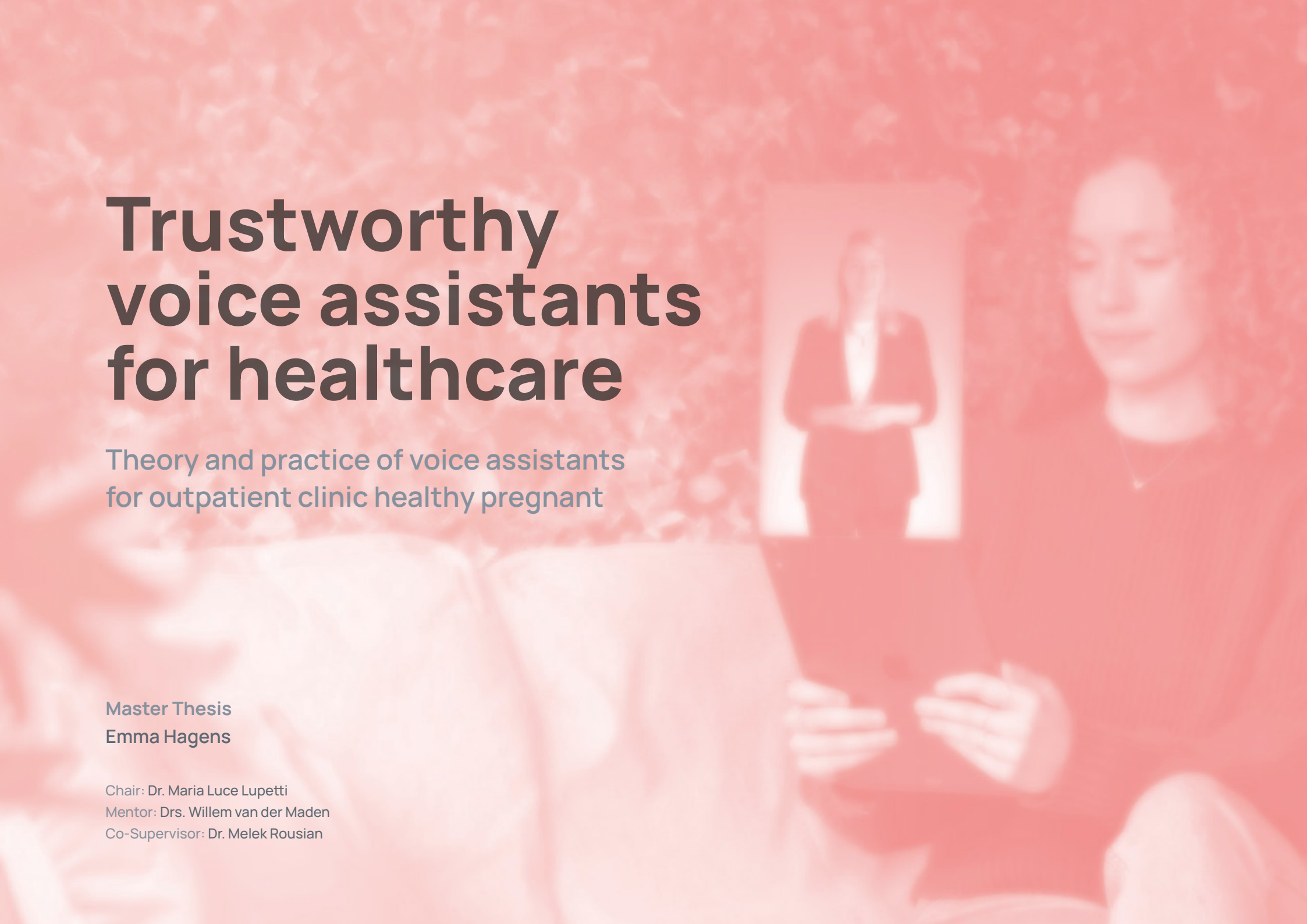


Trustworthy voice assistants for healthcare

Theory and practice of voice assistants
for outpatient clinic healthy pregnant

Master Thesis
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Faculty of Industrial Design Engineering

Design for Interaction

Master Thesis



Designing trustworthy Voice Assistants for healthcare

Theory and practice of Voice Assistants for the Outpatient Clinic Healthy Pregnancy

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I would also like to add my gratitude to Lorette Paas who helped me so much during the user testing. To this I also add my gratitude to the participants who wanted to participate in my research. I am grateful for your enthusiasm and openness towards my project.

Finally, I obviously would like to thank my family and friends who supported me during this project.

Enjoy reading!

Executive Summary

In the Netherlands, the healthcare sector is facing increasing staff shortages and the demand for adequately trained healthcare personnel is expected to increase in the coming years. Shortages in obstetric care mean that not all women and their partners receive the care they need before, during and after pregnancy. **To counter these shortages, there are opportunities in technology and continuity in maternity care.**

Erasmus MC has set up its own (online) care path for preconception care, Smarter Pregnant. This programme consists of online platforms for preconception screening and the outpatient clinic healthy pregnant (OCHP). **OCHP is a counselling session for couples or individuals to make pregnancy as healthy as possible or to obtain the healthiest possible lifestyle to get pregnant.** The conversation consists of a number of set questions that are answered structurally.

Most of the pain points occur when filling in and processing data in the Smarter Pregnant system. The current system of Smarter Pregnant is often not understood by patients and nurses have to process

the data manually. This processing of data is perceived by nurses as monotonous - which is why nurses report that the work feels robotic. Moreover, there is less focus on delivering care and more on interacting with the system. As a result, patients have to search for more information on the internet, getting lost in the validated and non-validated e-health for conception. **Therefore, the need for an authoritative and trustworthy source of information for the OCHP is great.**

For this study, the specific focus was on creating a trustworthy VA for OCHP. Trust is important when using VA in official application areas with sensitive data (Wienrich et al., 2021) and an essential prerequisite for long-term adoption (Braun et al., 2019). The dimensions of trustworthiness are leading for the interaction and thus the design of the Voice Assistant. **There are three layers that were considered when creating the Voice Assistant for the OCHP; the user, the context and the technology.**

For the VA to ensure the same trustworthiness as interacting with a nurse, the same interplay of trustworthiness has been simulated as in the current context. In the current context, trustworthiness is generated by taking responsibility and exuding expertise. Responsibility is something the nurse has to take on the word of the patient and partner. The trustworthiness of the nurse can be measured by his or her expertise. Expertise is considered a dimension of trustworthiness in several models. **By combining the dimensions of these existing models the measurements for the user testing were determined.**

To decide what the VA had to look and sound like, several experimental prototypes were conducted during the context analysis and collection of existing theories and methods. These prototypes served both as validation of research, and to spawn further research. The results of these studies led to a final prototype. **This final prototype was tested with the variables found from the models of trustworthiness and context analysis.**

Executive Summary

Each test ended with a qualitative interview with the patient based on the dimensions of trustworthiness. To structure patients' responses to the VA, three research questions were formulated regarding; expectations, comparing human-to-human versus human-to-robot interaction and characteristics affecting trustworthiness. Because the context analysis revealed that in the context of OCHP, trustworthiness depends on expertise, this research question was reformulated specifically regarding expertise. The results were clustered in themes, based on the research questions.

These themes helped accomplish and structure the overarching goal of the project: Forming principles on how trustworthy VAs can be designed for healthcare in the future. These principles form a set of pointers on how trustworthiness can be implemented in a VA for healthcare.

Table of Contents

Chapter 1. Project outline	9	Chapter 5. Experimental prototyping	60
1.1 project partners	10	5.1 Dialogue Design	62
1.2 project scope	10	5.2 Embodiment	67
1.3 target group	12	5.3 Conclusion of experimental prototyping	71
1.4 project objectives	12		
1.5 methodology	13	Chapter 6. User testing - approach	73
Chapter 2. Contextualizing	15	6.1 Hypotheses	74
2.1 outpatient clinic healthy pregnancy	16	6.2 Agent and Dialogue Design	74
2.2 e-health for conception in pregnancy	30	6.3 Set-up	76
2.3 conclusion of contextualizing	39	6.4 Participants	76
		6.5 Procedure	76
Chapter 3. Voice Assistants for healthcare and OCHP	40	6.6 Measurements	77
3.1 Voice Assistant for healthcare	41		
3.2 Voice assistant for OCHP	45	Chapter 7. User testing -results	78
3.3 Conclusion of VA for healthcare and OCHP	49	7.1 Analysis approach	79
		7.2 Expectations	79
Chapter 4. Trustworthy Voice Assistants	51	7.3 Preference and Comparison	80
4.1 Trustworthiness	52	7.4 Expertise	81
4.2 Critical view	56	7.5 Appearance of the VA	82
4.3 Conclusion of Trustworthy VA	59	7.6 Conclusion of test results	82
		7.7 Discussion	84

Table of Contents

Chapter 8. Future principles of designing trustworthy Voice Assistant	86
Conclusion	94
References	97
Appendices	101

Chapter 1. Project outline

An overview is provided of key components that composed the overall project.

This chapter contains

- Project partners
- Scope
- Target group
- Objectives
- Methodology

Project outline

1.1 Project partners

Erasmus Medical Centre - Research Group Lab - Periconception Epidemiology

The Periconception Epidemiology Research Group (PERG) investigates the influences of various maternal and paternal lifestyle factors on the embryonic and foetal development and growth of a child during the periconceptional period, such as nutrition, smoking, alcohol and folic acid use. Based on these findings, they want to develop innovative eHealth and digital interventions, such as Slimmer Zwanger (Smarter Pregnancy, SP), aimed at improving poor lifestyle factors.

By expressing my interest in Voice Assistants (VA) for healthcare to the chair of the PERG, the idea was conceived to specifically design a VA for the consultation of the SP programme. This collaboration made it possible to obtain highly targeted data and information. In addition, it was possible to walk along with the nurses during the consultation. These opportunities were valuable for both context and design.

TU Delft - Industrial Design Engineering

This research is conducted for TU Delft, Faculty of Industrial Design Engineering, in the context of the master track Design for Interaction. With supervisors specialised in Human Computer Interaction - Design Aesthetics.

My supervisors have both interests in design for well-being as well as understanding and designing responsible human-technology relations. By balancing both aspects through-out the research I stay critical and conscious about what approaches to use for VA development. They help me, where necessary, to come to new insights and give constructive criticism to ensure that the project is carried out well.

Goldfizz - Digital agency

Goldfizz specialises in setting up digital marketing and platforms. They have a large number of clients that belong to the Dutch healthcare sector.

Goldfizz' realistic view on today's healthcare platforms and knowledge of consumer needs, help me to make the connection between my own research and current platforms on the market.

1.2 Project scope

The purpose of this project is to investigate the potential of VA and chatbots in the healthcare sector, with a particular interest in the role of embodiment. The pressure on healthcare has only increased in recent years (Ter Steege, 2022). Therefore, the interest in technologies such as Machine Learning (ML) and Artificial Intelligence (AI) for the healthcare sector has increased (Sworna et al., 2021), specifically VA. These technologies, in fact, offer the possibility of alleviating care and more efficient time use of nurses as well as patients. In order to ensure long-term use of this VA, it is important that the user perceives them as trustworthy (Braun et al., 2019). To understand trust and a user group's ability to establish trust, a growing body of research examines trust in relationships between human agents, including many in healthcare. Specific knowledge about the physical implementation of VA in healthcare situations does not exist, however, testing and implementing a VA can provide insight into feasibility and value, so this thesis started by focusing specifically on one consultation within the healthcare sector, the Outpatient Clinic Healthy Pregnant (OCHP).

Project outline

1.2 Project scope

Within this case there are several factors and qualities that influence the ability to trust between the target groups. These factors are examined and discussed in terms of how they affect the use of VAs, thereby guiding the research. From this examination prototypes are made, which eventually lead to one final prototype to test an embodied VA as well as a chatbot for the OCHP. The results will be the start of how trustworthy interaction can be realised between computer and human within the healthcare domain.

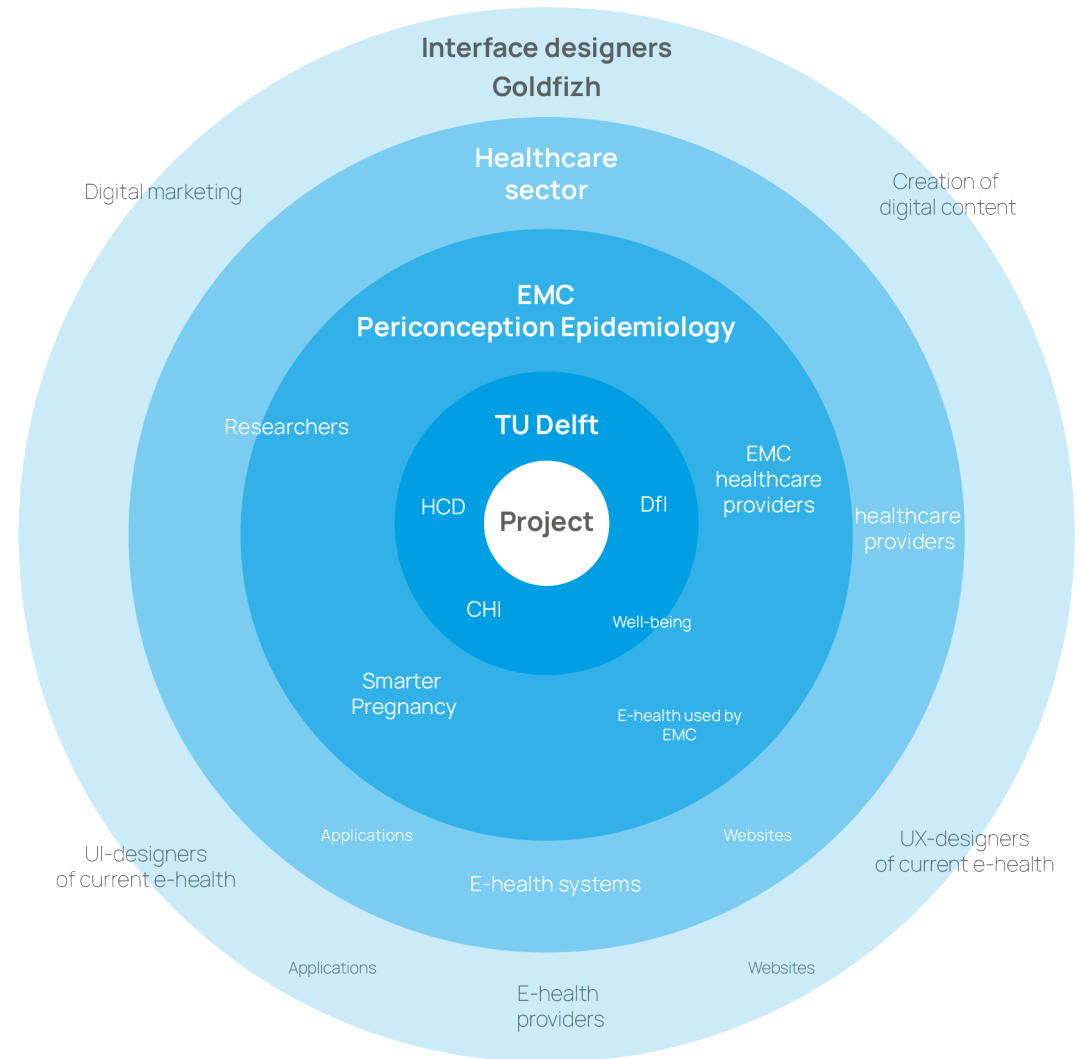


Figure 1. Project stakeholders and project scope

Project outline

1.3 Target group

There are two primary target groups:

Women and partners participating in OCHP

one target group of this study are women and partners participating in the OCHP of the SP programme at Erasmus Medical Center (EMC). The programme is meant to provide couples who want to become pregnant or are already pregnant with information on how to make the pregnancy as healthy as possible. The groups participating in this project come to this programme often referred through their General Practitioners or health institutes.

Professionals involved in OCHP

In order to implement VAs in healthcare situations such as consultations, it is not only important what patients think of the design but also what healthcare professionals think. By listening to healthcare professionals, the acceptance of new innovation will be faster (Idenburg & Schaik, 2013). Therefore, the second target group of this study are the professionals in charge of the OCHP.

1.4 Project objectives

This project touches upon the current situation in healthcare; pressure on healthcare workers will increase now and in the future. The aim of this research is to relieve pressure on healthcare using the technology of VAs. This thesis experiments with trustworthy VAs in healthcare, by reason of trustworthiness leads to long-term implementation. Therefore, the main question of this thesis is as follows: How to design Voice Assistants for trustworthy interactions in healthcare domains, especially for Outpatient Clinic Healthy Pregnant.

One can imagine that voluntary or involuntary participation in a consult has a great influence on the attitude of a patient during the consultation and at the same time on the attitude of the healthcare professionals. The difference in patients' attitudes creates a difference in the capacity for trustworthiness on the part of both patient and healthcare provider. Therefore, the aim of this project is to map the attitudes of patients and nurses and the context of the Outpatient Clinic Healthy Pregnancy as accurately as possible, the context analysis. In addition, literature and field studies will serve to analyse factors that further influence trustworthiness.

To guide the variety of analyses done in this study, research questions have been set up. These will act as a guide for the user research that will be designed in the course of this project. The research questions of this thesis are as follows;

Research questions

- 1. What are the main expectations of a conversational system?**
- 2. What are the differences between human-to-human and human-to-computer conversations?**
- 3. What characteristics ensure that VAs become trustworthy tools for searching healthcare information?**

The final product is a set of actionable recommendations to support the design of trustworthy voice assistants for pregnancy conversations. The intention behind these recommendations is to make them applicable not only to this specific context, but in the broader context of healthcare. As a result, this research serves as a principle for other designers to create trustworthy VAs for healthcare.

Project outline

1.5 Methodology

Firstly, this chapter illustrates where and how the position of the interaction designer is in this study. Different facets of existing and new research were used to produce analyses and results. These analyses ran in parallel.

1.5.1. Role of the interaction designer

Conducting research in parallel ensured an interplay of research for design and design for research. In particular, context analysis acted as a basis for prototyping. By adhering to existing theories and methods, results from prototyping could be validated. By constantly validating intermediate results, a new iterative process could be carried out at each step. The end result are operational principles, which help designers, developers or other interested groups to build on the same topic, in this case trustworthy VAs, in the future.

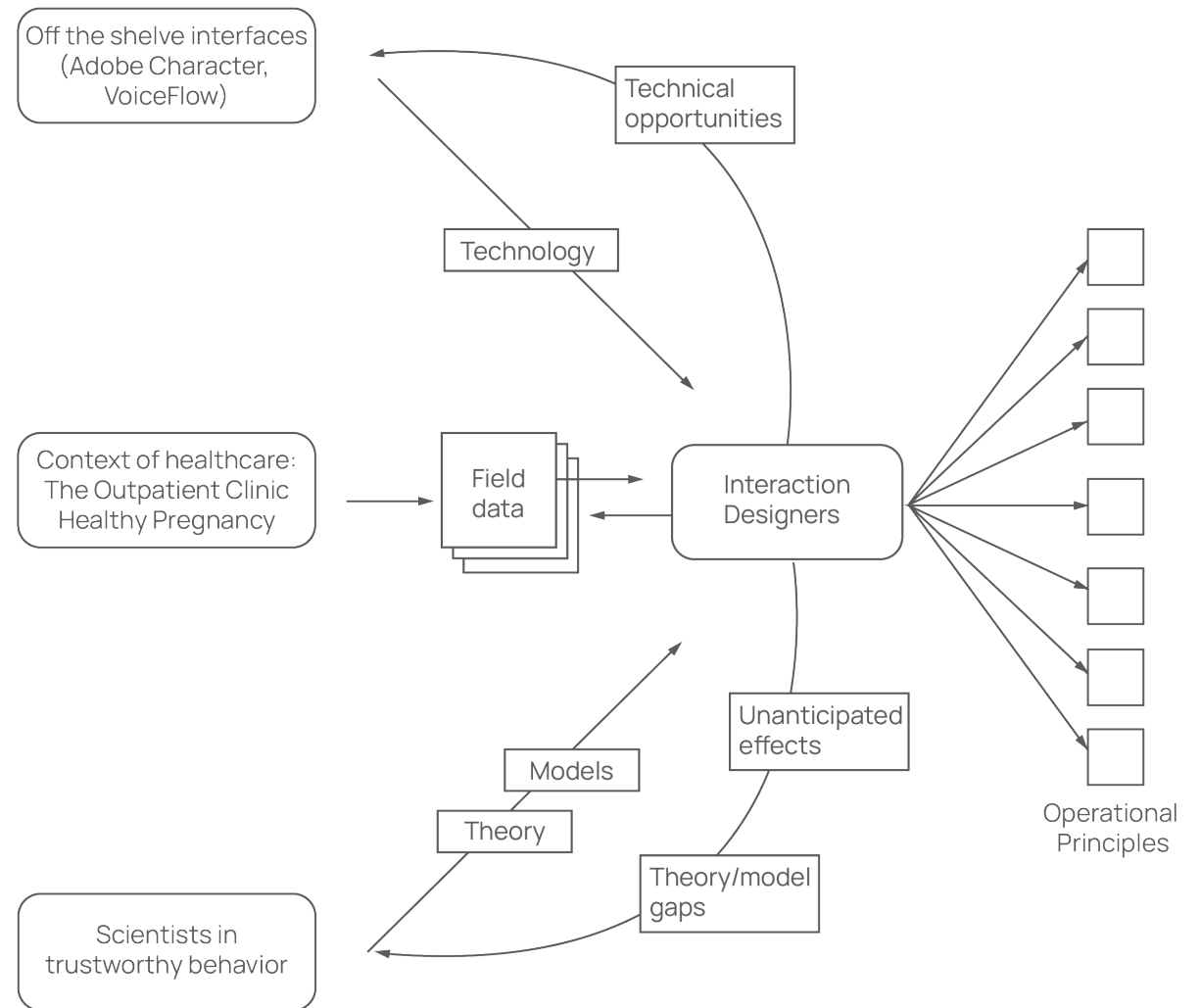
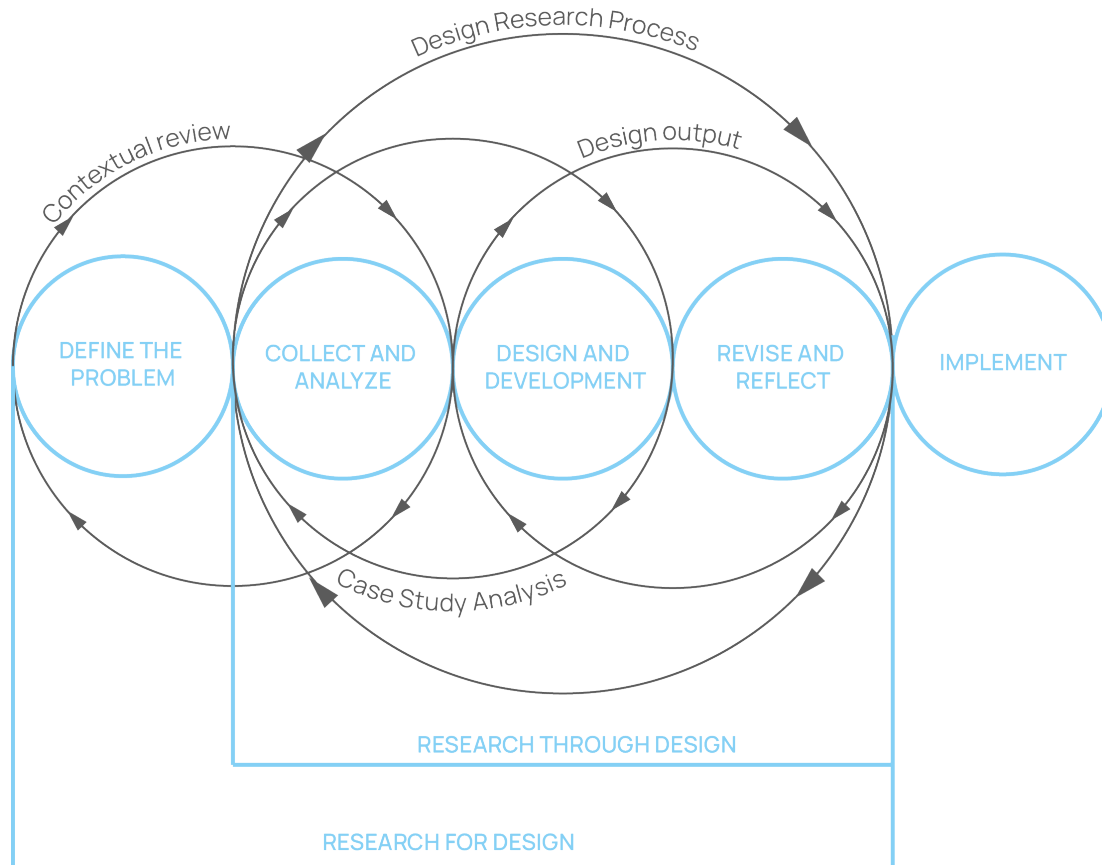


Figure 2. The role of the interaction designer within research for trustworthy VA in healthcare

Project outline

1.5 Methodology



1.5.2. Research process

To obtain a picture of the context, information was gathered from the field as well as analysing current studies and literature related to this study. By conducting thorough research and establishing the context, prototypes could be developed early in the research process (research for design). These prototypes, in turn, helped to revise and reflect on the current context and research that has been done in the field of trustworthiness and VAs (research through design). This revising and reflecting helped in keeping a critical vision throughout the process.

