomstige realitieit reflecteert met als doel om het huidige proces te verbeteren en te leren over de BgZ. Het is hierbij van belang dat je de voor- en nadelen bespreekt, maar je je ook bewust wordt van de kansen en risico's die deze werkwijze met zich meebrengt.

1. Pak de evaluatie kaarten uit kistje III en beantwoord de vragen of bespreek de stellingen.

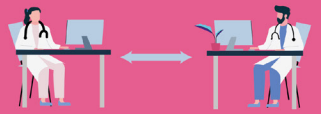


! Zorg voor een constructief gesprek, waarin iedereen zijn mening mag geven!

2. Klaar met de voorbereidingen? Start de timer en begin het spel! Jullie hebben 10 minuten

! Klaar met de evaluatie of is de timer afgegaan? Ga verder naar de volgende fase!

Uitwisselen & dossier opbouw



We zijn nu in fase 4, waarin jullie een nieuwe kans krijgen om de voorbereiding van het spreekuur uit te voeren, maar volgens een nieuwe gestandaardiseerde werkwijze: de BgZ. Opnieuw zullen jullie opzoek moeten gaan naar alle informatie van de patiënten om het spreekuur te kunnen voorbereiden en de nieuwe patiënten goed te kunnen helpen. Echter werken jullie hierbij niet meer in je eigen EPD, maar werken jullie samen om de BgZ te vullen. Het doel is om zo een gebundeld dataset te creëren die vervolgens uitgewisseld kan worden.

Doel van het spel
Ruil de puzzelstukje, als zijnde informatie, met jullie collega's om zo de BgZ van de nieuwe patiënten op te bouwen.

1. Verdeel de zakjes met puzzelstukje uit kistje IV en de puzzeldelen gelijk en willekeurig over de spelers.

2. Leg de patiënt dossier platen klaar op een centrale plek.
Pak enkel de 5 platen waarop de Basisgegevensset zorg is aangegeven.

3. Positioneer jullie zelf in een cirkel rond een tafel, waardoor iedereen een goed overzicht heeft op eigen puzzelstukken en puzzeldelen.

! Bekijk de puzzelstukjes nauwkeurig en spreek samen een strategie af!

! Jullie mogen alleen ruilen! Aan het einde van het spel mag je de puzzeldelen ook alleen uitwisselen!

4. Klaar met de voorbereidingen? Start de timer en begin het spel! Jullie hebben 10 minuten!

! Klaar met het spel of is de timer afgegaan? Ga verder naar de volgende fase!

Registreren &
Toestemming

I

Uitwisselen &
dossier opbouw

II

Evalueren &
terugkijken

III

Uitwisselen &
dossier opbouw

IV

Evalueren &
vooruitkijken

V

Opbouw game
Een serious game

Welkom in de Weg(iz) naar de BgZ serious game!
Voordat we kunnen beginn
Volg de instructies en veel

- ! Zie het opbouw figuur
- 1 Pak alle spelonderdelen
- 2 Leg alle spelonderdelen
- 3 Leg de badges en timer
- 4 Leg de fase doosjes op
- 5 Leg de voorgeschiedeni
- 6 Zorg dat kistje 2 op slot

Opbouw game
Een serious game

Registreren & toestemming

Uitwisselen & dossier opbouw

Opruimen game
Een serious game

Bedankt voor het spelen van de Weg(iz) naar de BgZ serious game en hopelijk hebben jullie genoten!
Aan alles komt een einde en daar hoort opruimen natuurlijk bij. Volg de instructies hieronder!