Figure 3. Method: steps used to tackle the research

Chapter 2. Contextualizing

In this chapter, a contextual review is conducted to obtain an overview of the Dutch obstetric system and the impact of care shortage on this system. Using literature and field research, the current system is mapped out, involving both interviews with nurses and patients and walking along with the Erasmus Medical Centre's preconception care consultation service, OCHP. In addition, an overview of current preconception e-health with educational goals that currently exists is being made. Field research will be used to investigate how pregnant women use this e-health in reality and what problems they encounter while using these platforms.

This chapter contains

- A short explanation of the Dutch obstetric system
- Explanation of the OCHP
- Patient Journey - OCHP
- Nurse journey - OCHP
- An overview of current educational preconception e-health
- An overview of the current system for OCHP
- Current painpoints using e-health

Contextualizing

2.1. Outpatient Clinic Healthy Pregnancy

Following the negative reports of relatively high infant mortality in the Netherlands compared to other European countries in 2003 and 2008 (Heering, 2012), developments within obstetrics were initiated. From this, periconceptional care came into being. Erasmus Medical Center has set up its own (online) care pathways for this, Smarter Pregnant and Healthy Pregnant.

2.1.1. Staff shortages in Dutch healthcare

In the Netherlands, the healthcare sector is struggling with increasing staff shortages and the demand for adequately trained healthcare staff is expected to increase in the coming years. An example where this shortage is visible is among General Practitioners in the provinces of Twente, Friesland and Zeeland. Using dinners and holiday homes, residents are trying to lure GPs to the edges of the Netherlands (Idzikowska, 2019).

Shortages in obstetric care have the consequence that not all women and their partners receive the care they need before, during and after pregnancy. To counter these shortages, there are opportunities in technology and continuity in maternal care. In recent years, the number of completely online health activities has increased (CBS, 2021). To date, the patient comes to the healthcare providers in most cases. In the future, the aim is for care to always be accessible and available online. This makes the Netherlands one

of the frontrunners when it comes to seeking health information online. Pregnant women are increasingly making use of the technical possibilities at their own request during childbirth and pregnancy (Ensing & Care Management, 2010). This gives them more control over their own pregnancy. Here, it is important that patients will be guided by doctors and nurses in this self-management. This communication is good for mutual trust and contributes to self-direction and self-management (Expertgroep ZIG, 2020)

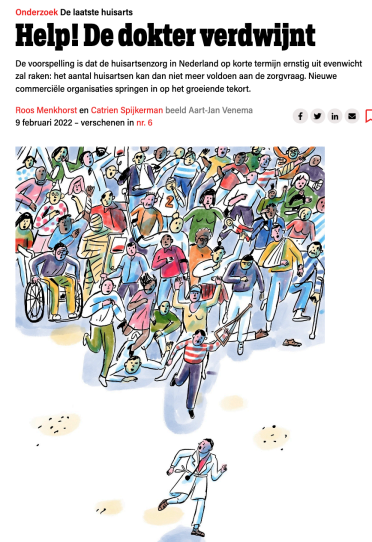


Figure 4. newspaper article de groene amsterdammer: help! the doctor disappears

2.1.2. The Dutch obstetric system in a nutshell

Obstetric care refers to the care that takes place from the start of pregnancy (prenatal care), through delivery (natal care) and the postpartum period (postnatal care) (Ensing & Care Management, 2010). Obstetric care in the Netherlands has a unique character due to the first-line position of the midwife. The first-line providers of obstetric care, an obstetrician or a general practitioner active in the field of obstetrics, takes care of a selected group of low-risk pregnant women (Visser & Steegers, 2008). When risk selection by primary care providers shows that there is an increased risk of complications during pregnancy, delivery and the postpartum period, they transfer the care to the secondary care provider. The largest number of midwives work in primary care.

In 2003 and 2008, infant mortality in the Netherlands was relatively high compared to other European countries (Heering, 2012). For this reason, professional groups within obstetrics have taken responsibility for improving obstetric care in the Netherlands. In doing so, they have improved continuity of care for pregnant women in various forms of integrated obstetric care (Wiegerinck et al., 2015). To improve this continuity, the Netherlands has added a new component to obstetric care, preconception care.

Contextualizing

2.1. Outpatient Clinic Healthy Pregnancy

The preconception period can be seen as a so-called 'window of opportunity': where risk factors are inventoried and anticipated before they can generate negative effects on the unborn child (Bouter & et al., 2018). This promotes healthy pregnancies, increases the likelihood of pregnancy and reduces problems during pregnancy. Informed choices are enabled and risks minimised with the help of education, counseling and preventive policies.

2.1.3. Preconception care - Outpatient Clinic Healthy Pregnancy

An example of preconception care is Erasmus Medical Center (EMC), Smarter Pregnant (SP) programme. The programme is set up using the online platform SlimmerZwanger.nl and ZwangerWijzer.nl for preconception screening and the Outpatient Clinic Healthy Pregnancy (OCHP). OCHP is one of the steps of antenatal care at EMC. It is a counselling conversation for couples or individuals to make the pregnancy as healthy as possible or to obtain the healthiest possible lifestyle to become pregnant. These conversations can be held before, during and after pregnancy. The results are used to identify lifestyle habits that may affect pregnancy. The interview consists of a number of set questions that are answered structurally. To understand the interaction and the target

groups of the consultation, 5 consultations were attended at the EMC. In addition, the procedure protocol could be accessed. The following sub-paragraphs capture the main facets of the OCHP. In addition, several journeys were made of both patient and nurse with the interaction and associated thought process for each step.

For this journey, the persona from figure 5 is used. This means that solely the experience of the woman during OCHP is visualised and not the experience of the partner. However, according to EMC, both woman and partner should be considered equally during OCHP.

The coaching programme is available for all women (18-45) years and their partners with a desire to have child or get pregnant. Currently, the coaching programme is actively offered to all women with a desire to have children who are under treatment at EMC (Department of Obstetrics & Gynaecology including sub department of Reproductive Medicine). They can be referred to the SP trajectory in different ways. This can be via GP, gynaecologist or voluntarily. Factors such as age or underlying health problems can affect fertility and pregnancy. Therefore, patients are prioritised according to a hierarchy in which it is important which agency, Centre for Young Pregnancy, Reproduction Centre or Specialist Preconception Advice, referred them to the SP programme.

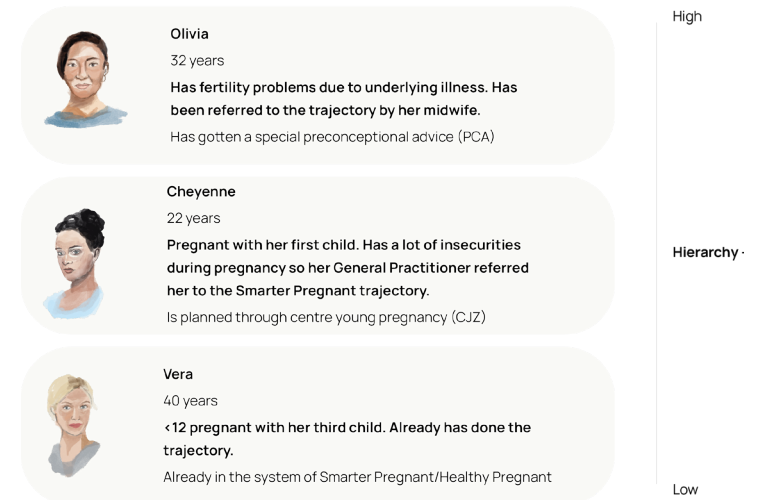


Figure 5. Personas - Patients at OCHP

Preparation

All patients are sent a leaflet (Figure 6) at home. This requests them to complete the questionnaire of the SP programme and the questionnaire of Zwanger Wijzer. The emphasis is on completing the SP programme.



Figure 6. Leaflet Smarter Pregnant

Contextualizing

2.1.3. Preconception care - Outpatient Clinic Healthy Pregnancy

The consult

Consultations are both physical and online. Online, the Microsoft Teams platform is used. Consultations in Erasmus take place at the Obstetrics and Gynaecology outpatient clinic.

The first step is to explain the OCHP. After this, the nurse checks whether the patients have registered for the SP programme. If this has not happened, the healthcare provider and the patients together fill in the personal details of the programme. It is emphasised that the partner can also register for this programme.

The lifestyle check starts by measuring the height and weight of the patient. After this, the results of SP and the SP coaching programme are discussed. If the patient needs extra information about what she may or may not eat, she is referred to e-health. More information about these educational e-health platforms will be given in chapter 2.2.

After the consultation

At the end of the consultation, the patient and her partner are informed about the current studies they are eligible for.

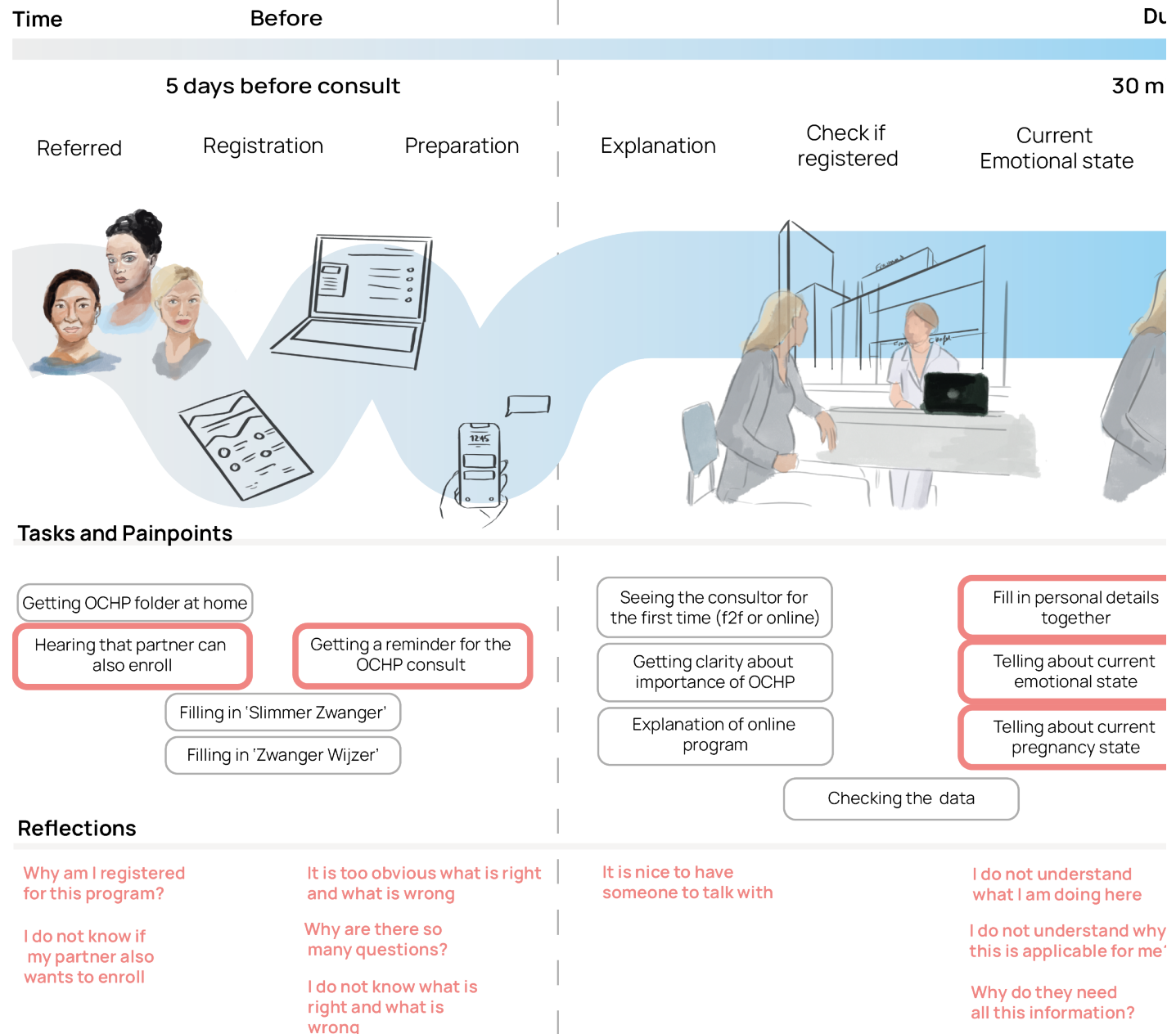
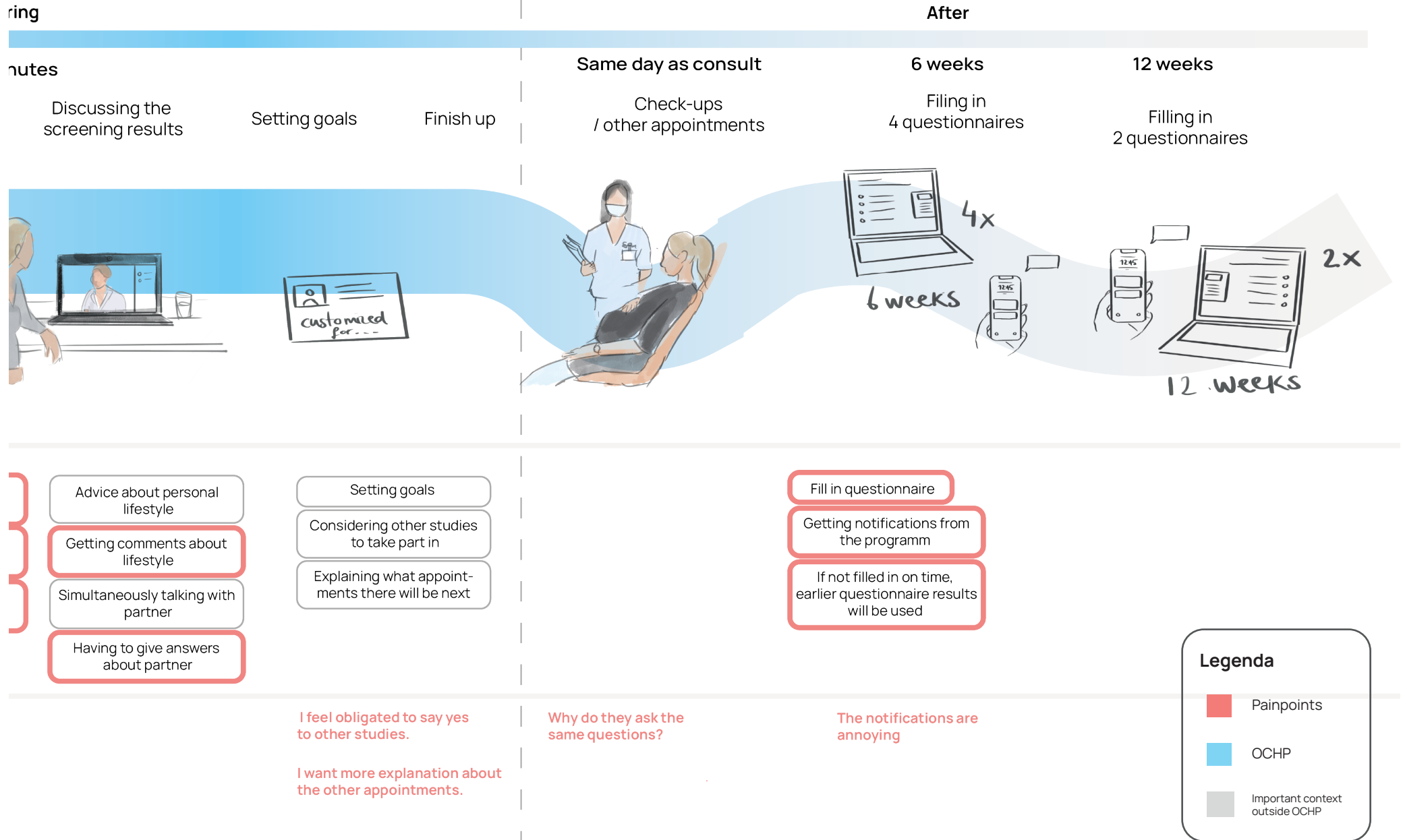


Figure 7. Patient journey and painpoints

Contextualizing



Contextualizing

2.1. Outpatient Clinic Healthy Pregnancy

2.1.4. Perspective of patients

To map the patient's perspective, a diagram of interactions between the different stakeholder groups was drawn up. This diagram is discussed in this section from bottom to top. The red arrows indicate where pain points, or tensions, occur between the stakeholder groups.

Partner - Patient - System tension

The partner has little interaction with the system. This may be because the partner does not know about the existence of the system, does not know he or she can sign up for the system or does not understand its purpose. Notifications and reminders for completing the questionnaire are received by the person that signs up for the SP programme. When only the patient, the woman getting pregnant, signs up, a responsibility interplay between partner and patient arises. The partner trusts the expecting patient to use the system properly and answer correctly.

Partner - Patient - Nurse tension

Besides the responsibility interplay between patient and partner during the interaction with the SP system, there is also a responsibility interplay between partner, patient and nurse. Because the partner does not always show up at the consultation, the patient is given the responsibility to pass on the right data about the partner to the nurse.

Partner - Nurse tension

The partner trusts that the nurse will provide appropriate care to the patient because the nurse is considered an expert. Although the nurse and partner will not always meet, the nurse will require the partner to listen to the advice that will be passed on through the patient.

Patient - System - Nurse tension

Before the consultation, patients have to log into the SP system. It may happen that a patient does not understand the system or is not aware of its existence or that they had to register. More time during the consultation is spent signing up for the SP system than to actually advising on lifestyle and nutrition. As a result, patients cannot always obtain all the care they want.

Patient - Nurse Tension

The patient feels responsible to listen to the nurse because of the reputation of EMC and the expertise the nurse conveys during OCHP.

EMC - SP System and Nurse - Patient and Partner

The last interaction is not a tension, but a connection between concerned groups leading to trustworthiness. EMC is represented in 2 ways. By the nurse and the SP programme or system. By the reputation EMC holds, the largest academic hospital in the Netherlands, both the SP system and nurse are validated and

considered experts. This reputation of expertise and additional trustworthiness is crucial for the patient and partner to feel responsibility to participate in the OCHP and listen to advice.

Contextualizing

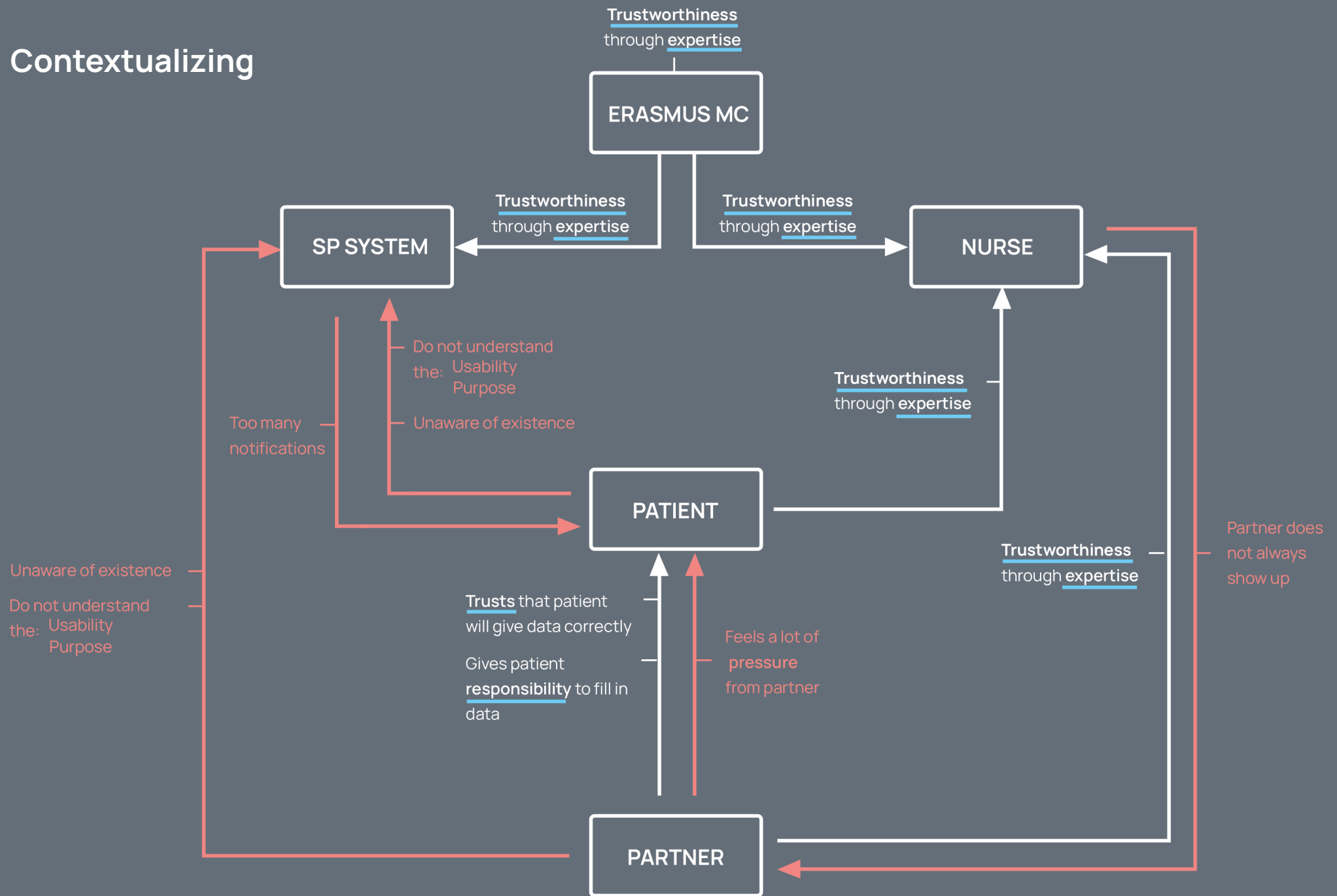


Figure 8. Tensions in OCHP from the patient perspective

Contextualizing

2.1. Outpatient Clinic Healthy Pregnancy

2.1.5. Perspective of nurse

The aim of this study is to implement a Voice Assistant in the SP trajectory. Here, not only the perspective of patients of the OCHP, but also professional caregivers is important. This not only makes it easier to incorporate technology into healthcare systems (Idenburg & Schaik, 2013), but is fundamental in this specific process. To get an overview of the perspective of health professionals at the Healthy Pregnancy Consultation and patients, two qualitative interviews were conducted with two health professionals (Appendix A).

These interviews focus on attitudes towards the groups involved, institute and patients, and the current consultation with the associated system.

By attending the OCHP, the nurse specialist's train of thought or reflections while performing the consultations could be documented.

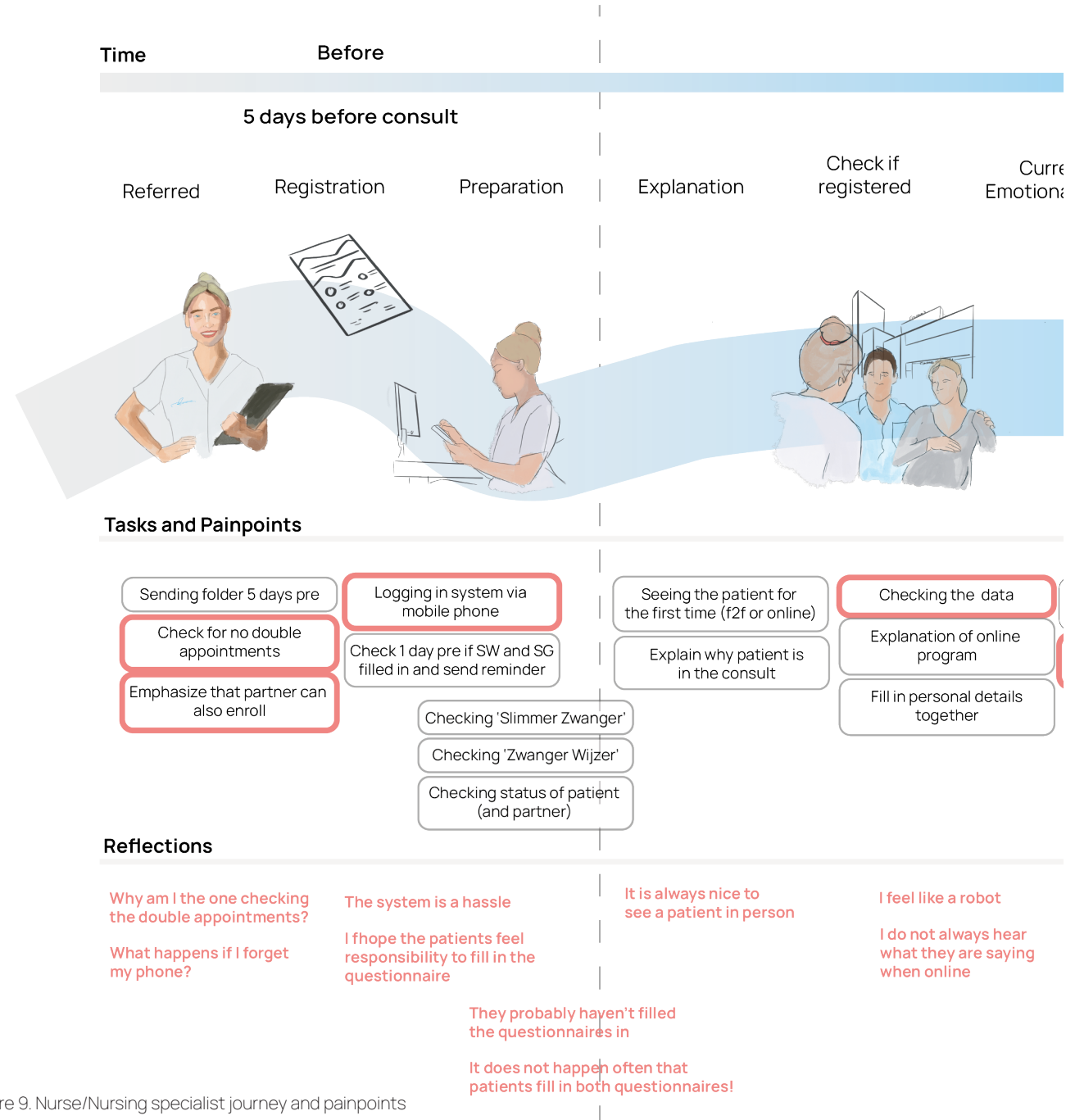
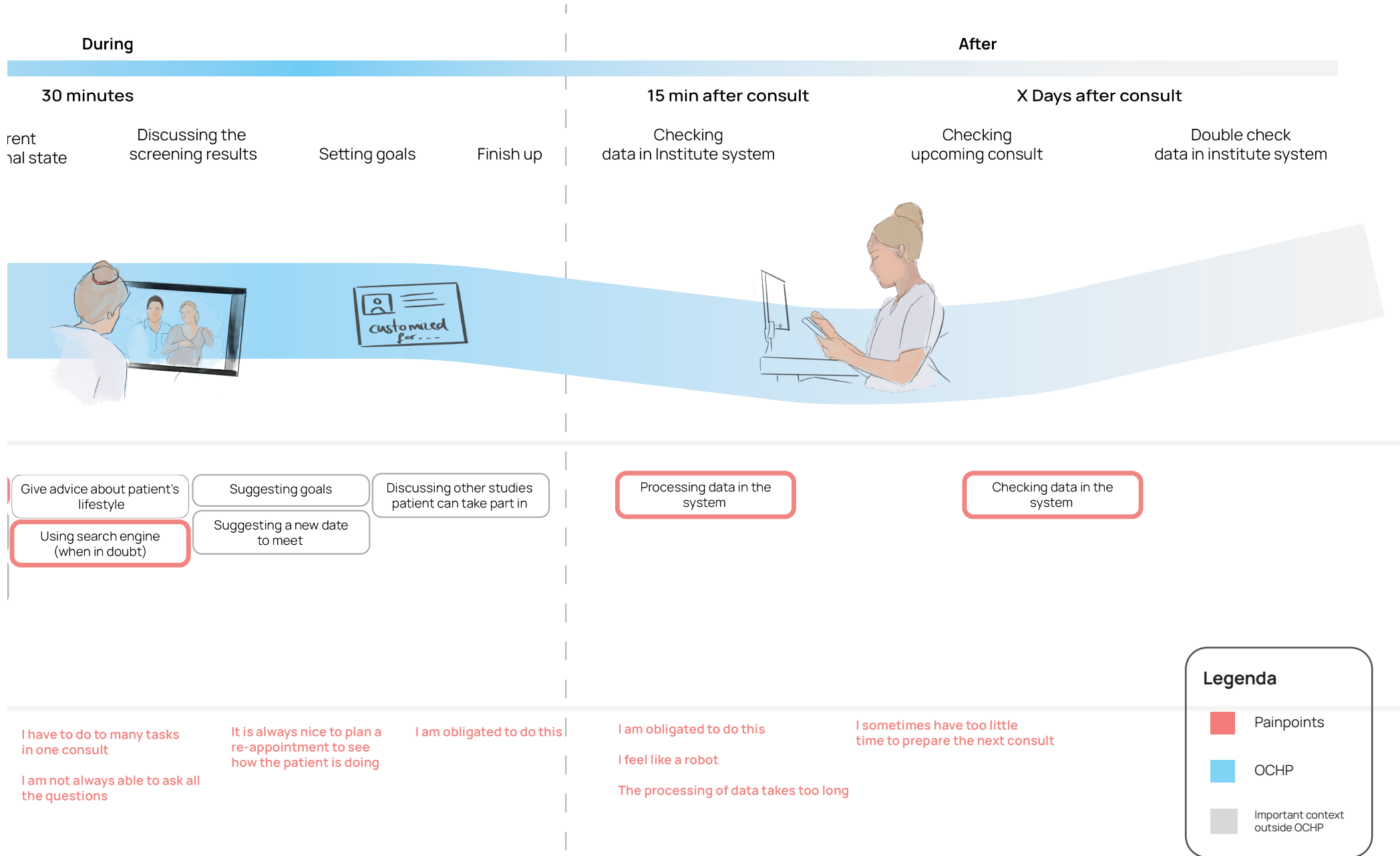


Figure 9. Nurse/Nursing specialist journey and painpoints

Contextualizing



Contextualizing

2.1. Outpatient Clinic Healthy Pregnancy

2.1.5. Perspective of nurse specialists

Nurse - Patient/Partner tension

The nurse feels responsible about the patient's health. In return, the healthcare provider expects a responsibility from the patient. In doing so, the nurse trusts that the patient tells the truth and will not lie about information. This applies to the pregnant woman, woman with pregnancy wish and partner. As mentioned earlier, partners do not always understand the need to change his or her lifestyle or show up. As a result, the nurse specialist cannot always assess the situation properly.

Nurse - Partner tension

The nurse does not see in the database if the partner is also attending the consult. Partners are often attending the physical consult, but not the online consult. The nursing specialist has to ask questions about the partner. To get data about the partner the nursing specialist needs to trust the expecting woman that she will give the right answers if the partner is not present.

Nurse - System - Patient tension

The nurse logs in the system with the help of a phone, this means that without their phone they cannot start the OCHP. The system itself is dependent on manual processing, in which the nursing specialist needs to process all data manually. This is perceived as a hassle. Because patients sometimes forget to fill in

the questionnaires before the consultation or do not understand the SP system, the nurse specialist needs to fill it in together with the patients. This systematic or monotonous interaction makes the nurse feel as if she is a "robot".

Nurse - Other healthcare workers within SP tension

Asking and running through standard questions in the EMC System does not only occur at the OCHP. At the other check-ups belonging to the SP trajectory, the same questions are asked again. This is due to the old-fashioned way data is delivered, namely on paper or through long documents in the system that are never opened. As a result, time is spent asking the same data repeatedly. Thus, time is spent inefficiently.

Nurse - EMC tension

The relationship between institute and nurse also has to do with responsibility. Besides being held for providing information about pregnancy, the OCHP also serves scientific research. Here, the nurse specialist is given the responsibility to process data. While on the one hand this purpose works as an incentive to work more accurately, it also creates a sense of unnecessary within the institute. As a result, the consultation is occasionally seen less as providing care and more as a necessity for scientific research.

Contextualizing

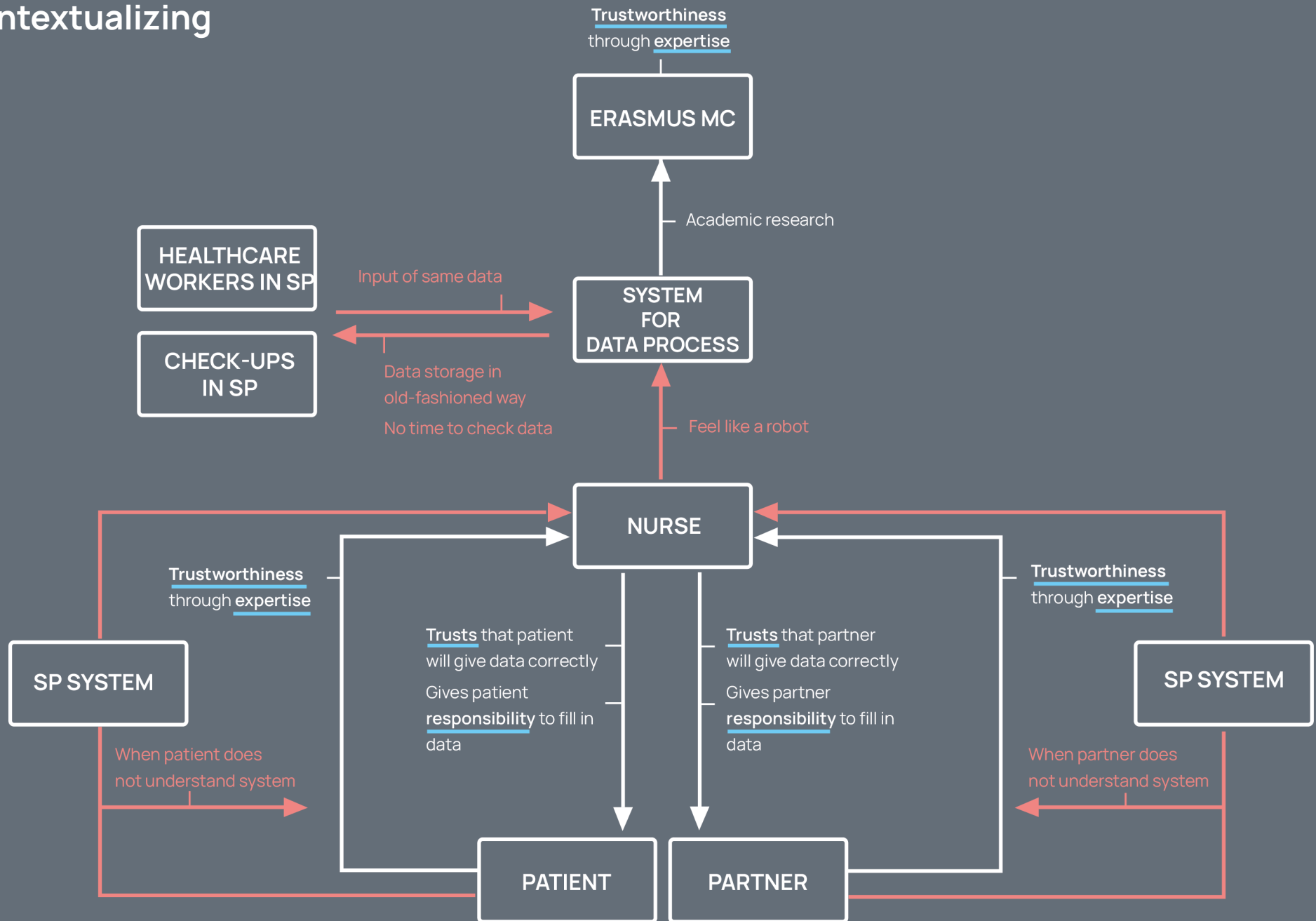


Figure 10. Tensions in OCHP from the patient perspective

Contextualizing

2.1. Outpatient Clinic Healthy Pregnancy

2.1.6. Conclusion

OCHP is one of the steps of prenatal care at EMC. The consultation consists of a number of systematic steps to be followed by the nurse specialist using the online platform SlimmerZwanger.nl and ZwangerWijzer.nl. The aim of this consultation is to give (pregnant) patients tailor-made advice on how to go through pregnancy as healthily as possible or promote pregnancy.

Using an extensive analysis of both the patient and partner perspective and the nurse leading the OCHP, several tensions were drawn up. These tensions schematically indicate where pain points in the interaction take place and interplays of trustworthiness are established. These pain points and interplays are considered opportunities for implementing Voice Assistants in the OCHP.

Most of the pain points occur in using **the system in combination with the nurse-patient or partner interaction** and **processing data in the system for EMC**. Because the systems are not understood by patients and partners, nurses have to do data processing manually. This processing of data is perceived by nurses as monotonous - therefore, nurses express that the work feels robotic. Moreover, the recorded data from the OCHP is not processed in other check-ups of the SP trajectory. As a result, other nurses have to collect the same data, leading to inefficiency. This

inefficiency can be solved by a VA that can take over these standard questions. The aim of this smart system is to improve continuity within the SP trajectory.

For the VA to ensure the same trustworthiness as interacting with a nurse, an analysis of the interplay of trustworthiness between stakeholder groups was conducted. **This showed that trustworthiness is generated by taking responsibility and exuding expertise.**

Nurse's perception of trustworthiness

The nurse trusts patient and partner when she feels they handle information responsibly and will pass on data correctly. This trustworthiness cannot be measured; this is something the nurse will have to take the word of the patient and partner.

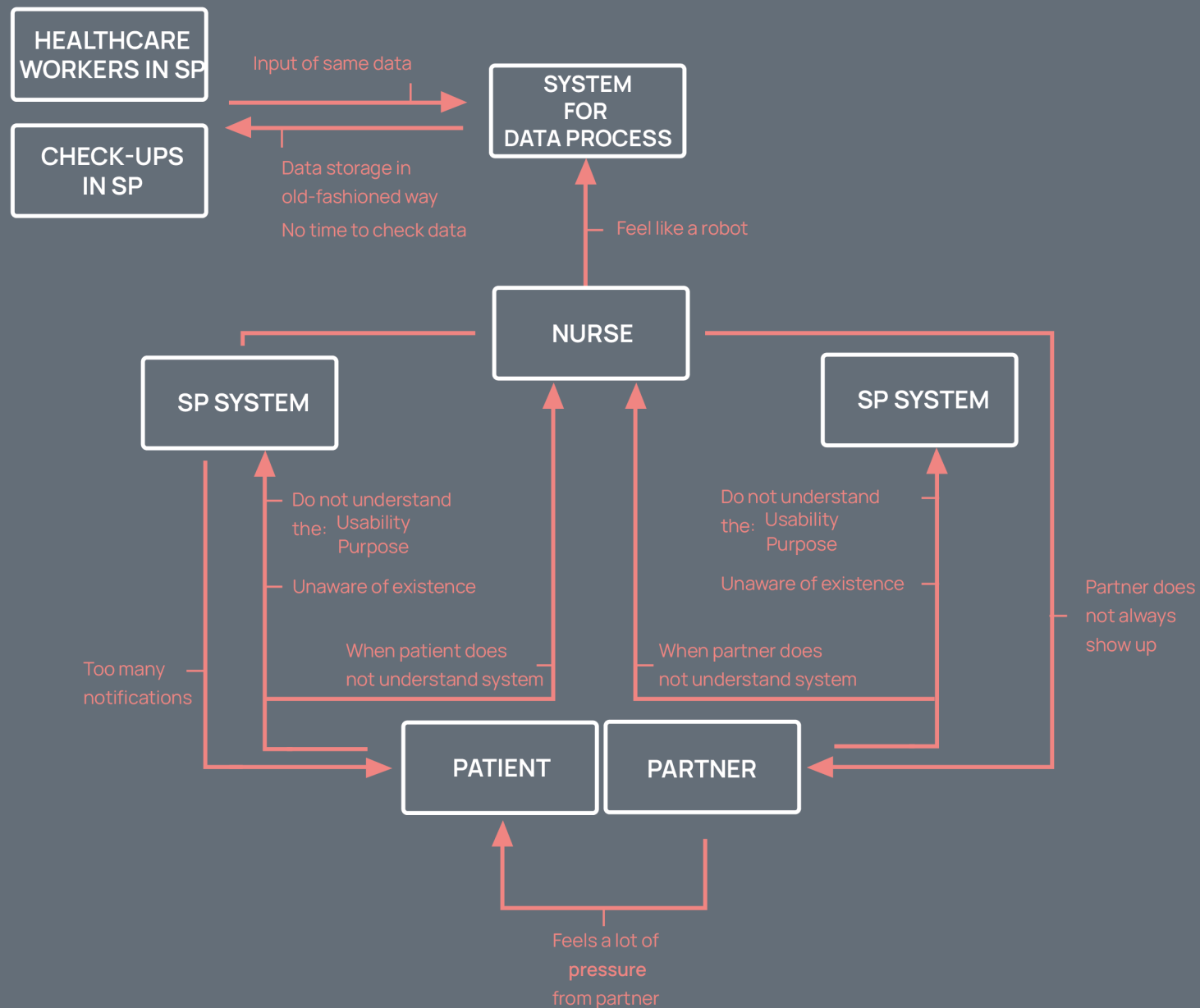
Patient's perception of trustworthiness

On the other hand, the trustworthiness of the nurse can be measured by his or her expertise. The nurse's expertise results from the information they provide to the patient and partner, but also from the reputation they automatically acquire because they work for the Erasmus MC institute.

“I sometimes feel as if I am a robot”

nurse's experience in OCHP

Contextualizing



Contextualizing

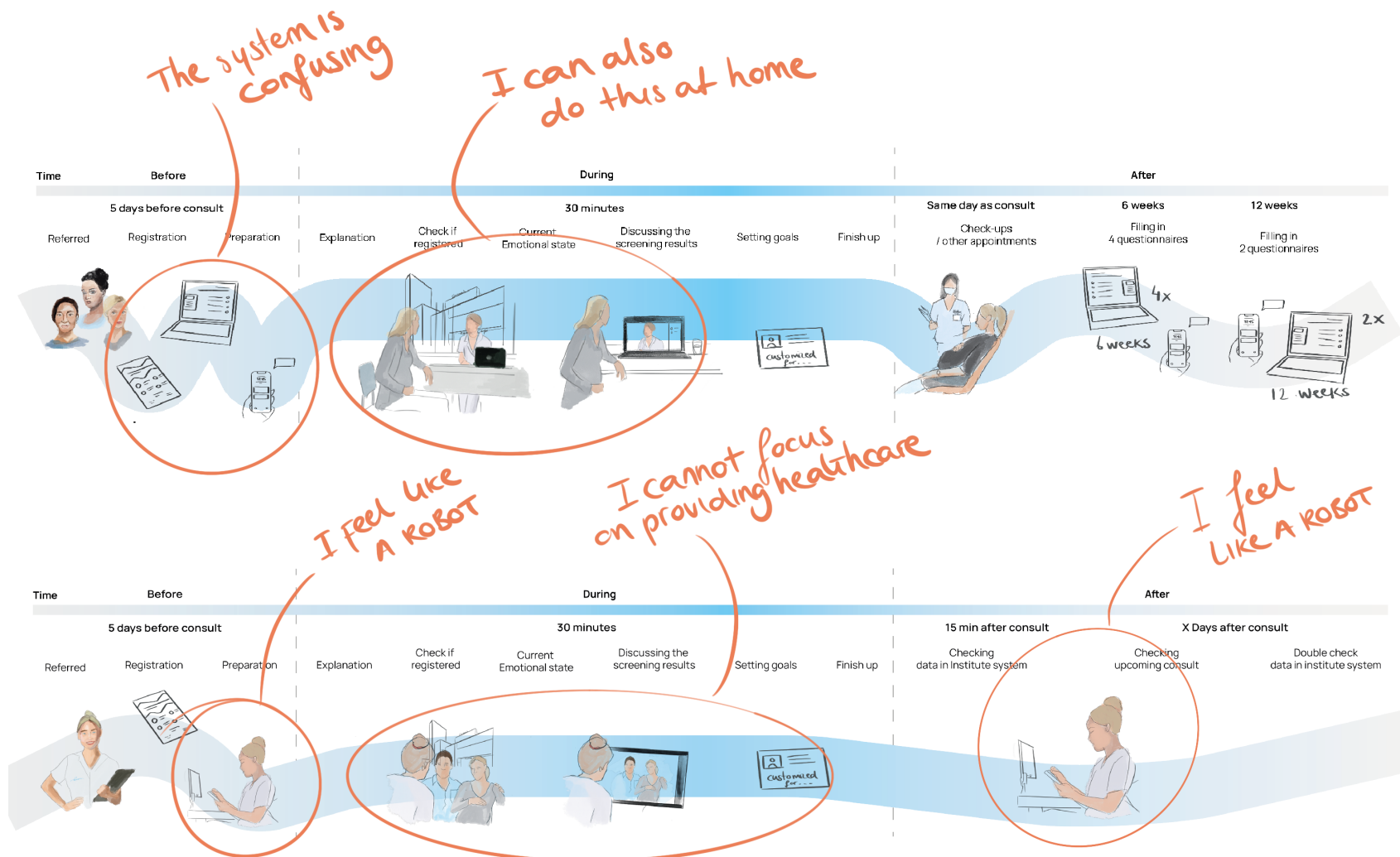


Figure 12. Figure with patient and nurse journey

The red annotations show where the opportunities are for the Voice Assistant

Contextualizing

2.2. E-health for conception in pregnancy

Self-monitoring of pregnancy is widely practised these days. This trend has led to a wide range of e-health offerings. These offerings include EMC's own platform, the Smarter Pregnant programme. This chapter analyses existing systems and applications for preconception care and identifies how couples with a pregnancy wish and pregnant couples interact with these platforms. The aim of analysing the current interaction between e-health and pregnant couples, women with pregnancy wishes and partners is to make a prediction of how a technology like voice assistants will resonate with this target group.