- ! Zie het opruim figuur op de achterkant!
- 1 Verzamel alle naamkaartjes van de spelers.
- 2 Verzamel alle instructieposters.
- 3 Verzamel alle patiënten lichaamon
- 4 Verzamel alle evaluatie kaartjes en
- 5 Verzamel alle rechthoekige puzzels
  Stop de zakjes in kistje 2 en sluit de
- 6 Verzamel alle puzzelstukjes van fas
  Stop de zakjes in kistje 4.
- 7 Verzamel alle puzzeldelen van fase
- 8 Verzamel alle puzzeldelen van fase
- 9 Schakel de timer uit.
- 10 Plaats alle onderdelen terug in de

Opruimen game
Een serious game

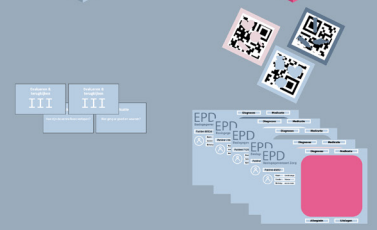
Registreren & toestemming

Uitwisselen & dossier opbouw

Evalueren & terugkijken

Uitwisselen & dossier opbouw

Evalueren & vooruitkijken



Evalueren & terugkijken
III

Stelling
Het ontbreken van gestandaardiseerde informatie bemoeilijkte het proces en leidde tot inefficiëntie.

Evalueren & terugkijken
III

Evaluatie
Welke risico's brengt deze werkwijze met zich mee en hoe vertalen deze zich naar de dagelijkse praktijk?

Evalueren & terugkijken
III

Stelling
De complexiteit van de game weerspiegelt de huidige uitdagingen in de digitale informatie-uitwisseling in de zorg.

Evalueren & terugkijken
V

Evaluatie
Hoe heeft deze ervaring jullie perceptie over de huidige staat van informatie-uitwisseling beïnvloed?

Evalueren & vooruitkijken
V

Stelling
Het succes in deze game benadrukt het cruciale belang van samenwerking in de zorg.

Evalueren & vooruitkijken
V

Stelling
Hoe kunnen we deze samenwerkingsdynamiek behouden en bevorderen bij de implementatie van de BgZ in de praktijk?

Evalueren & terugkijken
III

Evaluatie
Hoe kunnen we deze ervaring gebruiken als katalysator voor verandering in de praktijk?

Evalueren & vooruitkijken
V

Evaluatie
Wat waren de belangrijkste verschillen in de ervaring tussen deze fase en fase 2?

Evalueren & vooruitkijken
V

Evaluatie
Hoe kunnen we deze ervaring gebruiken als basis voor het opstellen van implementatiestrategieën voor de BgZ?

Evalueren & vooruitkijken
V

Evaluatie
Hoe kunnen we dit bewustzijn verder verspreiden en integreren in de dagelijkse werkzaamheden?

Evalueren & vooruitkijken
V

Stelling
Het succes in deze game benadrukt de impact van gestandaardiseerde processen op onze ervaring en werkplezier.

Evalueren & vooruitkijken
V

Evaluatie
Het bewustzijn van de BgZ bleek een cruciale factor in het succes van deze game.

Evalueren & vooruitkijken
V

Stelling
Het gestandaardiseerde karakter van deze game verbetert duidelijk de efficiëntie en effectiviteit van informatie-uitwisseling.

Evalueren & vooruitkijken
V

Evaluatie
Hoe kunnen de principes en kansen van deze game worden vertaald naar de dagelijkse praktijk?

Evalueren & terugkijken
III

Evaluatie
Wat ging er goed in deze game en hoe kunnen we deze positieve aspecten versterken?