2.2.1. Self Monitoring of pregnancy

Mobile apps are a promising means of providing health information to new parents and overcoming previously identified barriers, as information is consistently available (Davis et al., 2017). For instance, there is a huge range of mobile apps regarding pregnancy, childbirth and parenthood (i.e. more than 1,200 apps in the Apple store and 700 in the Google Play store). Research showed that the majority of women download an average of three pregnancy apps during pregnancy (Tency, 2019). Research found that women value pregnancy apps and digital platforms "that are multifunctional and aligned". Pregnant women surveyed to inform the design of a Dutch pregnancy app described an app

that has the functionalities to provide individualised feedback, serves as communication platforms for pregnant women and medical professionals, and expressed a desire for apps to be integrated into routine clinical and antenatal care. In addition, they wished for a push notification system to remind them of tasks they needed to complete, an alert system to alert them when monitored signals became irregular or dangerous, and a social media platform to connect with other pregnant women. (Hughson et al., 2018)

Midwives and other roles in medical care recognise the potential benefits of such technologies. Self-monitoring during pregnancy can lead women to be more in control of their decisions as they get to know their bodies better. Increased use of these media can improve women's understanding and knowledge of personal health and healthcare options and better enable them to make the most appropriate choices for pregnancy (Dalton et al., 2018).

A concern for health professionals are the barriers for some women that prevent them from using antenatal education materials since health literacy during pregnancy is vital for the health and well-being of the mother and foetus.

There is a direct link between low health literacy and poor health outcomes and between low socioeconomic status (SES) and poor health outcomes, so it is important to promote health

education (Dalton et al., 2018). In addition, midwives and other healthcare providers are concerned about the quality and trustworthiness of available apps, as relevant information is often missing, unclear and not accurate, misleading or not up-to-date, consequently not evidence-based and of low quality. The quality of health apps is a crucial parameter as it affects end-user/client decisions and outcomes in terms of health and thus pregnancy (Tency, 2019).

Contextualizing

2.2. E-health for conception in pregnancy

2.2.2. Commercial e-health for conception during pregnancy

As mentioned earlier, a wide range of e-health about preconception has been released. This section discusses some of these websites and applications. These are applications and websites that have both educational goals, as well as bringing together groups that have a harder time during pregnancy. Each application has its own target audience and thus a different approach on pregnancy and/or pregnancy wish. The purpose of this analysis is to get acquainted with the current applications. This way, an understanding was gained of the patients' context; what they experience during the preconceptional phase and pregnancy.

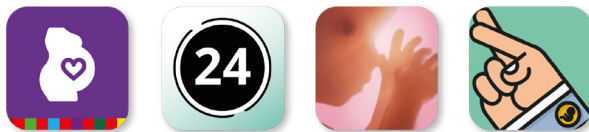


Figure 13: current commercial e-health

Mominbalance

website for outdoor training for pregnant women, postpartum recovery training and total body workouts for women. By encouraging sport during pregnancy, mothers become physically and mentally stronger and symptoms are prevented. The body is prepared for childbirth and recovery afterwards.

Freya

provides information on the fertility process, connects women with fertility problems and publishes a magazine 4 times a year.

Alles voor kinderen

where parents can find information on pregnancy from week to week, everything about babies, toddlers and preschoolers and primary school age children.

24 baby

an online forum on pregnancy, baby and toddlers. Baby's pregnancy and development is tracked day by day, where a personal diary can be created with personal milestones.

Pregnancy+

this app is developed by Philips and displays the baby's weekly development in an interactive way with audio (heartbeat SFX). In addition, the app provides daily pregnancy information, information on nutrition, exercise and childbirth.

Zwangerhap

Zwangerhap is offered by the nutrition centre. It is a free app where you can quickly look up which products can be eaten. If a product should not be eaten, an alternative is recommended.

Oudersvannu

Ouders van Nu is the largest and best-known 'parenting' brand in the Netherlands. For more than 53 years, Ouders van Nu has offered cross-media content where you as a (future) parent can find information about pregnancy or young children. Ouders van Nu shares recognisable stories, expert advice and recommends products.

Moeders voor Moeders

Is part of the pharmaceutical company Aspen Oss B.V and a nationwide active organisation that aims to help wishful parents with fertility problems fulfil their desire to have children. They do this by collecting urine from pregnant women from which the hCG hormone is extracted. Medicines can be made from this hormone, which can help these wishing parents to become pregnant too. Through MfM, pregnant women can participate and have their urine collected.

Contextualizing

2.2. E-health for conception in pregnancy

2.2.2. Commercial e-health for conception during pregnancy - partners

To get a picture of partners' views on pregnancy, an application specifically for partners is addressed. This application is specifically designed for men to gain more insight and knowledge about pregnancy. This application is not validated by Erasmus Medical Centre.

Tuurlijk Schatje

This app is made for the pregnant woman's partner. For 9 months, the user gets a daily notification with tip to make his or her partner happy. The app offers support to the partner in a humorous way.

2.2.3. The current e-health system of the Healthy Pregnant trajectory

To obtain a picture of the digitisation of preconceptional care, current e-health products and services were analysed. The following platforms were designed specifically for the Healthy Pregnant care pathway. Midwives like to recommend applications where they know the information is of quality (Vickery et al., 2020). Self-designing a pathway with associated platform automatically ensures this.

SlimmerZwanger (SW)

Slimmer Zwanger is an online coaching programme that provides advice on nutrition and lifestyle habits. The short screening combined with a questionnaire at the beginning of the programme gives insight into how healthy the patient is living and what can be improved. The results of the screening are linked to the coaching programme, so the patient(s) receive tailored coaching via e-mail messages with tips, facts and healthy recipes.

On the homepage, the user can choose different options. (1) The user can choose to take a self-test, which is completely non-binding and gives a picture of the lifestyle of the pregnant woman and/or partner. The questionnaire (5) consists of questions on nutrition and lifestyle habits. The questions are both closed and open-ended. After completing the screening, the user receives an overview of the results.

By registering with the Slimmer Zwanger programme, a care path can be drawn up personalised for the user (9).

(2) The user can register via the homepage, this is done using a code that the user obtains from the nurse or by signing up for the programme. If the user is already registered, the user will log in (3). The user logs into the programme via the verification page. Users land on a verification page. This works with the help of a confirmation code (4) that you obtain by

sending an SMS via mobile phone. So it is not possible to log into the system without a mobile number.

Once the user is logged into the system, the menu (6) allows navigation to various functions such as the personal data (7), partner registration (8) and the personal care path (9). In the personal care pathway, the results of completed screenings can be viewed. Graphs and scales are used to indicate the aspects in which the user scores well and badly. In addition, the programme keeps track of how long the user has not exercised his or her poor need (10).

Contextualizing

Verification page

Homepage

Registrate Partner 8.

Personal data 7.

Questionnaire 'Slimmer Zwanger' 5.

Overview of questionnaires 9.

New results for week X

Overview of results from previous weeks 9.

Figure 14: Screenshot Slimmer Zwanger with reference numbers

Contextualizing

2.2. E-health for conception in pregnancy

2.2.3. The current e-health system of the Healthy Pregnant trajectory

SlimmerGezond (SG) or MediMapp

MediMapp is an application recommended while the patient is under observation at the Obstetrics & Gynaecology Department. After activating the app, the patient sees a timeline with appointments and related information. The aim of this app is to give clarity about the trajectory the patients have to go through. This application is used across the entire SP journey and not specifically for the OCHP. In addition, this application is not discussed in the OCHP between nurse and patient, but only provides clarification. For this reason, the decision was made not to analyse this platform.

ZwangerWijzer (ZW)

ZwangerWijzer is a supplementary questionnaire to the Slimmer Zwanger questionnaire. Patients can test whether there are any risks for the pregnancy and the baby. It is a questionnaire that helps prepare for pregnancy for both women and men and give the child a healthy start. Zwangerwijzer is for women who want to get pregnant, but can also be useful for pregnant women who want to get additional information.

When the user goes to the website, a brief description of the purpose of ZwangerWijzer and a button to go to the questionnaire appear (1). From this button, the questionnaire starts with questions about the user's gender (2) and whether the partner is available to answer questions (3). It also indicates at what stage (4) the user is currently in the pregnancy and how the user was referred (5).

Once these basic questions are completed, deeper questions can be asked about the patient's lifestyle and background. Yes/no questions can be used to answer these questions.

When a question needs to be discussed with the nurse, a red exclamation mark will appear (6). This exclamation mark is immediately accompanied by an advice (7).

At the end of the questionnaire, an overview is given of the risks (red exclamation marks) that should be discussed with the nurse. The grey exclamation marks (8) indicate what to watch out for during pregnancy and related information is given. To share the result with the nurse, the result can be printed out or downloaded (9). In addition, reference is made to the Slimmer Zwanger personal coaching programme (10).



Figure 15: The steps and functionalities of Slimmer Gezond trajectory

Contextualizing

Introduction - Questionnaire

Homepage



Lifestyle and personal background - Questionnaire

Results; red risks, grey risks, other answers

Figure 16: Screenshot Slimmer Zwanger with reference numbers

Contextualizing

2.2. E-health for conception in pregnancy

2.2.4. Factors that lead to underconfidence during self-monitoring of pregnancy

To contextualise the use of these e-health applications, pregnancy self-monitoring and nursing specialist visits from the patients' perspective, qualitative interviews were conducted with pregnant women and their partners. The interviews were conducted by telephone with two women who had just been pregnant and one pregnant woman (age: 20-30). This included questions about the partners (age: 20-40). The questionnaire including answers from the interviews can be found in Appendix B.

Demographics: all three women studied and were working. All three had access to multiple educational platforms. As a result, their prior knowledge about pregnancy was good.

Two women of this interview were aware of the risks of certain lifestyle habits. This makes it easier to change their behaviour since the women knew what to expect during pregnancy. For this reason, there was a difference between the women who became pregnant intentionally and the one woman accidentally. When a woman suddenly finds out she is pregnant, the lifestyle changes can be perceived as more intrusive. In addition, there is a sense of guilt

involved, as she did not know she was pregnant and thus life habits that are not desirable in pregnancy were maintained for a longer period of time than she had desired. This is only one of the many insecurities women experience during pregnancy;

Comparing with other women digitally

Social media provides women and partners with a platform to share pregnancy. Factors such as the number of followers could give the idea that what these "influencers" say is validated information. There are also several forums where women and partners share experiences about pregnancy. Comparing these influencers and experiences of others can lead to doubts about one's own experiences. Through use of make-up, lighting, camera equipment, and editing programs, visual pregnancy content was found to be more staged and idealised on Instagram than other online platforms. A new visual content that addresses expectant mothers is spread under the hashtag "Belly Only Pregnancy" (BOP). This term implies a "pregnancy body ideal" for expectant mothers. Despite the possible advantages of a balanced diet and an active lifestyle especially for expectant mothers, the harmful potential for psychological and physical disorders are dangerous aspects of the BOP trend. Regardless of how positively influencers implement this trend, some vulnerable peers might harm themselves and the unborn child by interacting with the BOP content. (Steube et al., 2022)

The wide range of information available on the internet

Besides social media platforms, there are a large number of applications and search engines to look up information about pregnancy with. This can leave women overwhelmed by the large amount of information, making it impossible for them to distinguish validated information from non-validated information. To reduce the likelihood for women of both finding erroneous information or misinterpreting correct ones, healthcare professionals should commit to fill the information gap and guide pregnant women in the online searches. (Bert et al., 2013)

Nursing specialist's opinion

Research shows that women in the Netherlands want clear information presented in an unbiased fashion. Information should not be self-conflicting or ambiguous. A number of women felt that their midwife was trying to impose her own opinion during discussions (Baas et al., 2015). These opinions may be based on aspects such as beliefs and culture. Research suggests that the initial choice of midwife, the influence of family and friends as well as beliefs, values, past experiences and cultural values have a strong influence on choice and decision-making for women and midwives (Noseworthy et al., 2013). This can cause miscommunication on habits, with one party seeing habits as part of culture and the other as bad. An example from the interviews was the advice of

Contextualizing

2.2. E-health for conception in pregnancy

Partner overprotectiveness

There has been considerable emphasis on the stress associated with childbirth and the impact that it has on women; there has been less emphasis on the impact upon men of discovering that they are about to become a father for the first time. In a psychological sense, first pregnancy provides a 9 month period for both expectant parents to prepare for the transition to parenthood. This involves grappling with a number of psychological tasks, particularly for expectant new fathers. Men often adopt the traditional role of "protector", and feel more comfortable when in control of situations and able to nurture their partners. At the same time, the pregnant woman comes under the protection of midwives and obstetricians. This world is perceived by man as something they have little influence and very little control over. She will often turn to her women friends for support, thus the man loses some friendship and intimacy. (Boyce et al., 2007)

Motherly instinct

Motherhood appears as a natural fact that is self-explanatory. (Leskošek, 2011). At the same time, there are psychosocial, cultural and environmental stressors that women experience during pregnancy. This prenatal stress has consequences for the pregnancy and causes women to feel uncertain. As a result, they are afraid to trust their own instincts, which creates a conflict between choosing their own feelings or searching for assurance.

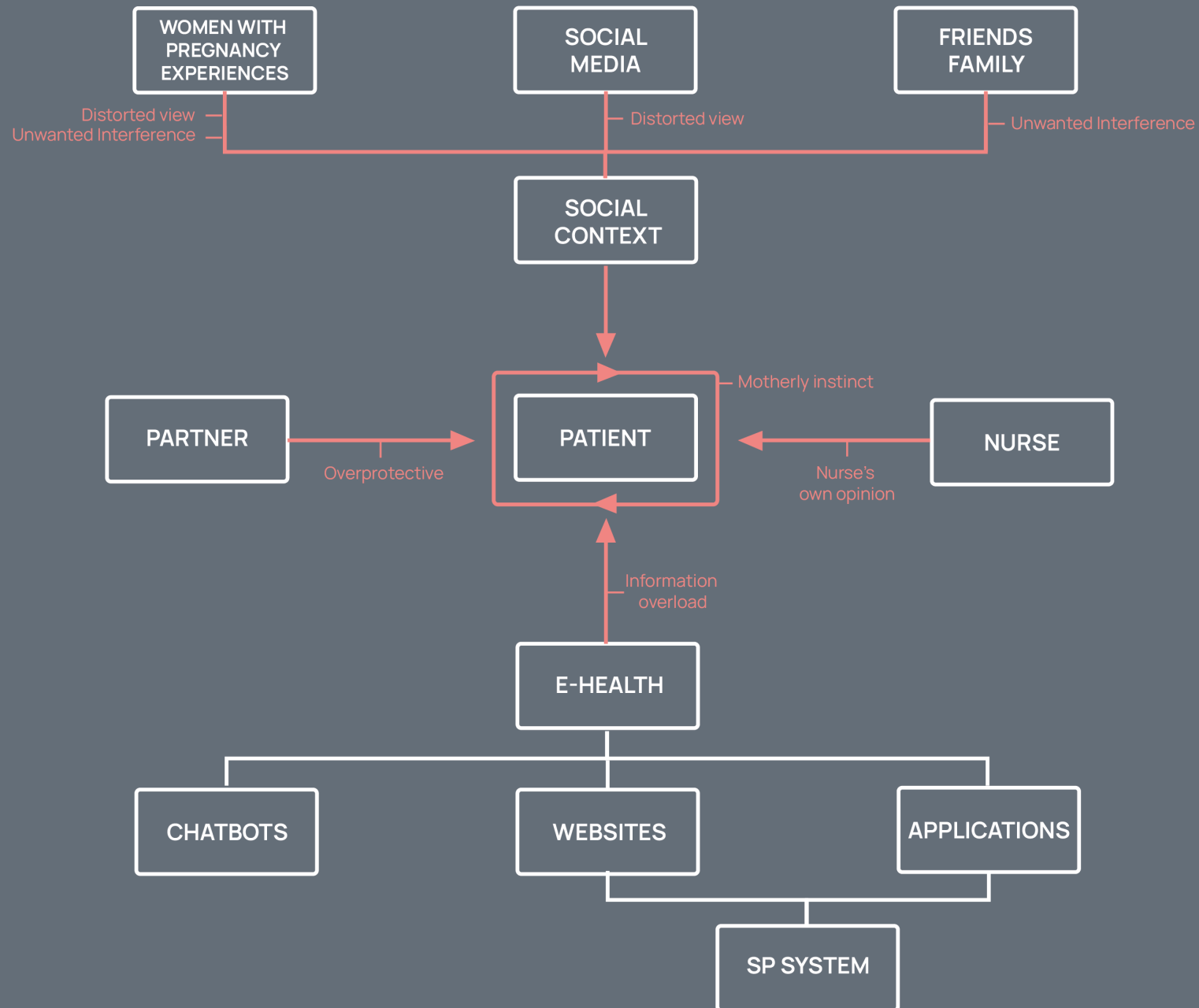
2.2.5. Conclusion

Modern-day e-health on preconception education is widely available. This technology offers the possibility for pregnant women and partners to monitor the pregnancy themselves and be more involved in the process. On the other hand, this e-health creates an abundance of information, leaving both pregnant and partner unsure of what to believe. Besides information from e-health platforms, uncertainties also arise from the social context. Expectant mothers and partners can become uncertain about their own experiences through social media, close ones like family and friends and women with pregnancy experiences. In addition, platforms like instagram can give a distorted picture of pregnancy.

The partner could experience uncertainty, because they do not experience the physical aspect like the pregnant person and have the feeling that they lose control over the pregnancy. As a result, partners may become overprotective to stay in control of the situation.

These uncertainties create the need for a platform in which validated information is provided. By conducting a platform on behalf of a medical institution, nurses can refer to this platform with certainty.

Contextualizing



Contextualizing

2.3. Conclusion of Contextualizing

The OCHP is one of the steps of antenatal care in EMC. The consultation consists of a number of systematic steps to be completed by the nurse using the online platform Smarter Pregnant. Qualitative research and field research have found where opportunities lie for VAs to be implemented in the system. For instance, the shortage of care in the Netherlands and the structural set-up of the consultation belonging to the Smarter Pregnant trajectory are reasons that a VA will be viable.

Moreover, pain points and tensions take place in both the nurse and patient perspective. Based on extensive analysis and the creation of a patient and nurse journey in the OCHP, these tensions were drawn up. These tensions schematically indicate where pain points in the interaction take place and interplay of trust is established. These pain points and tensions are considered opportunities for the implementation of Voice Assistants in the OCHP.

Most of the pain points occur in the use of the system in conjunction with the nurse-patient or partner interaction and the processing of data in the system for EMC. What emerges strongly in the current consultation and use of e-health is the uncertainty of the patient and partner, and the trust the patient and partner have in the nurse. This trust arises through an interplay of expertise and responsibility.

The focus of this study will mainly be on the perception of patients' trust towards nurse, in other words, trust by expertise.

In the field of e-health, there is already enough information on pregnancy, an additional smart device that can only provide information is not desirable for this reason. Furthermore, it can add up to a multitude of info sources undermining patients confidence. This is why the need for an authority and trustworthy source of information in the context of OCHP is high.

Chapter 3. Voice Assistants for healthcare

Smart systems like VAs have the potential to be used to overcome the healthcare shortage. These systems serve to complement the existing system of Smarter Pregnant. To implement this technology, an analysis is done of VAs in general and how in this day VAs are being implemented and researched in healthcare. The second part examines the OCHP, focusing on the opportunities within the consultation to deploy a VA. Finally, initial tests are done to get an impression of how a VA might perform a consultation like the OCHP.

This chapter contains

- A short explanation of VAs
- Current applications of VAs in ehealth
- Review of conducted research about VAs in e-health
- Expert interview
- An overview how a VA might be implemented in OCHP
- Experimental tests with a Google Nest in combination with the dialogue of OCHP

VA for healthcare

3.1. Voice Assistants for Healthcare

3.1.1. How does a Voice Assistant work

A Voice Assistant allows interaction and control of connected devices by voice. Each voice assistant developer applies their own specific methods and approaches to development, which in turn affects the final product. As a result, there is no universal assistant that can perform all tasks equally well.

The set of features an assistant has depends entirely on which area the developer has paid more attention to (Polyakov et al., 2018). All systems are based on Machine-Learning methods. This means that for the creation of these Voice Assistants, a large amount of data was collected from different sources and then trained accordingly. This is why the generated sources of this data play an important role. The amount of information from different sources determines the nature of the assistant. Despite different approaches to learning, different algorithms and techniques, the principle of building such systems remains roughly the same. The main technologies are voice activation, automatic speech recognition, Text-To-Speech, speech biometrics, dialogue manager, natural language understanding and name-entity recognition.

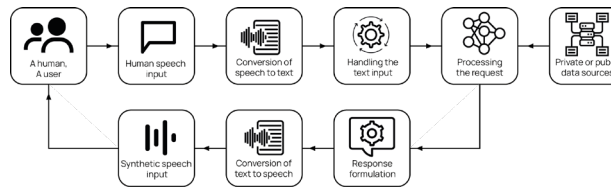


Figure 18. Voice assistant operation, Description: With the help of sensors, the voice assistant captures a number of recognisable words and word combinations (utterances), which in turn are converted from intent to a function.

3.1.2 Current application of voice assistants (in e-health)

Nowadays, research is being conducted on whether Voice Assistants can be used for other purposes within different sectors. In particular, the healthcare sector is mentioned as an emerging market for voice-based technology. More and more use cases are emerging in the context of medicine, diagnosis and therapy where VAs offer promising opportunities in the area of anamnesis¹ (Wienrich et al., 2021). Moreover, the ability to assess data remotely offers solutions to previously mentioned problems such as staff shortages in the Netherlands. It is mainly chatbots that are deployed to collect data on patients. This includes examples that track health data and provide information or monitor symptoms and make diagnosis.

ses. To date, only a few solutions have integrated voice recognition or connection with a voice assistant. Alexa Health Insurance Portability and Accountability Act (HIPAA) provides a set of tools to develop experiences that help users manage health and wellness. The goal is to connect healthcare organisations with customers through voice experiences, using protected health information. In doing so, Alexa can help users establish healthy routines, share information about their services and keep them on track with their health and fitness goals. Although these systems have gained popularity in recent years, functionalities are still in their early stages. The gap between the quality of the voice assistant and the actual use of its functions has to do with, as mentioned earlier, Natural Language Processing.