Evalueren & vooruitkijken
V

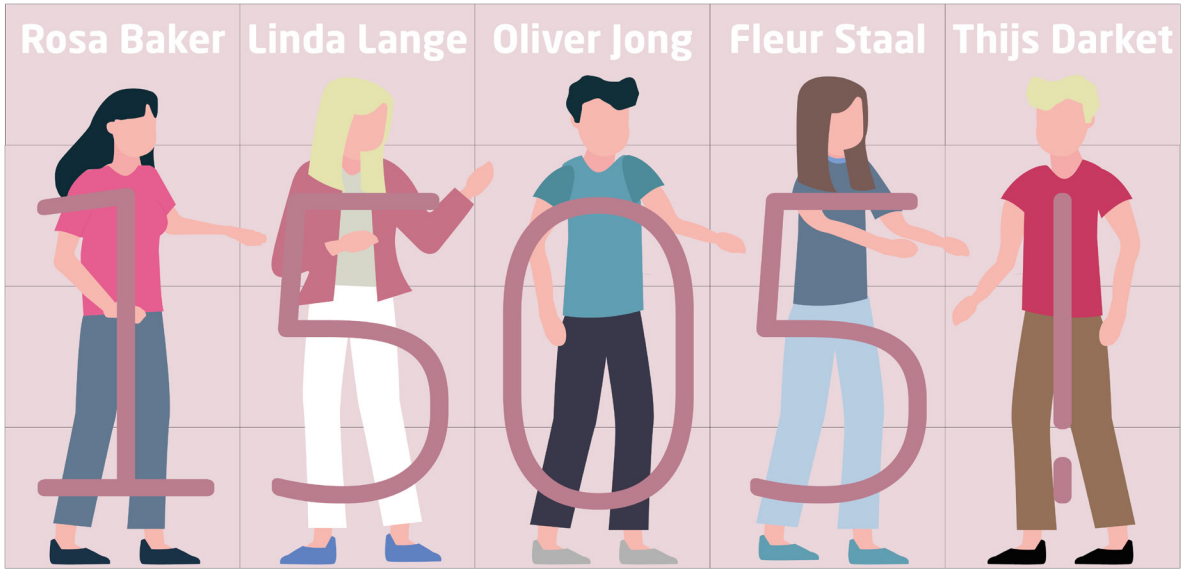
Evaluatie
In hoeverre heeft deze game jullie bewust gemaakt van de noodzaak van een gestandaardiseerde benadering?

Evalueren & terugkijken
III

Stelling
Doordat iedereen zijn eigen werkwijze aanhield en voor zichzelf bezig was leidde dit tot inefficiëntie en miscommunicatie.

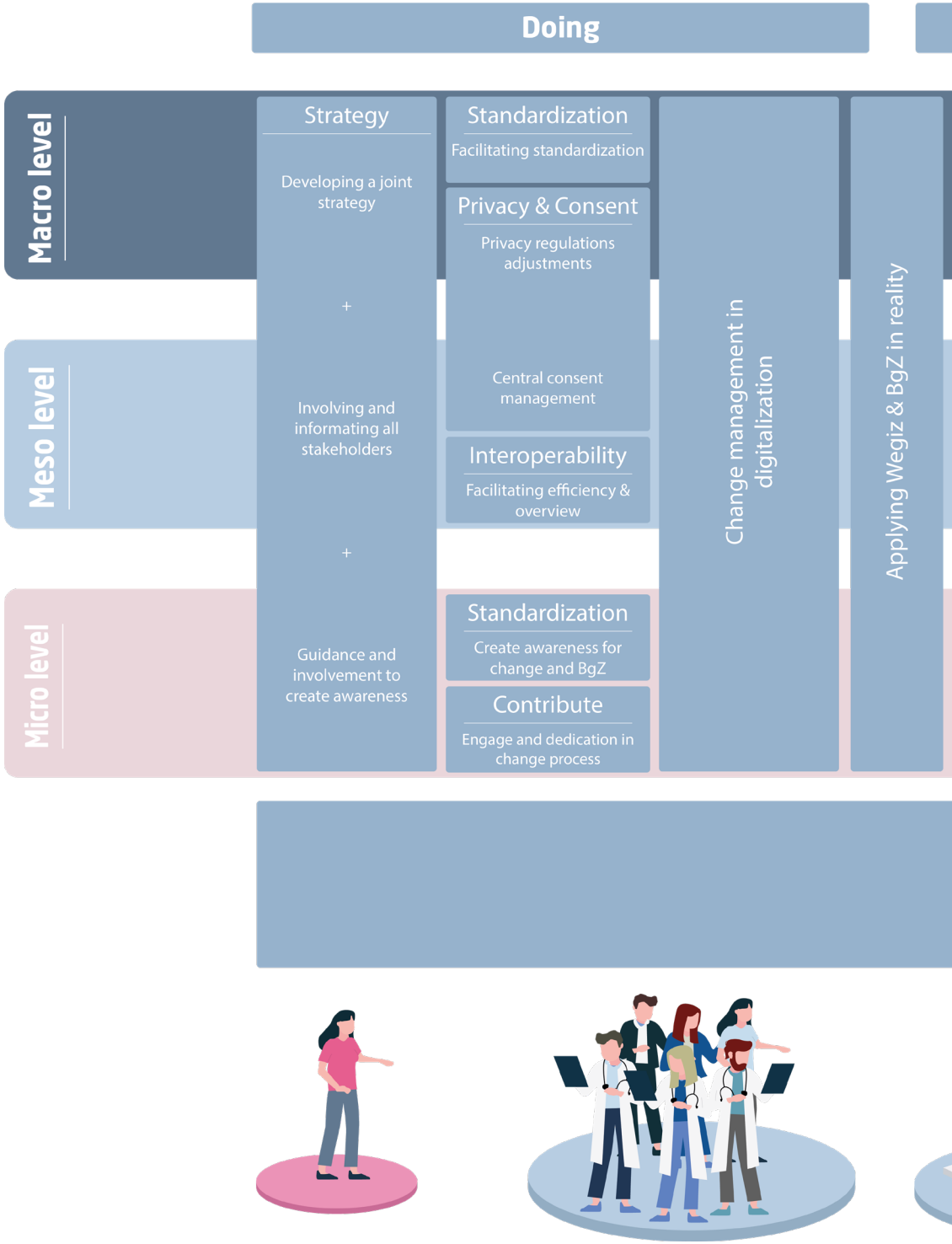
Evalueren & terugkijken
III

Stelling
De frustraties en belemmeringen benadrukken de behoefte aan verandering en de noodzaak om onze werkwijzes aan te passen.



6B Roadmap

Full verison of the roadmap



Thinking

Dreaming

Digital legislation
Development of legislation towards companies

Transition
Facilitate national transition

Healthcare empowerment
Joining forces to empower healthcare and it's stakeholders

Management
Facilitating and guiding healthcare towards independent position

+

Implementing business models to innovate regarding management and to cope with market forces

+

Acceptance of change in hierarchy to foster focus on patient care

Future-proof healthcare system

Human-centered
Building towards a future of healthcare where human-centred design principles are leading in innovation

BgZ
Facilitating that the evolution of the BgZ meets the user's requirements

Facilitate user-input
Involve users in the design and decision-making process

Change awareness
Guidance and attention for adaptation towards transformation

Change perspective
Change perspective to one where quality care and aiding people are central, and profit-oriented perspectives are