As speech recognition has become increasingly sophisticated due to increased computing power, large availability of linguistic data, improved Machine Learning (ML) methods and better understanding of human language (Hirschberg and Manning, 2015), users should be able to interact with VAs in a natural and conversational way (Rzepka, 2019). Nevertheless, voice assistant creators have failed to realise this natural interaction. In the remainder of this study, it will become clear why this natural interaction is difficult to realise.

¹ a patient's account of their medical history - Oxford dictionary

VA for healthcare

3.1. Voice Assistants for Healthcare

3.1.3. Previous research of Voice Assistants in E-health

To investigate natural interaction between human and CA, academic research has been conducted in the field of e-health. Studies have been done on physical as well as psychological characteristics of conversation agents.

A Comparison of Avatar-, Video-, and Robot-Mediated Interaction on Users' Trust in Expertise

In the field of embodiment, Pan and Steed (Pan & Steed, 2016) have done the following research to detect how embodiment of a VA affects trustworthiness in advice seeking. They have compared trust formation on three media representations; video, avatar, or robot. Unknown to the participants, one was an expert, and the other was a non-expert. They have observed participants' advice-seeking behavior under risk as an indicator of their trust in the advisor. Most participants preferred seeking advice from the expert, but Pan and Steed also found a tendency for seeking robot or video advice. Avatar advice, in contrast, was more rarely sought. Users' self-reports support these findings. These results suggest that when users make trust assessments, the physical presence of the robot representation might compensate for the lack of identity cues.

The impact of an embodied agent's emotional expressions over multiple interactions

Another work in the field of embodiment is done by Creed (Creed et al., 2015). This is a longitudinal study with an embodied agent to examine the effects of simulated emotion over extended periods of interaction. They present an embodied agent (Rachael) that simulates a health professional and attempts to help people improve their fruit and vegetable consumption. Emotional and unemotional versions of the agent were developed to examine how user perceptions of the agent changed over an intervention period of 49 days and in turn how this influenced fruit and vegetable consumption. Results found that whilst participants consumed more daily portions of fruit and vegetables over the intervention period and reduced their consumption gains post-intervention, there was no significant difference in consumption gains over time between those who interacted with the emotional or unemotional agents. Qualitative feedback, however, highlighted a strong preference for the emotional agent. A novelty effect was also observed where the agents were perceived more positively initially and less so over time.

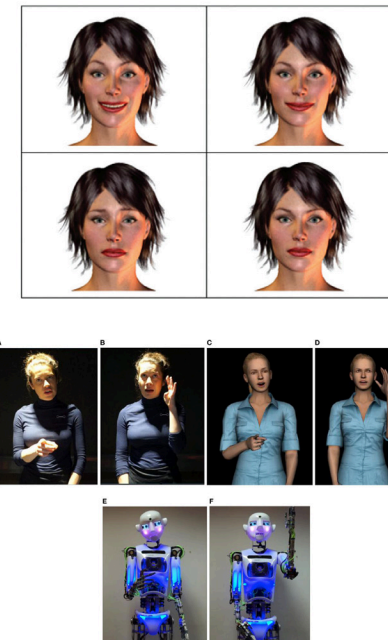


Figure 19. Embodiment of Voice assistants in earlier research
a. Embodied agent Rachael - emotional expressions
b. Avatar, video and robot for trustworthiness in advice seeking

VA for healthcare

3.1. Voice Assistants for Healthcare

An Affectively Aware Virtual Therapist for Depression Counseling

The results from these studies are both dependent on the context for which the VA is designed. In the following research by Ring and Bickmore (Ring & Bickmore, 2016) a highly sensitive context was chosen to test a VA. An affectively-aware virtual therapist was created for depression counselling, whose design is based on theories of emotions in psychotherapy, along with the results of a pilot study exploring the efficacy of this approach. The study demonstrated that it is possible to evoke and respond to a user's emotional state in real time during automated counselling sessions with an effectively aware agent. Although they did not power this study to produce significant changes in depressive symptoms, the majority of users expressed that they felt the agent understood their emotions and responded appropriately.

3.1.4. Expert interview with Minha

To capture the process of such research, an interview was conducted with assistant professor of TU Eindhoven Minha Lee and the work Caring for Vincent. In this study, a self-compassion chatbot (Vincent) was designed and compared in care-giving and care-receiving conditions. Caring-giving Vincent asked participants to participate in self-compassion exercises. Care-receiving Vincent shared his weaknesses, e.g. being embarrassingly late to an IP address, and asked for advice. While self-compassion increased for both conditions, only participants with care-receiving Vincent improved significantly. The study shows that when a person cares for a chatbot, that person's self-compassion may increase (M. Lee et al., 2019). Minha's role in this research was mainly background research, where she wanted to focus on two major topics.

1. How agents and conversations are designed in this day and age:

“I guess I often imagined the identity of things more specifically. With Vincent, it's about things I get annoyed with and the lack of creativity how we designed agents and conversations.”

2. How mental health is thought about in this day and age

“I was also not happy with how we were thinking about mental health.”

To address these two big issues, she wanted to think differently about how something is called a mental health problem. In which she did not want to focus on negative symptoms that prioritise the use of negativity. Instead, she wanted to maintain positivity in what it means to be healthy. Using literature, she delved into compassion and self-compassion and turned these scales into how it might talk. Here, the scale was not created and played as questions like a chatbot, but more as how the items on the scale transform into conversation in a more natural way rather than people having to develop certain forms or be taught about compassion. During the dialogue here, the identity of the avatar should emerge. So making a VA is no longer about the technology behind the voice assistant, but the thinking behind the conversation and the character of the VA. VAs have proven themselves as efficient search engines and implementers of functions, but not yet to the extent that one can derive properties such as trustworthiness from them.

3.1. Voice Assistants for Healthcare

This has everything to do with the designer's thought process while creating the VA's identity. For this reason, the focus for this research will not dwell long on the realisation of a working prototype, but more on the character design of the VA and how it comes across to the target groups.

3.1.6. Conclusion

The capabilities of VAs are constantly expanding. Today, speech is built into all kinds of products, such as smartphones (mobile applications) and smart speakers in households. The healthcare sector in particular is cited as an emerging market for speech-based technology. More and more use cases are emerging in the context of medicine, diagnosis and therapy where voice assistants offer promising opportunities in the area of anamnesis. Moreover, the ability to assess data remotely offers solutions to previously mentioned problems such as staff shortages in the Netherlands. The gap between the quality of the voice assistant and the actual use of its functions has to do with Natural Language Processing (NLP). As speech recognition has become increasingly sophisticated due to increased computing power, large availability of linguistic data, improved Machine Learning (ML) methods and better understanding of human language (Hirschberg and Manning, 2015), users should be able to interact with VAs in a natural

and conversational way (Rzepka, 2019). Nevertheless, makers of voice assistants have failed to realise this natural interaction. To investigate this natural interaction between human and voice assistant, several experimental tests have been conducted with voice assistants in the fields of e-health and healthcare. These will examine why voice agents are designed in the way we design them today and how human characteristics affect human-robot behaviour. In other words, the focus is no longer on the technology behind voice assistants, which have already proven themselves in previous years, but on the personality behind voice assistants and the character traits a designer infuses into them.

VA for healthcare

3.2. Voice Assistants for OCHP

Introduction

Before human attributes are assigned to the Voice Assistant of the Outpatient Clinic Healthy Pregnancy, the usability of VAs in the OCHP is first analysed. Considering that the consultation consists of a dialogue with structural questions. This structural setup makes implementing smart systems like voice assistants feasible. Literature has shown that VAs can formulate structural questions in both discrete and open-ended ways. Using a google mini and voice flow, this discretion and open dialogue of OCHP was tested. This allowed a first impression to be formed of the usefulness of VAs in the consultation.

3.2.1. Opportunities in Health Dialogue Systems for OCHP

Automated health dialogue systems mimic a form of interaction to communicate health information to users in a format that is natural, intuitive and dynamically tailored. Dialogue Systems can tailor messages at a very precise level, constructing each sentence of delivered information based on the user's inferred goals and beliefs at a particular point in time, and including everything said earlier in the conversation (Bickmore & Giorgino, 2004). In some ways, health dialogue systems may even be better than interacting with a human healthcare provider. One problem with face-to-face encounters with

healthcare providers is that all healthcare providers function in a healthcare environment where they can only spend a very limited amount of time with each patient. Time pressure can lead to patients feeling too intimidated to ask questions, or to ask for information to be repeated. Another problem is "fidelity": healthcare providers do not always act perfectly according to recommended guidelines, leading to significant variations in the provision of health information between healthcare providers. Finally, many people simply do not have access to all the health professionals they need, due to financial or scheduling constraints.

3.2.2. Designing a dialogue for the OCHP

The questionnaire completed for the OCHP consists of questions that can be answered using response scales. Results in previous research have shown that participants take longer to complete a questionnaire with a discrete VA than in an open-ended condition. This unexpected finding can partly be explained by the fact that participants have a greater number of 'help', 'repeat' and 'relapse' intentions with discrete answers. Users may have difficulty remembering an answer scale, which may impair cognitive ability, resulting in less attention to the question. This results in remembering the help intention more often. (Maharjan et al., 2021)

Multiple answer options may create more doubt for the user. When the VA does not receive an answer back, it may stop the dialogue. In addition, the answer that participants want to give may not stand as an option among the answers. This requires the user to think more before answering. Thus, one can assume that offering predefined response options does not necessarily lead to a more efficient self-reporting experience for Voice Assistant users. If this feature is not properly designed, it may delay users' decision-making, lead to higher error rates and take more time to complete the task (Maharjan et al., 2021).

At the same time, the same analysis shows that a discrete VA design was perceived as significantly more liveable than that of the open VA. Unlike the discrete VA, the open VA did not offer precise questionnaire response options. This may have proved unexpected for some users and also led to uncertainty about what to say and whether they were using the right terms (Maharjan et al., 2021).

As mentioned earlier in the context analysis, pregnant women, or patients with a pregnancy wish, face a number of uncertainties during pregnancy. The need for a reliable source that conveys expertise is high in this regard.

VA for healthcare

3.2. Voice Assistants for OCHP

On the one hand, giving open answers to questions can give the feeling that one can really say everything during the dialogue with the VA. This might have a positive effect on the usability of the VA. On the other hand, the function of open question and answer can cause more errors to occur in the dialogue, creating uncertainties in the interaction for both patient and partner, and nurse who has to record the data.

3.2.3. Experimental dialogues with Voice Assistants based on OCHP

To get an idea of the functionalities and usability of Voice Assistants so far, dialogues were conducted with a Google Assistant. The option to walk along with the consultation hour made it possible to mimic the dialogue of the OCHP. A snippet of the consultation was set up using the tool; VoiceFlow. These conversations could be transferred on a Google Nest using Google Assistant. Both open-ended and closed-ended questions were incorporated in the conversation. (Appendix D)

Demographics: all three participants were Dutch, female and in the age range of 20 to 30 years. They all had experience with other Voice Assistants like Siri or Alexa.

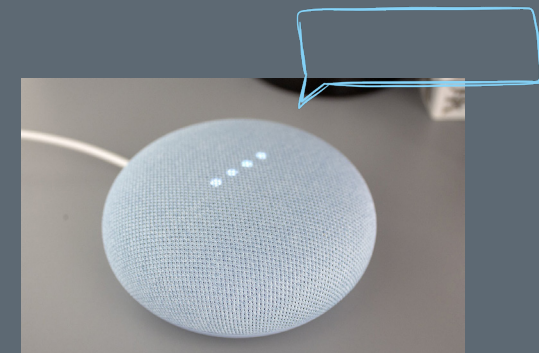


Figure 20. Google Nest - mini

VA for healthcare

3.2. Voice Assistants for OCHP

Script :Conversation for first impression

Google: I would like to talk to you about smoking, is that okay with you?

Participant: Yes

Google: Did you smoke during pregnancy

Participant: Yes, I have.

Google: Where do you smoke?

Participant: At a party.

Google: Can you tell me why you smoke?

Participant: Because I experience a lot of stress.

Google: Is there a lot of smoking in your child's environment?

Participant: I don't know, that could be.

Google: Second-hand smoke is very bad for your child's health. I quote "second-hand smoke can worsen the child's health by 50%, making cardiovascular disease more likely to occur."

exits with sound

If Google Assistant does not understand the user, "it" will add a sentence to the conversation themselves.

Voice Assistant's voice is automatically set to female

Other functions can be triggered during the dialogue such as putting on music or look up terms in the search engine.

Table 1. Results: Researcher first impression

The voice of the GA sounds like the voice of VAs like Siri and Alexa,. This reminds the user of previous experiences they have had with VAs.

Participants believe in the technology if it will also be used more by other users.

Participants assume that if a VA is embroiled in a system and more experienced with interacting with a VA, people are more willing to trust the agent.

Participants mainly see potential in functional aspects of a VA such as looking up guidelines about food.

When the VA does not function, it is immediately considered amateurish

Participants find it strange to use a product developed by Google for a dialogue about health. This made them doubt the trustworthiness of the system and what would happen with their data

Table 2. Results: Participants first impression

VA for healthcare

3.2. Voice Assistants for OCHP

Example dialogue first impression:

Google: I would like to talk to you about smoking, is that okay with you?

Participant: Yes

Google: Did you smoke during pregnancy

Participant: Yes

Google: Where do you smoke?

Participant: Outside

Google: Can you tell me why you smoke?

Participant: I like it

Google: Is there a lot of smoking in your child's environment?

Participant: No

Google: On a scale of 0-10, how badly would you like to quit?

Participant: 10

Google: How likely do you think it is that you will succeed on a scale of 0-10?

Participant: 10

A scale in this example only makes the interaction less-human like and more static
Participants believe that scales are not the way Voice Assistants will communicate in the future.
Scales are efficient for short and minimal questions, not for deep conversations.

Table 3. Results for open-ended and closed questions

3.2.4. Conclusion experimental tests with Google Nest

These brief experimental studies show that the use of a Google Nest influences the perception of the VA. First, certain design choices by the creators of Google nest influence the interaction;

That the voice is set to female by default was noticed by the researcher and no comment was made on this by the participants. However, the participants did note that the female voice reminded them of previously used VAs like Siri. If they have had a bad experience with previously used VAs, this affected the test results.

For successive tests, it is important that participants do not start making links with VA and large cooperatives developing VAs. Indeed, due to the healthcare context, using an existing VA, for example designed

by Google, is not appropriate. Confidential information is passed on, with participants unable to make the link between health information and the large cooperative Google.

The Voice Assistant was generally considered amateurish and not yet good-working. However, participants do believe this will change in the future. Once the Voice Assistant is engaged in our daily lives, we will also be willing to trust it. For now, the interaction remains mainly functional.

VA for healthcare

3.2. Voice Assistants for OCHP

3.2.5. Conclusion

The possibilities of using voice assistants for OCHP are in line with the findings earlier in chapter 2. For example, the systematic setup can be adopted by a VA, which not only ensures better continuity within the healthcare system, but also makes the consultation more accessible. To decide how a system like a VA should ask questions to patients, open-ended and discrete dialogues were programmed in VoiceFlow in combination with Google Mini. In addition, the first impression of a voice agent for healthcare could be measured. This first impression showed that previous experiences with Voice Agents influenced the new interaction. For all participants, talking to the Google Mini did not feel like a first impression, because they had used it before for other actions. In addition, they found the link between Google and the context of healthcare uncomfortable. As a result, they doubted the trustworthiness of the system.

This fact greatly affects this study, as it means that tests cannot be conducted with an existing voice assistant, whether in voice or aesthetic.

3.3. Conclusion

Designing VAs not only consists of designing answers and questions, but also the way questions and answers are formulated and the thought behind them. The current view of VAs is highly functional, with users imagining that the bot can perform functional tasks like advising on nutrition and lifestyle. This is a promising finding since the purpose of the OCHP is to inform patients.

However, the personality of the VA has a great influence on Human Computer Interaction. This thesis focuses on making the conversation between VA and patient more than just a functional conversation with standard answers. The results of chapter 2 have led to aspects that are valuable for designing the VAs personality; building trustworthiness by using expertise and responsibility. By conducting an initial experimental test with a small group of participants, the first impression of VAs for OCHP could be captured. Here, it was emphasised that previous experience and the maker of the VA, in this case Google and the Google Mini, have a lot of influence on trust perception. This moves us to the next chapter, which focuses on measuring trust and trustworthiness and factors of VA, patient, nurse and institute EMC that might affect trustworthiness.

“What does Google want with my pregnancy-data?”

Participant in experimental test with Google Nest for Healthcare

Chapter 4. Trustworthy Voice Assistant

The impact of VAs in healthcare will bring unintended consequences. The effects of implementing information technology in a complex socio-technical system such as healthcare can never be fully predicted and may lead to patient safety issues (Laranjo et al., 2018). The data disclosed here are more personal and sensitive, placing higher demands on the security and trustworthiness of the system. This leads to the need for research to focus not only on technological improvements to the system, its security or corresponding algorithms, but also on patients' perceptions of the system and their willingness to converse in a health-related context (Wienrich et al., 2021). This raises the question in the area of human-computer interaction what characteristics and factors influence patients' perceived trustworthiness towards the technological counterpart they converse with.

This chapter contains

- Trust and trustworthiness in OHCP
- The dimensions of trustworthiness
- Stakeholders of OCHP and trustworthiness
- A critical view on VAs for OCHP
- A critical view on assigning anthropomorphic features

Trustworthy VA

4.1. Trustworthiness

The goal of this research is to measure the trustworthiness and the willingness to trust between user and conversational agent during OCHP. For a point of reference existing models of trust and trustworthiness were analysed. By linking these models to the context of the OCHP, properties of the voice assistant can be defined that will influence trustworthiness.

4.1.1. Trust and trustworthiness in OCHP

The aim of this research is to design a Voice Assistant that is perceived as trustworthy. Trust is important when using VA in official application areas with sensitive data. In the case of the OCHP, patients will reveal personal, sensitive information to the voice-activated systems. For this reason, it is important to trust the VA (Wienrich et al., 2021). In addition, trust in digital systems is an essential prerequisite for long-term adoption (Braun et al., 2019). In the context of the study, interpersonal trust in Artificial Intelligence, trust can be defined into 3 different types of trust: rational trust, affective trust and normative trust (Ryan, 2020). The definition of interpersonal trust (A trusts B) is described with the following characteristics (Table 4).

The nurse, patient with pregnancy wish or expecting, partner and the institute Erasmus MC both step into the role of trustor and party trusted. The trust

judgments of the different groups in the context are expected to inspire action. Distrust, for example, can lead to guarding and monitoring a relationship, uncooperative behaviour or relationship breakdown. (Levi & Stoker, 2000).

I. A has confidence in B to do X
II. A believes in B is competent to do X
III. A is vulnerable to B's actions.
IV. If B does not do X, A may feel betrayed
V. A thinks B will do X, motivated by one of the following reasons; I. Their motivation does not matter (rational trust) II. B's actions are based on a benevolence towards A (affective trust) III. B has a normative commitment to the relationship with A (normative trust)

Table 4. Interplay of trust (Ryan,2020)

Trust is established when interacting over a long period of time. This study focuses on the first interaction between patient and voice assistant, therefore the choice has been made to focus on trustworthiness. Although the definition of trust and trustworthiness are very similar, they should not be mixed up during the design process. Indeed, a trusted person, even if trust is not actually required, can be trustworthy.

4.1.2. Trustworthiness in the context of OCHP

The dimensions of trustworthiness are leading for the interaction and thus the design of the Voice Assistant. There are three layers that are considered when creating the Voice Assistant for the OCHP; the user, the context and the technology. However, to build trustworthiness and adoption of technology, there are more factors to consider. Initial user trust is influenced by institutional trust (based on company reputation), personal factors and predispositions (such as propensity to trust, prior knowledge/ experience, personality type and technology adoption), and agent characteristics (aesthetics, anthropomorphic cues). These factors influence pre-trust (and expected experience) regardless of the situational context. (Guiot, 2020)

Trustworthy VA

4.1. Trustworthiness

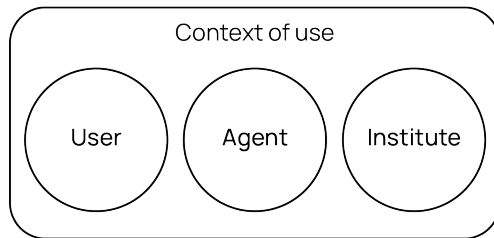


Figure 21: Context of use: User, agent and institute

User factors

Users can include both patients and health care providers of the OCHP. Each patient's tendency to trust is different. Users will each have their own experiences of using conversational agents such as voice assistants. This experience can have a positive or negative impact on future use. The user's personality may also have an influence. For instance, someone may like to be in control. In such a case, voice assistants can be a negative user experience, as they can come across as less predictable. Finally the openness towards technology influences the attitude towards the VA.

Agent factors

The appearance and anthropomorphic aspects of the conversational agent influence the first interaction and associated trustworthiness. Designing human-like agents is a strategy to encourage people's trustworthiness and use of technology. We might ask ourselves whether a VA needs to be human-like to use them.

Designing for anthropomorphism can have positive effects with patients. People find agents with anthropomorphic features more fun and familiar. Verbal anthropomorphic traits (gender/voice intonation) and psychological anthropomorphic traits of autonomy, sociality and personality are found to be efficient in creating more trustworthy VAs (Guiot, 2020).

Whether anthropomorphic cues have a positive effect on trust intentions and behaviour depends on the context and what kind of actions the agent has to perform. Users tend to perceive embodied agents with anthropomorphic features as useful and aesthetically pleasing even before the interaction (Guiot, 2020). To analyse how "anthropomorphic" VAs are perceived, a deeper analysis of the phenomenon is done in Chapter 5.

Although incorporating anthropomorphic features may sound as a highly positive phenomenon, there are also negative consequences that can arise from anthropomorphic features. A deeper analysis of these negative consequences is done in chapter 4.2.

Institute factors

An important link between brand reputation and perceived ease of use is that brand reputation lowers psychological barriers to technology adoption and has an effect on perceptions of self-efficacy (Morgan-Thomas & Veloutsou, 2013). An institution like EMC has a reputation as an academic institution. Patients tend to trust a healthcare institution like Erasmus because of this reputation. This may increase the tendency to trust technologies tested within the Erasmus institute more.

Trustworthy VA

4.1. Trustworthiness

4.1.3. Voice Assistant's perceived trustworthiness in OCHP

As mentioned in Chapter 2, trustworthiness is established in two ways in the context of OCHP; taking responsibility by the patient and sharing expertise by the nurse. Expertise, or mentioned in Mayer's model as competence or ability, is frequently used as a dimension to measure trustworthiness. Competence is the perception that the subject builds based on others perception of technical ability, assessing his body of knowledge and professional profile in a specific field. If the perceived competence built over the other is high in a given area the subject is more likely to trust him (Ferreira-Oliveira, 2014). Besides expertise, benevolence and integrity are taken as measures of trustworthiness. The perceived trustworthiness of drivers increases with increasing perceived ability, benevolence or integrity.

Ability

Competency is shaped by the trustworthiness of nurse to patient. The EMC institute carries a reputation as an academic hospital. This provides a role of expertise to the nurse. This reputation gives the patient the motivator to perceive the nurse as trustworthy. Therefore, to establish the same interaction between Voice Assistant and patient, it is important that the same expertise is emitted.

Character;

Nurse to patient: Benevolence is related to attitude, both from nurse to patient and vice versa. In this context, it is assumed that the nurse will always be benevolent. In terms of integrity, a nurse can hold to norms and values. As mentioned earlier, adherence to norms and values can negatively affect the patient as well. When the nurse interferes too much with their own beliefs in the consultation, it can lead to conflicts.

Patient to nurse: In the context of OCHP, the role of the patient is to be cooperative in terms of providing data. This allows the nurse to do the consultation in an adequate manner. Integrity in this context means that the patient will be truthful to the nurse. This truthfulness is crucial for the data the nurse will record. Therefore, integrity and helpfulness are important for the nurse's ability to give the right advice and make the OCHP successful.

Perceived Ease of use and Usefulness

Besides factors arising from the context analysis of this study, there are standard factors that influence acceptance of technology. These factors are derived from the Technology Acceptance Model (TAM). The TAM assumes a mediating role of two variables called perceived ease of use and perceived usefulness in a complex relationship between system characteristics (external variables) and potential system use (Marangunic & Granic, 2015).

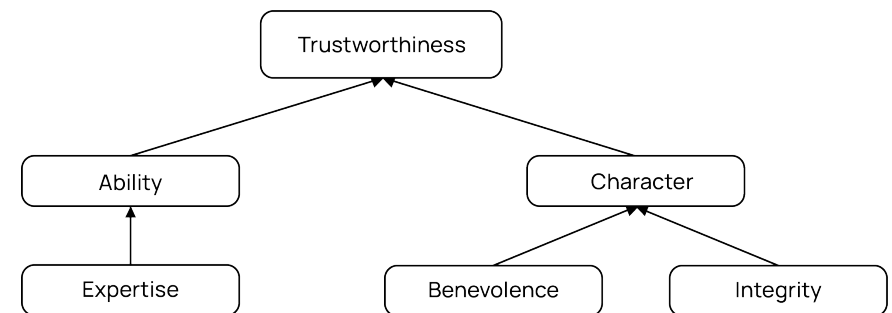


Figure 22: Mayer's model in combination with Covey's trust matrix

Trustworthy VA

4.1. Trustworthiness

4.1.4. conclusion

The aim of this research is to design a VA that is perceived as trustworthy. Trust is important when using VA in official application areas with sensitive data (Wienrich et al., 2021) and an essential prerequisite for long-term adoption (Braun et al., 2019). The dimensions of trustworthiness are leading for the interaction and thus the design of the VA. There are three layers that are considered when creating the VA for the OCHP; the user, the context and the technology. However, to build trust and adoption of technology, there are more factors to consider. Initial user trust is influenced by institutional trust (based on company reputation), personal factors and predispositions (such as propensity to trust, prior knowledge/experience, personality type and technology adoption), and agent characteristics (aesthetics, anthropomorphic cues). These factors influence pre-trust (and expected experience) regardless of the situational context (Guiot, 2020).

For this study, we focus on interpersonal trust where an interplay of trust occurs in the context of the EMC between nurse and patients. To integrate a voice assistant into this interaction, a brief encounter between patient and VA will take place. This brief encounter will not lead to a bond of trust, but it does reflect how trustworthiness is perceived by the voice assistant. Trustworthiness is created in the current OCHP interaction between nurse and patient through

expertise and responsibility. Expertise is used in Mayer's model as a dimension to measure trustworthiness. This is why this model is also applied in this study in combination with the other two dimensions; helpfulness and integrity. Besides trustworthiness factors derived from the contextual analysis and Mayer's model, factors from the TAM are used.

By combining all these elements, we get the following dynamic:

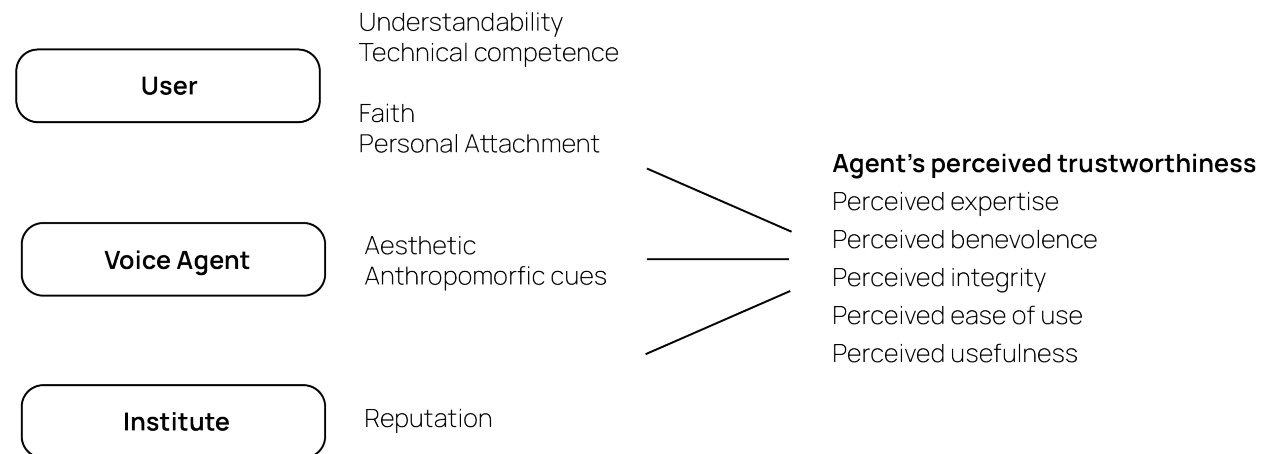


Figure 23: Schema of elements influencing trustworthiness

Trustworthy VA

4.2. Critical view

In order to derive anthropomorphic properties to a voice assistant, it is important for the designer to be aware of the consequences that these properties may entail. As mentioned earlier, trustworthiness depends not only on fixed dimensions but also contextual factors based on user characteristics. Each user will respond in his or her own way to design choices based on personal experiences and personality. This chapter discusses design decisions and contextual factors that could influence the user experience and trustworthiness negatively.

4.2.1. Overestimating skills and trustworthiness

Research findings have shown that interaction quality is an important quality factor that instils trust in users, which in turn leads users to use the voice assistant (Lee et al., 2021). Interaction quality increases as the previously mentioned dimensions of trust; perceived competence, benevolence or integrity increase. Expectations users have with conversational agents can influence these dimensions.

Uncanny Valley

Users' expectations of voice assistants have increased over the years with advances in speech technology, resulting in longer and more natural-sounding queries. Giving anthropomorphic features that in turn affect interaction quality are related to

Masahiro Mori's theory, Uncanny valley. This theory argues that people are uncomfortable with human-like robots and avatars. His research analyses how feelings of familiarity and pleasantness can be elicited by anthropomorphic robots up to a certain point. This point is where the robot becomes too human, making the interaction unpleasant. The theory is described in the following figure:

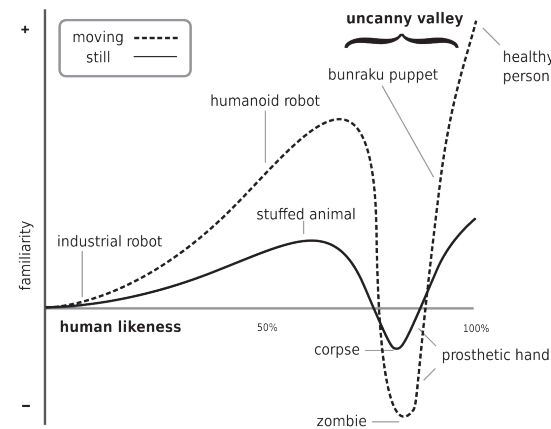


Figure 24: The first rising line indicates that anthropomorphic robots go hand in hand with a positive emotional response, until the point where the similarity is too great. This similarity causes a drop in familiarity, to a point that causes the user to feel repulsed and disturbed, the so-called uncanny valley.

However, research shows that a large proportion of participants prefer VAs with a natural tone, even though this goes against the principle of uncanny valley (Romportl, 2014). Indeed, anthropomorphism can have a positive impact on the interaction between humans and voice assistants: anthropomorphism improves initial trust perception and increases the acceptance of robots as team partners. It is seen as easier to communicate with, leading to higher familiarity, and supports the perception of predictable and understandable robot behaviour.

As a result of these anthropomorphic properties, when the voice assistant cannot meet the user's expectations, dissatisfaction with its use arises. This can lead to changes in user attitudes. An example of this is that the user begins to think of the voice assistant as a toddler, requiring sentences to be repeated slowly and clearly.

In short, giving a VA anthropomorphic features and interaction can increase usability. On the other hand, such high expectations can make people less forgiving when the system makes a mistake - users can quickly lose confidence if the assistant does not meet those expectations. Even worse, users may never try similar tasks again once confidence is lost. Therefore, it is important that VAs reliably support exploratory search to maintain trustworthiness.

Trustworthy VA

4.2. Critical view

4.2.2. Gender stereotyping and trustworthiness

Most VAs are exclusively female or by default female. While this design choice may seem innocuous at first glance, it can be seen as gender stereotyping. VAs are assigned traits such as serving and caring. Linking a female voice to these traits, leads to the idea that women are automatically servant and caring and men less so.

Human preference regarding the gender of the voice is a debatable issue. Studies suggest that people prefer male voices with a low pitch. However, here, the voice of the opposite sex or male voices are preferred for authoritative statements and female voices for helpful statements. (Pierantoni, 2019). An experiment by Lee in 2020 showed that participants rated a computer with a male voice as more socially attractive and trustworthy than a computer with a female voice. This led them to follow the suggestions of the computer with a male voice more in social dilemma situations. An experiment by Alexander and colleagues, solving puzzles with a puppet robot whose gender was manipulated by its voice and name, showed that participants felt more comfortable with the robot of their opposite sex compared to the robot that corresponded to their own sex (Alexander et al., 2014). This shows that not only does gender matter, but that users' gender and similarity can also have an impact on the level of trust in VAs. Gender-ambiguous voices

are a promising research direction for VA design, to pursue more inclusive design. Overall, gender ambiguous voices were perceived as organised, confidential, cooperative and polite, as were gender voices. This seems to be an encouraging first result for the use of gender ambiguous voices in VAs. More research is needed on different contexts and different pitches to confirm that gender-ambiguous voices do not negatively affect trust compared to gendered voices (Tolmeijer et al., 2021). However, there is currently a lack of tools that generate these voices and why this technology could not be used for this project.

Previous research has shown that therapy is often more effective with female therapists and of the same age as the clients (Bickmore, 2003). For this reason, it is likely that the agent in this research will be represented by a female voice in the age group of thirties. As this is the age group most prevalent in the OCHP.

4.2.3. Bias and AI

The increasing use of artificial intelligence in sensitive areas such as recruitment, criminal justice and healthcare has sparked a debate on bias and fairness (Silberg & Manyika, 2019). A feature of AI systems like a Voice Assistant is that its prediction and decision-making ability depends on data from which the system can learn, the trained data. This has implications for trustworthy AI. Building on the idea of

continuous trust, which states that trust levels can change over time, a chain of trust in machine learning (ML) needs to be built. Here, the trustworthiness of ML systems should be considered throughout the product life cycle. Bias can arise at any stage of the ML lifecycle, and is not just a problem of non-representative training data, as is often thought. Composite decisions in ML systems can lead to unequal outcomes even if individual decisions are fair (Suresh & Guttag, 2021)

These findings mean that if EMC wants to implement a Voice Assistant in consulting, they need to constantly check what training data has been entered and created by the ML system itself. This will reduce the risk of bias.

4.2.4. Cultural bias and trustworthiness

Dutch society is becoming more diverse. This is accompanied by a sharp increase in the proportion of women from ethnic minorities among pregnant women in the Netherlands (Heering, 2012). During the OCHP, interaction with different ethnic groups will take place. Here, it is important that each group will be understood in the same way by the conversational agent, regardless of ethnicity.

Trustworthy VA

4.2. Critical view

Moreover, the appearance and tone of voice of the VA should be pleasant for all patients. Research has shown that respondents' perceptions were influenced by their ethnic stereotypes: Asian participants found the Asian avatar more attractive, trustworthy, intelligent and persuasive; Caucasian participants preferred the Caucasian avatar. Similarly, research found that individuals were more persuaded by computer agents with an ethnicity similar to their own; individuals who received recommendations from computer agents they thought were of the same ethnicity were more likely to change their ranking based on the computer agent's feedback (Pratt et al., 2007).

4.2.5. Privacy and trustworthiness

Privacy and trust are negatively correlated and their relationship can often lead to different responses; for example, trust promotes positive outcomes such as relational behaviour and long-term adoption (Braun et al., 2019). Trust is key in achieving a strong bond between patient and Voice Assistant and the willingness to share information and allow the conversation to continue.

Contextual privacy is violated when VAs collect and upload data for processing without the user's knowledge (Pal et al., 2020). This may involve weighing up when the voice assistant may be on and the extent to which patients have a say in what data is and is

not passed on to the nurse and the institution. The ultimate goal is that the VA can be used at home to perform the consultation. Here, boundaries need to be set when the VA listens and can respond. Is that only when the patient engages on the SP platform or is the VA allowed to listen in constantly to answer patient and partner questions and collect data at any time?

To improve the voice assistant in the future, constantly making adjustments is important. Developers of VA will therefore want to constantly collect data to arrive at an optimal design. Data sharing privacy has to do with collecting more that is necessary and agreed upon to improve technology. To gain understanding for collecting more data, it is important to handle the collected data carefully and transparently and to include the patient in the process. Data sharing privacy is related to recording data such as locati-

on and sharing with third parties that the patient knows nothing about.

EMC is experienced in recording data and using it for research. They are known as an academic institution so confidence in securing data will be higher. Nevertheless, these values should not be lost sight of when developing the VA. We are dealing here with a new technology that uses larger data networks. For this reason, extra care must be taken with patients' data.

With the rise of IoT, the multitude of services it offers has opened up new challenges for government and governing bodies. Such as, in many cases, these "external environmental entities" keep the data of all users, not only for national security purposes, but also for improving services to citizens. As an end-user, this is a gross invasion of privacy. Whether this is good or bad is a matter of debate and is referred to as environmental privacy.

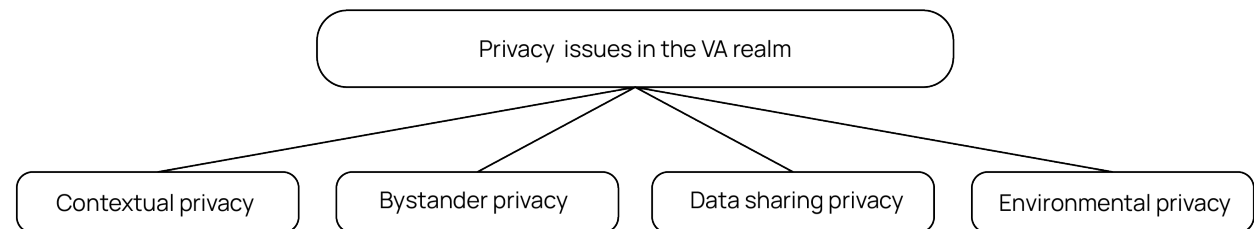


Figure 25: A privacy taxonomy in the VA realm (Pal et al., 2020)

Trustworthy VA

4.2. Critical view

4.2.6. Conclusion

This section has identified a number of the pitfalls that may occur during and after the development of VAs for OCHP. Choices such as giving a gender or human-like sound affect interaction quality and trustworthiness. The next chapter experiments with assigning anthropomorphic features to VAs. During this design process, choices will be made with a critical eye to avoid the associated “pitfalls” of anthropomorphism. Besides anthropomorphic design choices, a critical eye is cast on the data that needs to be processed in the VA for the context of OCHP. Here the focus was laid on the variation in cultural groups, Dutch society is becoming more diverse. This is accompanied by a sharp increase in the proportion of women from ethnic minorities among pregnant women in the Netherlands (Heering, 2012). During the OCHP, interaction with different ethnic groups will take place. Here, it is important that each group will be understood in the same way by the conversational agent, regardless of ethnicity. Lastly, attention is given to the manner in which data will be recorded and processed. Here, it is important that in the given context, attention will be paid to how EMC deals with the new systems of VA and how data of patients is passed on by this VA to health workers.

4.3. Conclusion

The aim of this research is to design a VA that is perceived as trustworthy. Trust is important when using VA in official application areas with sensitive data (Wienrich et al., 2021) and an essential prerequisite for long-term adoption (Braun et al., 2019). The dimensions of trustworthiness guide the interaction and thus the design of the Voice Assistant; expertise, benevolence and integrity. In addition, three layers are considered when creating the Voice Assistant for the OCHP; the user, the context and the technology. For this study, a focus is placed on interpersonal trust where an interplay of trustworthiness occurs in the context of the EMC between nurse and patients. In addition to trust factors derived from contextual analysis and Mayer's model, factors from the TAM are used. Combining all these elements creates a dynamic of stakeholder groups and associated factors that influence trustworthiness. These factors will be used as guides for the user research that will take place in Chapter 5. By identifying pitfalls that may occur during the development of VAs, we can anticipate the pitfalls that may occur during the experimentation with prototypes in Chapter 5.

Chapter 5. Explorative prototyping

The purpose of experimental prototypes and tests is to make the final design choices for the test prototype. The trustworthiness factors found in chapter 4 are leading for the experiments. This involved creating prototypes with different anthropomorphic characteristics and levels of competence. Earlier experimental studies showed that for testing using the Google Mini should be avoided, as this in turn would affect trustworthiness. Therefore, experiments were conducted with the embodiment of the VA. At the end of the chapter, an overview will be given of all the results of the experimental tests, which will lead to the final test prototype for the OCHP.

This chapter contains

- Dialogue design - male versus female sound
- Dialogue design - references
- Dialogue design - recorded voice
- Embodiment - generative session
- Embodiment - abstract to human-likeness

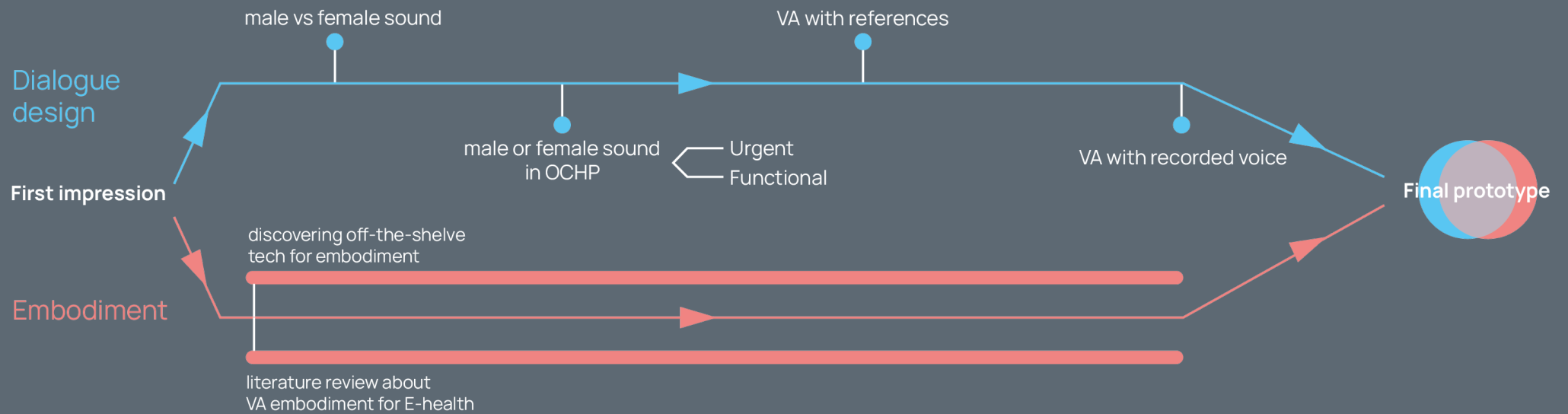


Figure 26. Timeline experimental prototyping through-out this research

Explorative prototyping

5.1 The dialogue

This section will discuss the various experiments conducted on the dialogue and characteristics of the VA's voice. First, a small reflection will be conducted on the previous experiments run in Chapter 3 and how to build on these in the following experiments. Next, a basal approach to testing male and female voices for the OCHP will be done. Following this, a distinction could be made between high urgency calls or functional calls. Subsequent tests were conducted with references, again testing both male and female voices. Here, references specifically to EMC were used, to see how EMC's reputation affects participants. Finally, tests were conducted with a recorded voice. An overview of the various experimental tests can be found in figure 24.

5.1.1. Reflection on earlier experimental tests in chapter

The short experimental studies from Chapter 3 showed that using a Google Nest affects the perception of the VA. Participants noted that the female voice reminded them of previously used VAs like Siri. If they had had a bad experience with previously used VAs, this affected the test results. For successive tests, it was therefore important not to let participants make links with VA and large cooperatives developing VAs. For this reason, it was chosen to use VoiceFlow's voices for sequential testing. VoiceFlow's voices are both male (2) and female (3).

The Voice Assistant was generally considered amateurish and not yet good-working. For this reason, a script had to be prepared for each experiment, with a predetermined set of what the test participant was expected to say. Only this enabled the maximum capacity of the VA to be used.

5.1.2. Male or female voice?

Previous studies were reviewed on VAs for healthcare to choose a male or female voice for the VA for OCHP. Earlier research from Bickmore has demonstrated that therapy is often more effective with female therapists and therapists of the same age as the clients (Bickmore, 2003). From this, the design choice may be to give the VA for OCHP an age of around 30, as this is expected to be the average age of the user group. To match the voice to this embodiment of the VA, a female voice corresponding to this estimated age will be able to be used. This method was also used in previous research by Creed (2014) and the embodiment of VAs for health advice. To confirm that this method is useful, several experimental studies were done with different male and female voices and a recorded voice.

The VoiceFlow voices, 2 male and 3 female, were used for the experiments. Using these voices, dialogues could be built in VoiceFlow that could be played back on the Google Nest. The Google Nest was kept in the

interaction as it enabled the technology needed for dialogue. To prevent the participant from making unwanted links between OCHP and Google, information was given beforehand about the function of the tests and who the interested groups in the interaction are.

Intonation

The standard voices, made for the Google Nest, from VoiceFlow have different intonations. In order to test participants' preferences, sentences were played from the OCHP with the different voices. After this, participants gave their voice preference. The tests were done with 10 people.

Voices	Preference
A (F)	0
B (M)	2 (1 f, 1 m)
C (M)	0
D (F)	5 (3 f, 2 m)
E (F)	3 (2 f, 1 m)

Table 5. Results preference male or female voice

Explorative prototyping

5.1. Dialogue

Voice A: “Definitely not”

This female voice was perceived as “scary”, “cold” and robot-like. Almost as if she is aggressive or does not want to help you.

Voice B: “It is not what I am used to”

This male voice was perceived as refreshing. The intonation was nice, but for the given context the participants prefer a female voice.

Voice C: “Horrible”

This male voice was perceived as robot-like and scary. The voice is also “too low” for the context of health-care.

Voice D: “Soft” “Reminds of google translate”

This female voice was perceived as soft and with good intonation. The voice reminded one of the participants of Google Translate, which also made it more robot-like. It does come across as a robotic person, but it is pleasant.

Voice E: “Fast and therefore more human-like”

This female voice was perceived as human-like, yet participants did not like the intonation in which the pitch of the voice got higher at the end of the sentence. This scared them and made the voice less fitting for the context of healthcare.

Urgency or functional

For the urgent and functional conversation, one conversation was designed in VoiceFlow in which severe symptoms worked as intents to be referred to an expert. This allowed participants to go through both the urgent and functional dialogue (figure 26).

The results in table 6 show the participants' opinions on the male and female voice assistant. Due to a programming error, the voice skipped from male to female several times during the interaction. Voice skipping affected the user experience.