Cultural development
Education on cultural changes

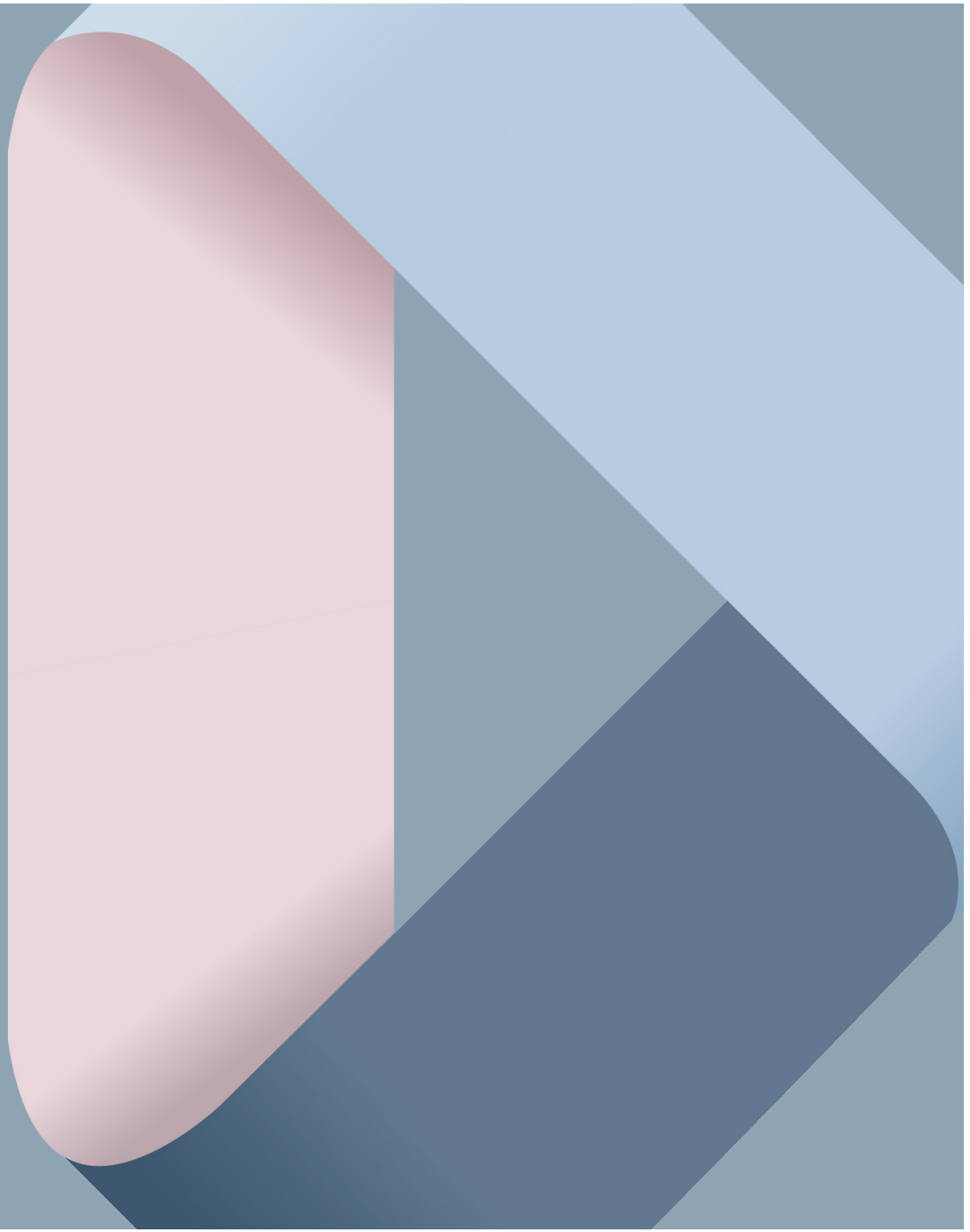
Healthcare empowerment
Joining forces to collectively adapt and improve

Patient empowerment
Facilitating patient involvement

Working together

Awareness on collective effort

Project Brief



DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Kroon
initials: E.R. given name: Lisa
student number:
street & no.:
zipcode & city:
country:
phone:
email:

Your master programme (only select the options that apply to you):

IDE master(s): ★ IPD ○ DfI ○ SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ○ Honours Programme Master
specialisation / annotation: ★ Medisign
○ Tech. in Sustainable Design
○ Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: dept. / section: HCD
** mentor: Dr. ir. Arjen Jansen dept. / section: SDE
2nd mentor: Mw. Dr. Petra Kok
organisation: Reinier de Graaf Gasthuis
city: Delft country: Nederland

comments (optional)

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair _____ date ____-____-____ signature _____

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: _____ EC

Of which, taking the conditional requirements into account, can be part of the exam programme _____ EC

List of electives obtained before the third semester without approval of the BoE

YES all 1st year master courses passed

NO missing 1st year master courses are:

name _____ date ____-____-____ signature _____

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: APPROVED NOT APPROVED

Procedure: APPROVED NOT APPROVED

comments

name _____ date ____-____-____ signature _____

Initials & Name E.R. Kroon Student number _____

Title of Project A product-service to synchronize healthcare & policy for patientcare

A product-service to synchronize healthcare & policy for patientcare — 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 23 - 08 - 2023 — 24 - 01 - 2024 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, ...).