This experimental test was conducted with three women in the age group of 20-30 years.

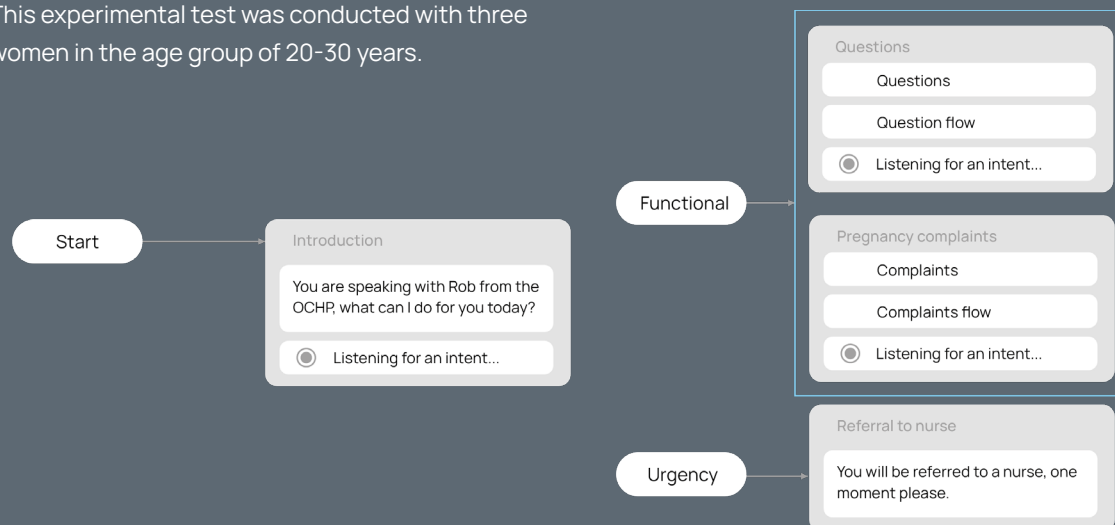


Figure 27. Set-up Voice-flow: urgency and functional

Explorative prototyping

5.1 The dialogue

Female	Male	Mixed
P2. "I want a woman, softer and more caring. I would have with pregnancy that a man doesn't understand, I would already have friction with that."	P1. "The male one was better. I think because most voice assistants I know are female and this is just a bit different."	P2. "Funny how voice skips to woman. This really makes me feel like it's not a human being."
P1. "Yes if the choice is yours I would choose a woman. Although men are often purely clinical"	P3. "Maybe men have more admiration for the female body and how pregnancy works?"	P1. "I also found the woman's voice really annoying."
		P3. "It really doesn't matter to me, as long as I have a click or trust."

Table 6. Results urgency and functional conversation

The three participants of the test were female; so in the dynamics of conversation between the women after the tests, this female perspective on pregnancy was reinforced. One of the participants (P1) had the expectation that men do not understand pregnancy. As a result, she thinks friction will arise when a VA is male. On the other hand, a participant (P3) notes that this lack of knowledge can also lead to admiration. P2 adds that she thinks men are more clinical. She weighed this clinical attitude against the caring attitude of a woman. This caring attitude was preferred by participant 1.

Alternating between a male and female voice had a negative impact on participant 2's experience. This alternation confirmed for her that she was not talking to a human-like being. By alternating the male voice with the female voice, the female voice was more

likely to be perceived as irritating. Interesting was the last addition of participant 3. She did not have a strong preference for a male or female voice. She was concerned with building a bond of trust with the voice assistant. This finding confirms previous research that building trustworthiness depends not only on concrete design choices but also personal preferences and experiences.

5.1.3. Referencing Voice Assistant

A 1-minute dialogue was prepared for the referencing VA with a reference to a nurse of Erasmus MC. Here the choice was made to include one reference in the dialogue. Again, testing was done with the three participants from the previous test. For this test, both female and male voice were tested.

Script referencing voice

Google: I would like to talk to you about smoking, is that okay with you?

Participant: yes

Google: Do you currently smoke?

Participant: No

Google: Is there smoking in your environment?

Participant: Only at parties

Google: Do you know the consequences of smoking in your environment?

Participant: No

Google: According to your nurse Melek, second-hand smoke is very bad for your child's health. I quote "second-hand smoke can worsen the child's health by 50%, making cardiovascular disease more likely to occur."

exits with sound

Explorative prototyping

5.1. Dialogue

Participants experience too many references as overwhelming. As a result, the VA no longer comes across as serving, which reduces the usability.
Participants liked the experience of referring to a n expert, such as a nursing specialist. A requirement for this is that the VA should clearly describe which nurse is being referred and that it is truly a quote and not made up by the VA to come across as an expert.
Participants experience a VA with too many references as a "know-it-all". This led in the experimental tests to rude behaviour.

Table 7: Results referencing VA

5.1.4. Voice Assistant with recorded voice

To incorporate anthropomorphic features into the dialogue with a VA, several recordings of my own voice were made. Using a studio and microphone set-up, these fragments could be made at high quality. A number of anthropomorphic features were incorporated into the dialogue as stop words and accents. In addition, the voice assistant refers to Erasmus MC at a number of moments. This captures initial impressions of how this could lead to the attribution of more expertise. The use of my own voice ensured that anthropomorphic cues were automatically featured in the dialogue. Limitations to the choice of voice were that the participants were from my immediate circle and recognised my voice. As a result, they are biased.

By recording the voice characteristics such as huskiness can be implemented. This makes the VA feel more human.
Participants preferred an "intrinsinc" VA, with antropomorphic features such as a slur. Thiis created more empathy.
A sound like "mhm" was seen as too "manufactured" to be processed through the conversation. Instead of providing more trustworthi-ness, the VA was perceived as implausible and annoying.
The side effect of self-recording the dialogue or voice the VA is that the voice is recorded in a way that it is adapted to the context. This allows sentences to be phrased in a more pleasant way that suits the context of the OCHP.
Participants expressed needs for stop-words like "uh'. This makes the VA feel more human

Table 8: Results recorded voice for VA - anthropomorphy

For functional tasks such as looking up something quickly, partici- pants did not find it worthwhile to humanise the voice. In fact, the participants might even have wanted less intonation for clarificati- on.
Participants expressed needs for stop-words like "uh'. This makes the VA feel more human

Table 9: Results recorded voice for VA - usability

Explorative prototyping

5.1 The dialogue

5.1.5. Conclusion

VoiceFlow's standard female and male voices were compared. From this, a preferred male and female voice emerged. These voices were used in the following dialogue, based on OCHP. A functional and urgent conversation were set up using VoiceFlow. These dialogues were run by female participants.

These tests showed both preference for the male voice, because it was perceived as new, and the female voice, because it came across as caring and soft. That the male voice is perceived as novel and therefore pleasant is again related to previous experiences users have had with VAs.

References are perceived as credible, but they need to be integrated into the conversation with precision. Too many references can lead to unsympathetic behaviour from the patient or overwhelm, making the VA no longer perceived as serving and thus less user-friendly.

Finally, the recorded voice was tested. Here, the use of anthropomorphic sounds should be handled with care. A large amount can lead to unpleasant or fake. A positive side effect of having your own voice recording is that it is tailored to the context. This was perceived as pleasant by participants.

5.1.6. Further thoughts

The fact that the participants were female affected the way they perceived the male voice. For further research, it would be interesting to include male participants in these tests as well. Furthermore, the number of referrals influenced how user-friendly a VA was perceived. Researching this boundary would be interesting; at how many referrals is a VA perceived as pedantic or unhelpful?

Explorative prototyping

5.2. Embodiment

As mentioned earlier, existing Voice Assistants like Google Mini have an impact on trustworthiness. This is due to previous experiences that participants have with these well-known voice assistants or the behind the product company that released this voice assistant. For this reason, a new appearance will be created for the Voice Assistant for the OCHP. Different appearances of Voice Assistants were experimented with based on literature, results from previous research and a small generative session. The experimental prototypes serve as an introduction to new technologies and systems for creating the final appearance.

5.2.1. Earlier research in Virtual Health Assistants

A scoping review of previous research on improving the user experience of virtual health assistants was conducted by Curtis' research group in 2021. This scoping review serves as a synthesis of literature on the effects of design features on the user experience of virtual health assistants. A wide range of design features were examined, using the highest level of evidence.

This review serves as a reference point for Voice Assistant appearances for OCHP. In addition, the computers-as-social-actors (CASA) perspective is applied in many other studies to investigate which human and social factors are associated with users'

perceptions of the trustworthiness of computer agents (Lee & Nass, 2010). When choosing to assign computer human-like characteristics such as language, social role, gender, ethnicity and personality, a computer is automatically considered social. (Lee et al., 2005, p. 540).

Other research shows that when presenting both a face field and a voice of computer agents, consistency was important in trust perception (Gong & Nass, 2007). Participants trust human faces matched with human voices, and computer-generated faces matched with computer voices more than non-matched cases in an intimate self-disclosure conversation by the computer agent. (S. K. Lee et al., 2021).

Design virtual health assistants to express verbal empathy, for example, understanding of the user's feelings
Design virtual health assistants to disclose personal information about themselves to the user, for example, information about their past and personal preferences
Engage in formative research with the target audience and adopt a user-centered design approach to ensure that the software meets the needs and preferences of the user
Consider designing a human avatar to be more realistic with medical professional attire
If designing an animated virtual health assistant, it should display nonverbal relational behaviors, for example, emotional facial expressions, gestures, and mutual gaze
If empathy and relational behaviors are unable to be incorporated, consider that an animated avatar may not be beneficial or cost-effective

Table 10. Curtis researchgroup - scoping review UX virtual health assistant

Explorative prototyping

5.2. Embodiment

To dive deeper into these findings from the literature review from Curtis et al., several tests were conducted with different appearances of conversational agents.

5.2.2. Quick Generative Session

To get a reference point for the embodiment of voice assistants, I did a short generative session together with two people with the aim of obtaining an overview of visual associations with the Healthy Pregnant consultation, nurse specialist, Erasmus Medical Center in combination with trust and competence. In doing so, they were allowed to think in a broad spectrum of assistant embodiment; abstract to high human likeness. After giving a brief introduction about the study and its research questions, the

participants were allowed to cut and paste parts from random magazines onto a sheet of paper.

What is interesting about this generative session is that the two participants explored the embodiment of the VA in both an abstract and literal way. They chose images that literally showed healthcare, with nurses and people caring and helping each other. On the other hand, they thought about trust and how they would consider a doctor as an expert. An interesting result from this session is shown in Figure X. In this collage the participant combined a male doctor's Adam's apple with a woman's face. Here, the participant explained that the adam's apple

was related to a serious and clinical attitude, while the woman's appearance served as recognition and confidence. The colour blue in the colour plane behind the person reminded her of healthcare.

The method from abstract to very literal embodiment in the generative session is also applied in visualising the VA. In doing so, the study explores how an abstract visualisation affects usability and trustworthiness compared to a visualisation that has a more human-like appearance. The figure below shows the levels of each prototype made in this study from abstraction to human-likeness.



68 Figure 28. Generative session - fraction of collage

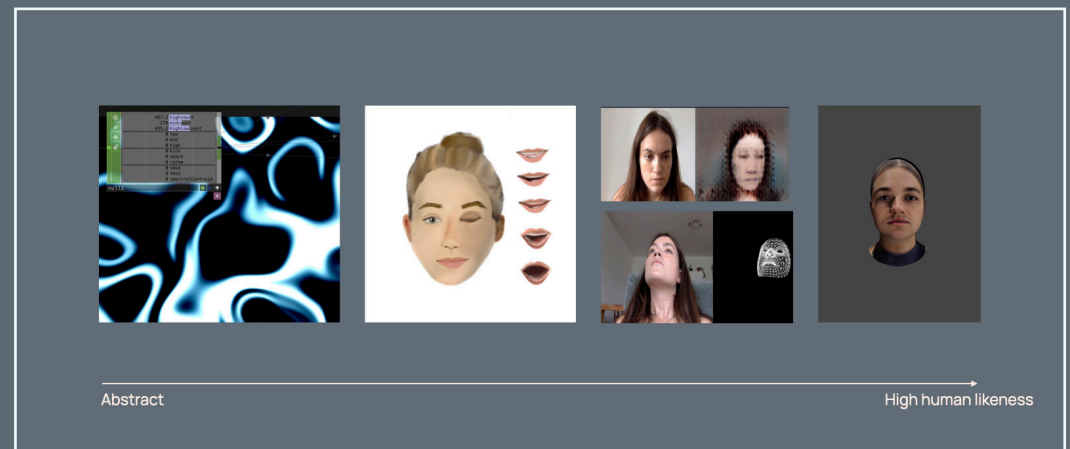


Figure 29. Levels of abstraction to human-likeness

Explorative prototyping

5.2. Embodiment

5.2.3 Abstract visualisation with TouchDesigner

The generative session showed that the colour blue reminded participants of care. In movies like Iron Man and in current technology like Siri, VAs are portrayed as abstract shapes and colours. This is why this style of embodiment was recreated using the programme Touch Designer. In this software, it is possible to create a play of colours that responds to the heights of the voice assistant's and the participant's voice. By using the recordings from the earlier experimental tests for the dialogue (chapter 5.1), the programme allowed this colour palette to move along with the dialogue for Healthy Pregnant consultation.

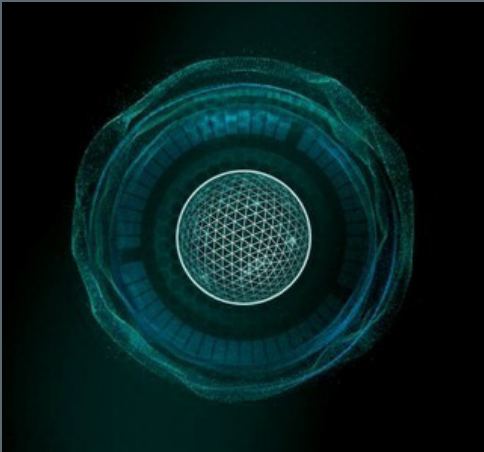


Figure 30. JARVIS - Iron man

The abstract display of the VA was shown to three test subjects. The VA did not work like the interaction with the Google Nest. This meant that no dialogue could be formed on the spot with the test subjects. Instead, a recorded dialogue was played. From this came the following results:

Participant feels too much like an outsider by not being able to participate in the dialogue.
Tries to find structure in the way the colours move and understands that it is responding to the dialogue
The participant is distracted by the colours, because of this he no longer pays attention to the conversation

Table 10. Results from abstract embodiment

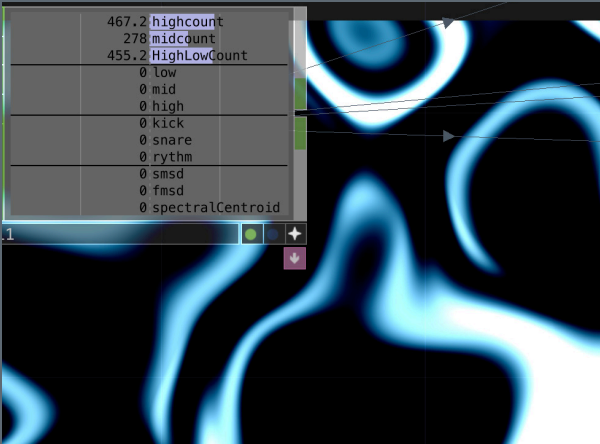


Figure 31. TouchDesigner colour palette

5.2.4. Embodiment with Deepfakes

Besides abstract visualisation, technologies were discovered at the other end of the spectrum. These technologies could potentially create a 1-to-1 image of the EMC's health worker. For these 1 on 1 visualisations, technologies like Deepfake from figment and 3d modelling programmes from Blender were used.

Deepfakes can create hyper realistic renderings of people using AI. The danger to this technology is that reality and fake media can no longer be separated. Deepfake technologies can make personae (and other creatures) perform actions they never did. This can be harmful to society. Nevertheless, this technology also brings benefits. For instance, a hyper realistic representation of a healthcare worker can be created to simulate the OCHP consultation in fine detail.

To do this, thousands of photos of the researcher were taken, this data allows a "new" image of the head to be formed using ML. Unfortunately, to make this head move hyper-realistically, more than a thousand photos are needed. The number of photos used in this test left the image fuzzy, making the image come across as ghostly rather than realistic.

Explorative prototyping

5.2. Embodiment

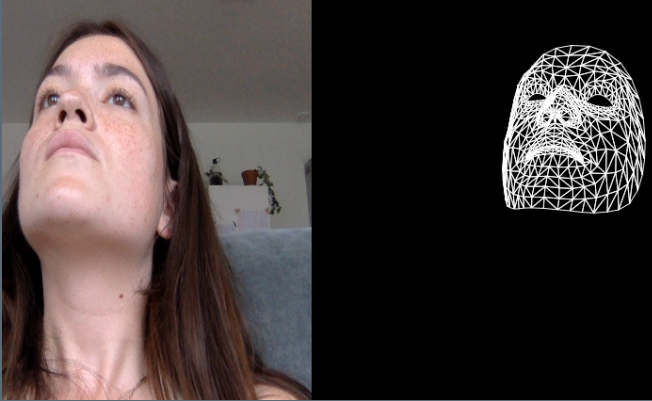


Figure 32: deepfake in Figment

5.2.5. Embodiment with 3D-modelling

Another way to get a hyper realistic image was done using Blender. Blender is 3d-modelling software. By taking photos of each view of the head and “pasting” them onto a 3d-modelled head, a representation of what a 3d human head would look like could be created. The downside of this technology is that it takes a lot of time to render movement in real-time. This is why we are making the move to the next technology: Adobe Character Animator.

5.2.6. Adobe Character Animator

Adobe Character Animator works using webcam. This reads facial expressions and movements, which can make animated characters come to life. This allows an animated creature to be animated as an extension of a person. This programme responds not only to images, but also to sound. Adobe Character Animator has different phonemes, where a different mouth position can be created for each phonym. This simulates the image of the avatar talking. This technology is promising for the test setup for this research. The disadvantage to this technology is that the image remains 2-dimensional, so the animation may be seen as non-realistic.

5.2.6. Conclusion

The part of embodiment consists of both literature research and experimenting with different technologies. The literature review by Curtis research group provides some guidelines that can be used for voice assistant embodiment.

Doing literature research was not enough to make a decision for embodying the VA for OCHP. For this reason, a number of off-the-shelf technologies were tried, ranging from highly abstract to anthropogenic. The embodiment of a VA in TouchDesigner was created using colours and movement. The colours responded to the intonation of the dialogue. This fact

was understood by the participant, but because the dialogue was pre-recorded, the participant could not empathise with the interaction.

After this test, technologies were played with where people can be made with high fidelity. Both technologies are not yet at the level where they can be converted into a prototype that can engage in a dialogue. If an embodiment that is supposed to be of high fidelity does not meet expectations, it can be perceived as scary.

Finally, Adobe Character Animator (ACA) technology was tested. This technology has the ability to detect movements and sounds, allowing an avatar to be brought to life by the creator.

5.2.7. Further thoughts

TouchDesigner’s abstract visualisation was brought to life by a recorded dialogue. For further research, an abstract visualisation could be created that allows the participant to conduct the dialogue themselves.

Technology like deepfake and renders in blender require hardware with large storage to create a VA. When this technology can be tested, it would be interesting to compare these results with the results of abstract embodiment. To what extent does a human embodiment add to the VA? And when do we reach the limit of uncanny valley?

Explorative prototyping

5.3. Conclusion



Exploratory prototyping included two sections. The first part experimented with dialogue, involving factors of anthropomorphism and expertise.

In the area of anthropomorphism, tests were done with male and female voices and how they are perceived in functional and urgent situations. Although these results led to interesting insights, no clear preference emerged. For this reason, the choice was made to let results from the literature review guide the final prototype.

For expertise, testing was done using references to the EMC. This showed that expertise can be conveyed using these references. However, there must be nuance so that the VA does not come across as a pedant. Although a VA can exude authority, participants in the experimental study still preferred a VA who is subservient.

The use of anthropomorphic features also needs to be nuanced. Unnecessary use of human features led to irritation among participants.

Different technologies with regard to the appearance of the VA were explored. By using literature to assess the usability of these technologies, a decision could be made on which technology to use for the final test prototype. Further details on this will be covered in the next chapter.

**“The male voice was better, I think
because most VAs I know are female”**

Participant in experimental test with VoiceFlow for Healthcare

Chapter 6. User testing - Approach

To design a trustworthy VA for OCHP, tests are carried out in the context. Materials and methods were used to perform the user testing. The method was derived from the previous analyses of this study. Hypotheses were constructed based on the trustworthiness factors that resulted from the stakeholder groups of OCHP. Following these, a test design was created with conditions aimed at answering the research questions and corresponding hypotheses. Materials were chosen based on literature review and experimental prototypes. This chapter will elaborate more on the method and materials and how they were derived from the analyses.

This chapter contains

- Hypotheses
- Agent and Dialogue Design
- Set-up
- Participants
- Procedure
- Measurements

6.1. Hypotheses

Based on the context analysis and existing trustworthiness theory, the following hypotheses were established;

Hypothesis 1.
A voice assistant's communication style (referential vs confident) has a significant effect on patients' trust, acceptance and expectations in the OCHP.

Hypothesis 2.
Anthropomorphic appearance of a voice assistant (avatar vs chatbot) has a significant effect on patients' trust, acceptance and expectations in the OCHP.

Measuring these hypotheses will help answer the research questions formulated at the beginning of the study.

This will compare human-to-human interaction and human-to-computer interaction, by creating a Voice Assistant with anthropomorphic features such as voice and appearance and a chatbot with little to no anthropomorphic features. The study will measure how these anthropomorphic features affect trustworthiness, acceptance and expectations of the technologies.

Perceived expertise will be measured using four prototypes. Two prototypes that do not refer to the EMC, two prototypes that do refer to the EMC. How these prototypes were developed is explained in the next section.

6.2. Agent and dialogue design

Making a Voice Assistant with anthropomorphic features raises expectations about its capabilities and thus trustworthiness. Users may expect the voice assistant to handle and resolve ambiguity better (via natural dialogues) than text-based search. This is why a text-driven assistant and voice-driven assistant are compared. These speech-driven and text-driven assistants will both adopt 2 different ways of communicating, namely confidence and using references. This leads to a 2 (communication style: referential vs confident; between-subject) × 2 (anthropomorphic level (avatar vs chatbot; within-subject) mixed experimental design.

Research questions	Hypotheses	Prototypes			
What are the main expectations (and beliefs) of a conversational system		Chatbot		Voice Assistant	
What are the differences between human-to-human and human-to-computer conversations?	Anthropomorphic appearance of a VA has significant effect on patient's trust, acceptance and expectations in OCHP				
How can perceived expertise influence the trustworthiness of conversational agents for searching healthcare informatie	A VA's communication style has a significant effect on patient's trust, acceptance and expecations in OCHP	Ref	No Ref	Ref	No Ref

Method

6.2. Agent and dialogue design

6.2.1. Voice Assistant

The Adobe Character Animator (ACA) programme was used to develop the VA. It was decided that the representation of the agent would consist of an animated head and torso combined with a recorded female voice. The motivation for choosing only the head and torso had to do with the difficulty of creating realistic and believable emotion representations in combination with a full body. For example, this approach would have meant that different body parts would have to be animated effectively to create a realistic person. The agent's posture should also be taken into account, as it can easily influence the perception of trustworthiness.

The avatar in ACA can detect movements and sounds occurring through the webcam and microphone. For this reason, it was chosen to conduct the test in the OCHP using Wizard of Oz. The method of WOZ is explained in more detail in the next paragraph.