The current health care system is under tremendous amount of pressure, due to increasing health care consumption, which is resulting in a growing shortage of (human) resources. Consequently, a transition is needed to maintain a sustainable and efficient health care system, which implied the start of a digital transformation with the aid of new legislation and policy: "Wet elektronische gegevensuitwisseling in de zorg (Wegiz). These new rules require that data exchange between healthcare providers takes place electronically, to provide a complete and up-to-date patient data set, which makes sure of the continuetity of providing care. The specific set of data that needs to be exchanged digitally is described in the "Basisgegevensset Zorg: BgZ" *. Implementation of this dataset requires not only a operational transition towards new legislation and digitalisation, but also a cultural and strategic shift to accomplish behaviour change, that is needed to create a well balanced health care system. This process is rather complex and requires a lot of effort of all stakeholder involved to be implemented successfully. The overall goal is to create a transition towards a more communal effort of keeping the health care system healthy and sustainable.

Several stakeholders are involved in the project, who are all part of the health ecosystem. Firstly, of course the minstery of public health, welfare and sports (VWS), since they provide developments regarding policy and legislation. Furthermore, Reinier de Graaf Hospital and it's employees are involved, because this hospital is a leader in digital innovation, with special departments regarding Medical Information Exchange and Innovations. Obviously, future developments will impact the workspace and the experiences of employees. In addition, Reinier de Graaf Hospital is a representative hospital of Dutch institutes and therefore an example for national roll out of any design interventions. The cooperation between Reinier de Graaf, VWS and TU Delft is a unique alliance to start innovation from a technical, human and policy perspective. Lastly, patients play an important role, since future changing digitilization policy will have a huge impact on the patient journey within the health care system.

There are many opportunities within this project, since allignment of several parties towards a mutual future goal is not only interesting, but also a necessity within current society, where there are obvious signs that the health care system is in desperate need of a change and future vision in these fast changing times. Both parties are tightly concerned and provide good guidance and a huge network, which provides the opportunities to interview many stakeholders and have a broad exploration of the problem. Furthermore, I am aware of the sensitive environment, with privacy and personal information involved, which may lead to limitations. In addition to this, timewise this is a project that can really drag you into a complex web of information, which will need a thorough, well-planned and narrowed down execution to keep overview and fit the given timeframe.

* BgZ: A national standard of exchanging patientdata, to ensure continuity and transfer of health care.

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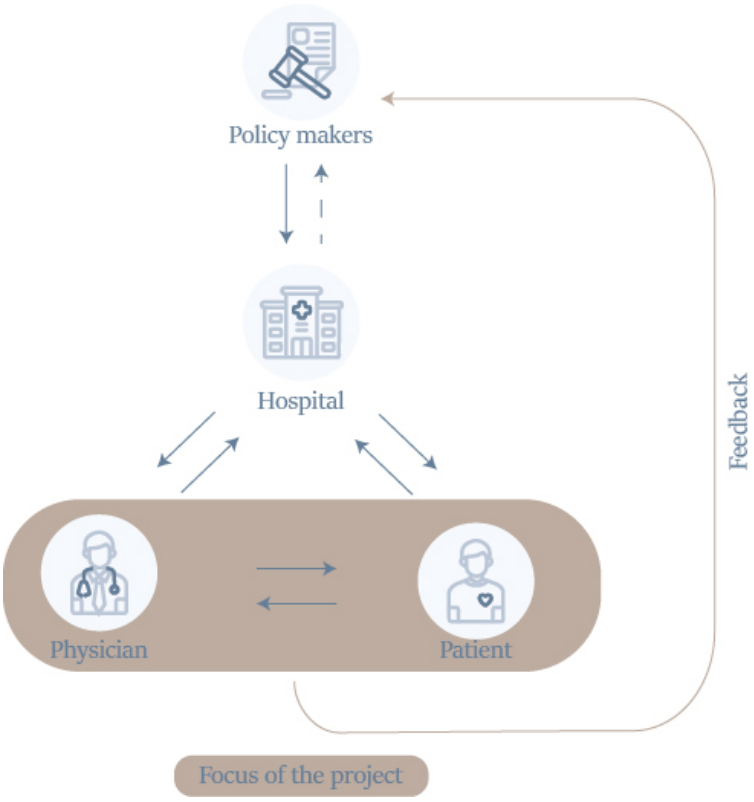

image / figure 1: Stakeholdermap

image / figure 2: Cooperative alliance between TU Delft, Renier de Graaf, VWS: Digitalization in the health care system

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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 problem is that the factors that determine successful adoption of digitial information exchange, according to the Wegiz of the ministery of health for patient care, are unknown. What design intervention is needed to help policy makers with the implementation of the BgZ is also unknown.

However within the project the focus will lie on the interaction between patient and physicians and their experience with BgZ. This will provide the policy makers with a better understanding and bring them closer to the consequences of their changing legislation, which makes it possible to develop a realistic digitalized health care system.

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.

Design a product-service system that will improve the patients-physician interaction. The product-service system should improve the digital information exchange according to Wegiz.

I will perform an explorative study to identify the factors that determine the usability and adoption the Basisgegevensset Zorg policy and come up with a design intervention that provides/facilitates a successful implementation of the new policy.

Me as an IDE student, I have gathered the required skillset to identify the friction factors, interdependencies and to come up with an innovative design intervention that combines all stakeholders requirements and solves the challenge that we are facing. An outsiders view is needed, with knowledge and experience with similar topics and problems, to methodologically and with aid of design-thinking provide a suitable solution. This solution will be in the form of a concept product-service system and a SEIPS model, to equip the client with a broad overview and suitable implementation strategy to improve patientcare with regards to Wegiz. I will be using the SEIPS model and journey mapping methods to identify a deisgn direction for the final concept design.

This is a medisign project, since the focus lies on the health care ecosystem and it's stakeholders, which include hospitals, physicians, patients and health care policy makers.

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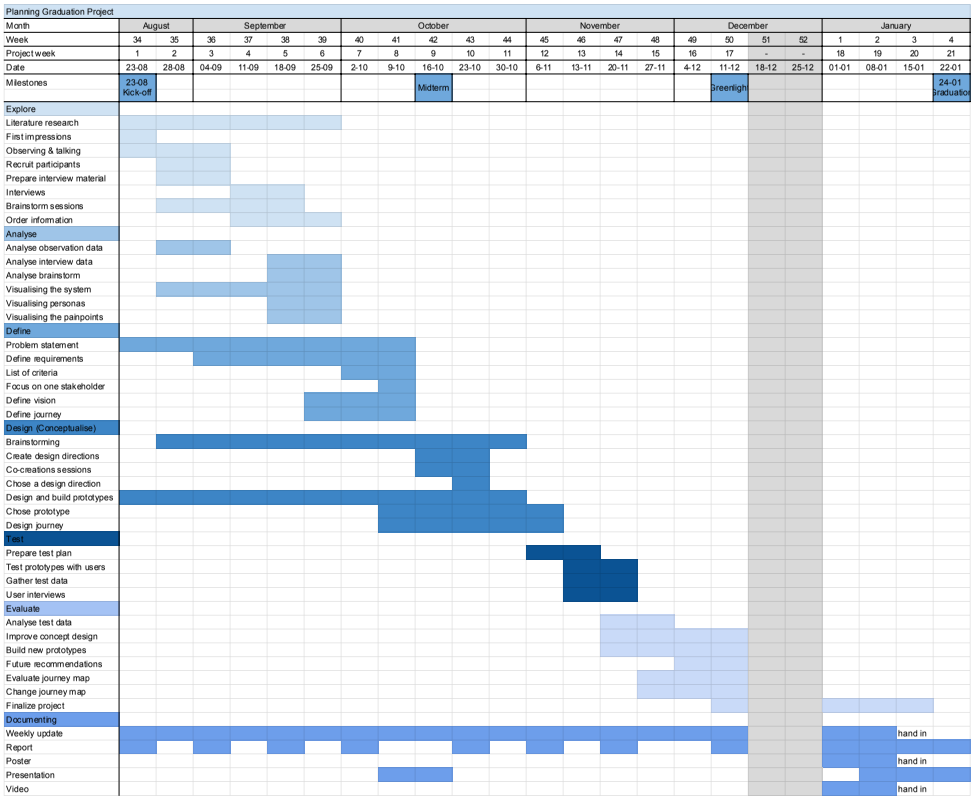
PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 23 - 8 - 2023 24 - 1 - 2024 end date



The project will be kicked-off at wednesday the 23rd of August 2023 and will finish 20 working weeks later at wednesday the 24th of January. Included is a two week Christmas and New-Years break, which I will be spending as time off the project.

Furthermore, I will use this planning as a guideline and of course on the way this illustration is subject to change. The approach of my project is quite straight forward, which means that I will follow a standard design cycle and interations. However, I will parallely work on a concept design and a SEIPS model to give a full advice and implementation strategy to the ministry of health and the hospital Reinier de Graaf Gasthuis for the new legislation regarding information exchange. This means I will execute one test round and the final proposal will be a concept design deliverable.

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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.

I set up this project, because it met my most important personal requirement for a graduation project: a project that is a present societal topic, that is helpful and necessary to innovate for the future. Most importantly, I want to do projects that have a specific purpose and are meaningful, I want to do good. In addition to this, I believe I can put my gathered skills, as an IDE student, to use within this project. Solving complex problems by mapping all stakeholders input to come up with important insights and designing a useful design solution that fits all. Building bridges between worlds is what I love to do, especially in the medical field, since there are many perspectives and contradicting demands. This is what I will try to do as well within this project, since finding common ground and working together is an important requirement for this pressing societal issue.

Next to this, I have always had a healthy aversion against splitting up the IDE studies into separate departments, strategy, product design and interaction, since I believe that all three have to move together and one can't go without the other two. This project is a perfect combination of all three, where a technical design is needed to substantiate a well-defined strategy to implement digital transformation legislation into the health care system, where interaction between stakeholders is the key to success. During my studies, I have followed several internships and worked in the field for some time, which gave me a sense of direction for my future career and being a design consultant feels most natural to me. This project will give me the opportunity to develop myself and experience to be a consultant and to help a system that is stuck in habits and complex policy to move forward and start innovation. In addition, during the elective semester I have used the SEIPS model and journey mapping to map a complex stakeholder structure and all their activities and interests, which helped to create an overview and combine insights into a design solution. These methods will be the foundation of the project as well. Furthermore, interviewing stakeholder participants and testing with them will be done as well, since during the mandatory period of the master I have developed the skills to identify the interdependencies of systems and their users, which I want to use and further develop.

Lastly, I have found a big passion in visualization and systemic design over the years, but especially during my masters and the internships/working experience. I would love to use my visualization skills within the project to engage stakeholders and make information exchange easier and more intuitively, to help stakeholders understand each other better. For this project systemic design will come on in handy, which I have touched during an elective, which I would like to explore and use more extensively in this project.

FINAL COMMENTS

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

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