To make the VA talk, different shapes of the mouth are designed. The mouth is moved by detecting sounds in combination with shapes of the mouth. For the voice, the researcher's own voice was used.

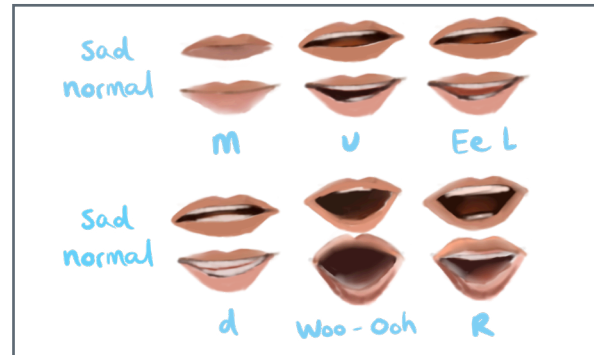


Figure 33. Phonemes of the VA

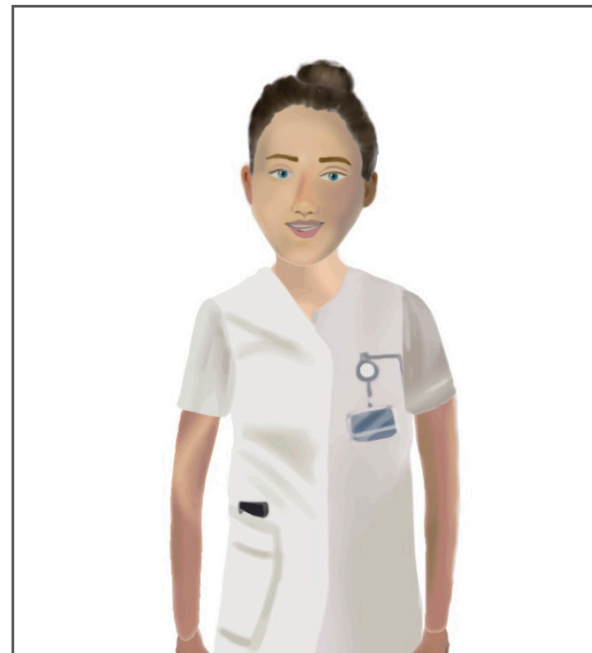


Figure 34. Robin the Voice Assistant

6.2.2. Automatic Agent

To compare conversational agents and the influence of anthropomorphic features, a chatbot was designed. Each message from a participant was forwarded to the platform in which the website was built, and the response was sent back to the participant. The response consisted of a text snippet based on the script used for the dialogue with the VA. The appearance of the chatbot was similar to the style of the SP system. Participants were told that they were interacting with an experimental conversation system, but were not given any specific information about the connection to SP's current system.

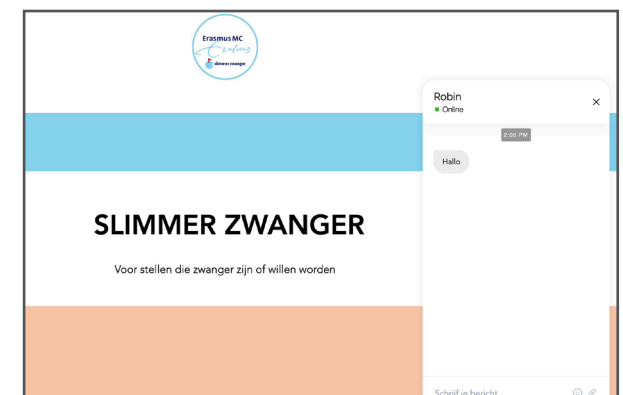


Figure 35. Robin the Chatbot

Method

6.3. Set-up

6.3.1. Wizard of Oz

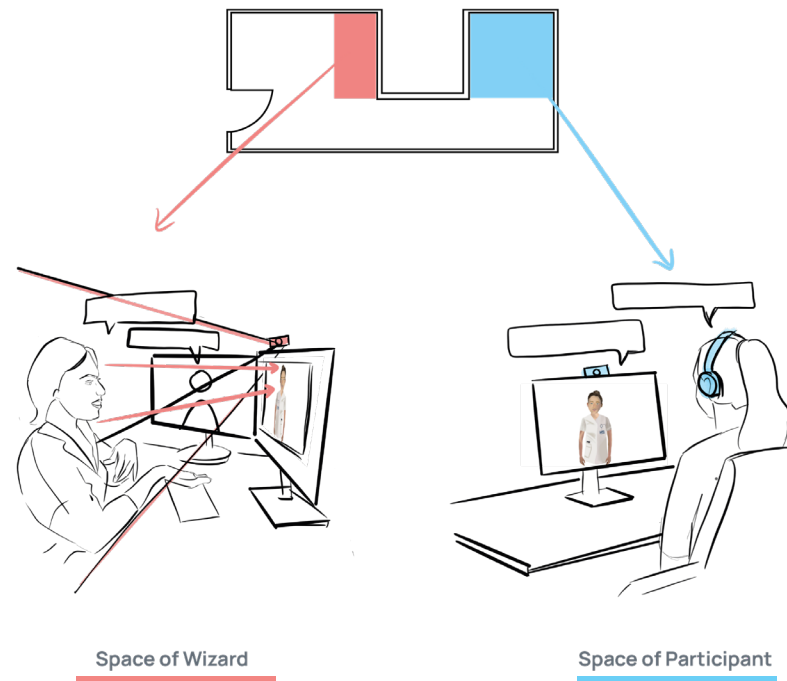
It has often been argued when using data and theory to design natural language interfaces that human dialogues should be taken as the norm and starting point, that is, a natural dialogue between a human and a computer should resemble a dialogue between humans as much as possible (Dahlbäck et al., 1993). Therefore, for this study the WoZ method was chosen. In the research subjects will be told they are interacting with a computer system through a natural language interface, when in fact they are not. Instead, the interaction is mediated by a human operator, the wizard, with the result that the subject can be given more freedom of expression, or constrained in more systematic ways, than is the case with existing NLIs (Dahlbäck et al., 1993). The WoZ method is suitable for finding out about application-specific linguistic features, or to collect data as a basis for theories about the specific genre of human-computer interaction in natural language (Dahlbäck et al., 1993).

6.3.2. Set up

For the test setup, a monitor is used to play the avatar on. In another room is the test-taker or "wizard". The wizard will control the Voice Assistant and Chatbot using laptop, screen and webcam. Based on answers given by the patient, the wizard can anticipate and formulate the answers.

6.4. Participants

25 Participants (18 female, 7 male) took part in this experiment. A total of 9 days with an average of 3 consultations per day were attended. A small number of patients refused to participate in the experiment. Participants were recruited by asking at the beginning of the OCHP if they wanted to participate in the experiment.



6.5. Procedure

The experimental procedure took 5 minutes for each participant. First, participants signed a consent form, the Participant Information Form (PIF). Next, the experimenter showed the participant how to use the VA. Next, participants engaged in a conversation with the conversational agent. Finally, a short interview with the participants was conducted with questions based on Mayer's model.

Figure 36. test set-up, wizard and participant space

Method

6.5. Procedure

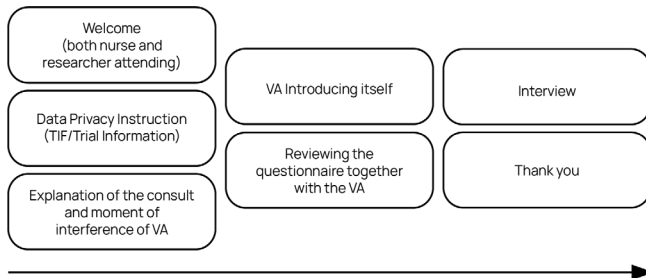


Figure 37. Procedure of the test in chronological order

Dimension of trustworthiness	Question subjects
Benevolence	Added value
	Responsiveness
	Feasibility
Expertise	Credibility
	Expert
	Competence
Integrity	Morality
	Empathy
	Comfort

Figure 38. dimensions of trustworthiness according to mayer's model and related topics

6.6. Measurements

The qualitative interview consisted of 12 questions formed based on the trustworthiness factors from Mayer's model. At the end of each test, these questions were discussed and recorded. After the tests, the answers could be ordered based on the research questions formulated for this study;

1. What are the main expectations of a conversational system?

2. What are the differences between human-to-human and human-to-computer conversations?

3. What characteristics ensure that VAs become trustworthy tools for searching healthcare information?

Research has shown that there are a large number of characteristics that affect the trustworthiness of a VA. Specifically for this study, the characteristic expertise is important to build trustworthiness between patient and nurse. Therefore, the decision was made to reformulate research question 3 as follows;

3. How can perceived expertise influence the trustworthiness of conversational agents for searching healthcare information?

Chapter 7. User testing - Results

Tests were conducted with 25 patients from the OCHP. In the process, patients expressed their perceptions about interacting with the Voice Assistant and chatbot and perceived trustworthiness. The clusters that emerged from these responses will be reviewed in this chapter. The limitations of the user tests will be listed. Finally, using quotes, conclusions will be drawn from the user tests.

This chapter contains

- Analysis approach
- Results: Expectations of the VA
- Results: Preference and Comparison
- Results: Expertise
- Results: Appearance VA

Results

7.1. Analysis approach

25 participants participated in this study. More than half of the tests, the partner was present while the pregnant person interacted with the VA. When the pregnant was unsure about her English or Dutch, the partner could be asked to take the test. For privacy reasons, demographic characteristics of the test participants cannot be shared.

12 participants tested the Voice Assistant, 12 participants tested the Chatbot.

To analyse the results, clusters were made of all the quotes from the qualitative interviews. These clusters will guide the analysis of the results. For each cluster, the chatbot and VA results will be discussed separately.

In the cluster of expertise, on top of the difference chatbot and VA, a distinction will also be made between referring and non-referring/self-referring VA or chatbot.

7.2. Expectations

This section discusses expectations of chatbots and VAs. When and how soon do participants envision the development of this technology? Are they already familiar with the technology? Do they see a future in the technology?

7.2.1. Expectations of a chatbot

The participants could imagine using this technology at home. All participants were familiar with the technology of chatbots. They expect the development of new technologies to be inevitable. This is viewed in both positive and negative ways.

“Our generation is used to answer questions like this”

“Everything is nowadays with our mobile phone or laptops, it’s just moving with the times”

7.2.2. Expectations of a VA

For the VA, they expect the development of this new technology to take place over time and become more normal in the future. For now, VAs remain fairly new today in the healthcare context, which made the interaction uncomfortable.

“In the future everything will be impersonal”

“In time, we will get used to this”

“I think it has to do with the fact that it is new, and not used in other contexts. This makes the interaction uncomfortable”

Notable is the statement of a participant who linked the development of VA with Covid. Here the patient understands that Erasmus MC will make use of this technology when the pandemic reappears.

“In Covid times I can understand why Erasmus would use this VA”

Results

7.3. Preference and Comparison

In this section, interaction with chatbot or VA (human to computer interaction) is compared with interaction with the nurse (human to human interaction).

7.3.1. Chatbot

Using the chatbot was received as quick and easy. While interacting with a chatbot can speed up the consultation and make it easier for patients whose native language is not Dutch or English, it is still preferred by all patients to have human-to-human interaction. They considered the use of the chatbot an addition rather than a replacement.

“For us it is harder, it is not our native language. This is quick and easy, when calling a call-center you often need to wait”

Interaction with the chatbot remains superficial. Patients did not talk further by themselves and felt that the chatbot should have elaborated more deeply on patients' answers. The interaction remained an interplay of question-answer and did not transform into a dialogue.

Interestingly, patients felt that an automated system

directed the chatbot. In reality, the researcher was leading the conversation. Because of this perception that it was human-computer interaction and not human-human, patients could not get the full potential out of the chatbot than was in fact possible.

“Impersonal, you feel there is a robot behind it! It is the way questions are asked, that makes it superficial.”

7.3.2. Voice Assistant

Patients understood the value of a VA for the OCHP. Like the chatbot, they understood that it would lead to time-efficient processes, on the other hand, they argued that this value will emerge only when the technology is better developed.

“Human to Human is always better, but if it would make the consult more time efficient than I understand its value”

Still, human-to-human interaction was preferred throughout. However, patients imagined that this technology could serve as preparation for the OCHP.

At the same time, they could not then comprehend why a VA would be used for this task and not just a questionnaire like the current situation.

“What would a VA add if you can also put it in a questionnaire on a pc”

Patients preferred doing the consultation at home, in which case they would prefer not to talk to a robot (patients called it a puppet) but to someone via video call. At the same time, one patient felt that interacting with the VA was better than just making a phone call where there is no image. This may mean that using a visualisation adds value to human-robot interaction.

“Better in real-life. Video-call different, but this is a puppet”

“Better than only phonecall”

Results

7.4. Expertise

7.4.1. Chatbot with self-confidence

All patients could not give a clear answer as to whether they could consider the chatbot to be an expert. Reasons they could not answer this were the duration of the interaction, which they felt was too short, or the depth of the conversation. Here, patients believed that if more questions were asked in depth on a topic, there should be verification that the patient knew who was behind the answer. Two patients did not understand the question due to poor English; they took the expertise for granted.

“It is what it is. It is on the screen, so it must be right.”

7.4.2. Chatbot with references

2 out of 5 participants found the chatbot with reference an expert. Also with this chatbot, patients had difficulty considering chatbot as an expert. One reason for this was again the superficiality of the conversation, with the chatbot only giving suggestions on what can change and not going into depth. This superficiality is established by the expectation of the chatbot's capabilities. Answers were made shorter so that the chatbot understands.

“I want to make answers short to make it more easier for the bot”

At the same time, the introduction given by the nurse influenced the chatbot's perception of expertise. Because of the setting and seeing the nurse specialist, patients also perceived the chatbot as credible.

Again, patients indicated that if the chatbot, according to them, responds correctly to what the patient says, they may perceive the chatbot as an expert. By going into depth on certain topics, it feels more like the patient is talking to a human-like agent.

7.4.3. VA with self-confidence

2 out of 4 patients considered the VA to be an expert. They expect the VA to be an expert specifically on lifestyle and nutrition and not on other topics.

“Specifically for this topic I expect it to be specific and correct. If she is specialised on this, I suppose the conversation will also flow”

The patient who self-assuredly could not perceive the voice assistant as an expert had a history in healthcare and preconception. This patient felt that if deeper questions were asked, the voice assistant did not have the capacity to give an adequate answer back.

“It did not feel like an expert, it felt automated. It feels when you tell something difficult she won't give an adequate answer”

Results

7.4. Expertise

7.4.4. VA with references

In the case of the VA with references, patients believed the VA knew what it was talking about. Here, the doctor's coat was mentioned as the finishing touch. One patient experienced the interaction with the VA as if she was talking to a human-being and not something automated.

The VA with references was considered more of an expert than the VA with confidence.

“It's based on what I filled in, so I think it's credible”

With both VAs, it was noticed that if the VA works well, responds to the patient with an answer that they believe to be of quality and answers based on what was entered in the previous lists of SP, the VA is credible. Of both groups, patients emphasised that in terms of lifestyle and food, she comes across as credible and an expert. They did not believe the VA had knowledge beyond these topics.

7.5. Appearance VA

Compared to the chatbot, the VA had an appearance with anthropomorphic features. These features affected the VA's user experience.

One of the patients stressed that the white background negatively affected the experience. A consultation room or Erasmus logo would improve the experience for her.

In contrast, for both subgroups it was found that the patient did not find the clothing adding anything or even the appearance of the robot was not noticed. Here, the patient focused only on the voice and not how the VA looked.

“I was listening to what she was saying, not how she looked.”

7.6. Conclusion

The conclusion is divided, for consistency, into the clusters created from the qualitative interviews' responses. Adhering to these clusters makes it possible to answer the research questions at the same time.

A conclusion is drawn from each cluster and associated research question. The discussion reflects on the process of the user test. This includes a discussion of how the result may have been influenced by limitations and how this may be overcome in the future.

7.6.1. Expectations

1. What are the main expectations of a conversational system?

The technology of chatbots is perceived as familiar by participants. Among “their generation”, it is a way of communication they are used to. Although the participants were familiar with the technology, this does not make the interaction quality better.

The technology of VAs is new and therefore uncomfortable to use. Nevertheless, participants can appreciate the potential of VAs. Specifically, for extreme situations affecting care as COVID.

Results

7.6. Conclusion

7.6.2. Preference and comparison

2. What are the differences between human-to-human and human-to-computer conversations?

Generally, human-to-human interaction is always favoured over human-to-computer interaction. a fair comment from participants is therefore that the human-to-computer interaction is an addition or preparation to make the human-to-human interaction better.

The chatbot was perceived as superficial. Even if the chatbot was controlled by a smart system, or in this case the wizard, the participant still perceived the chatbot as an impersonal "robot". In addition, typing feels like a strange interaction to share healthcare information, especially with a robot. The VA was received positively by the participants. Although interaction with a human is better, they see the potential of this technology in the future.

The difference between VA and chatbot - anthropomorphic appearance

One participant thinks it adds value that the technology has an appearance like a VA. The other would find the experience just as good if it were via a phone call. Participants sometimes do not pay attention to the appearance of the VA, preferring to concentrate on the conversation with the VA.

7.6.3. Expertise

3. How can perceived expertise influence the trustworthiness of conversational agents for searching healthcare information?

It is harder for participants to regard a chatbot as an expert than a VA. The chatbot with self-assurance could not be considered an expert. According to participants, the conversation was too short to comment on this. For the chatbot with references, participants felt that the chatbot's knowledge remained too superficial. The chatbot was seen as less stimulating; it can give advice but not trigger action. A VA, on the other hand, can have more impact. It should be mentioned here that the perceived expertise will remain specific in lifestyle and nutrition. Participants do not believe that the VA's area of expertise is larger than what the VA is specifically made for. The appearance of the VA helped complete the picture for 2 of the 12 participants. In doing so, they even felt it added value to the interaction if the logo and a consultation room of EMC were added to the image.

As mentioned in this study, trustworthiness depends on multiple dimensions. Expertise can help in accepting a conversational agent. With a chatbot, references can help to come across as an expert when a short interaction takes place between patient and chatbot. With VA, this is not the case.

A VA can be considered an expert even without references. However, the expertise will be constrained. Patients believe the VA is an expert, but only for what it is programmed to do. So, for other questions, they will not see the VA as an expert and therefore may not be trustworthy.

Results

7.7. Discussion

Embodiment

The experimental prototypes led to choosing Robin the avatar for the appearance of the VA. This VA was well suited for testing in the OCHP. Nevertheless, the VA's appearance made it difficult for patients and the nurse to remain serious in the interaction. The nurse joked about the VA and sometimes started talking childishly. This could be due to unfamiliarity caused by the newness of the technology. In addition, the prototype was highly dependent on light fall, so it did not work properly in some cases. This evoked negative reactions from both patient and nurse.

Expertise

To measure whether the VA and chatbot come across as expert and thus trustworthy, the multiple dimensions of trustworthiness were used. Specifically, competence or expertise was measured of the VA. By having the VA and chatbot reference the EMC, it was measured whether it was considered expert and possibly more trustworthy. In reality, referencing through a conversation appeared to be difficult. The wizard controlling the VA naturally had to engage in the dialogue and incorporate the references that had already been thought up. This caused pauses in the dialogue, which meant that the dialogue did not always feel natural.

Wizard

On top of this, it was required of the wizard in the user test that each conversation would be of the same level. Although this was aimed for, it cannot be said with all certainty that the wizard's state of mind was the same for all conversations. In addition, the wizard is subconsciously influenced by the patient's character. As a result, the wizard may feel more comfortable with one patient than another.

Set-up

The Wizard of Oz set-up worked as planned and made it possible to hear and see what the patient and partner were doing on the other side of the room. Interaction with the chatbot involved acting with thoughtful consideration. Patients thought longer about giving the answer and started discussing with partners what to say. An interesting fact is that the WoZ position allowed this discussion to be heard. On the one hand, this can provide insightful results. On the other hand, as discussed in Chapter 4 on privacy, data is collected on patients while they do not realise it. This is a violation of privacy. For this reason, these conversations have not been included in the results.

Context

Participants were for the most part not alone while performing the test. The partner was often sitting opposite the patient watching the test. As a result, the participant may possibly experience pressure or be distracted during the conversation with the chatbot and VA. On the other hand, the presence of the partner will also occur in the usage scenario in the real-life context.

Qualitative interview

Qualitative interviews were conducted with the patients to get results. Due to the time limit of the OCHP, these qualitative interviews could not exceed a minute to 2 minutes. As a result, some conversations, and thus results, remained superficial.

Results

**“I want to make answers short to
make it more easier for the bot”**

Participant in user test OCHP

Chapter 8. Future principles for designing trustworthy VA for healthcare

After testing the VA in the OCHP context and answering the research questions, it was possible to carry out the overarching goal of this research: to compile the principles that future designers can use to design trustworthy VAs for OCHP. These principles are based on; experimenting with off-the-shelf technologies, conducting a context analysis and collecting and analysing existing theories and models on trustworthiness. The principles are divided into the factors that can affect trustworthiness in potential ways.

This chapter contains guidelines for

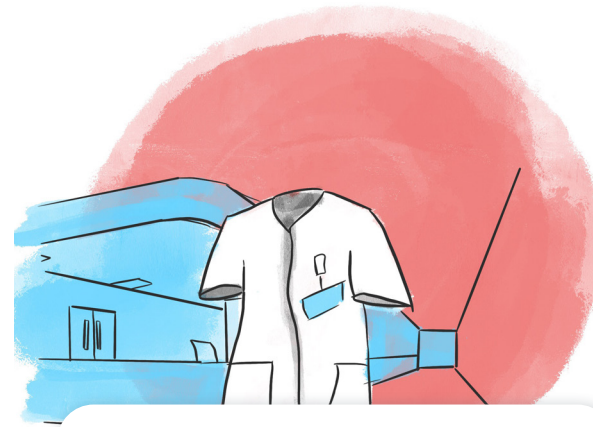
- Embodiment
- Usability
- Understandability
- Expertise

Future principles for designing trustworthy VA for healthcare

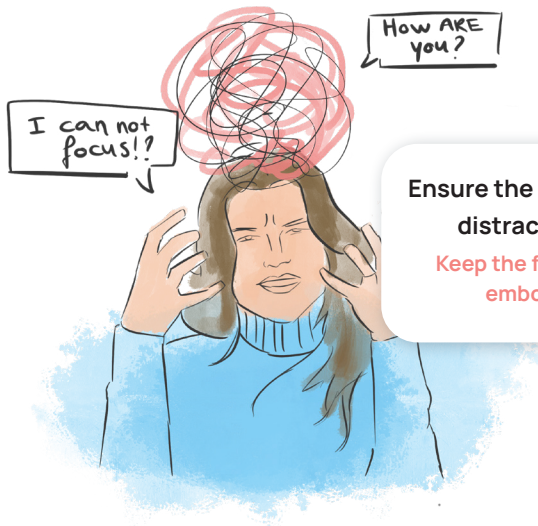
Guidelines for embodiment

Overly generic or vague embodiment can distract the user

Keep the connection between the dialogue and the embodiment



Embodiment related to the context can enhance features of the Voice Assistant and make the interaction more credible



Ensure the embodiment of the VA does not distract the user from the dialogue

Keep the focus on the dialogue and build an embodiment around this dialogue



Not every user will and wants to pay attention to the embodiment of the Voice Assistant

Future principles for designing trustworthy VA for healthcare

Guidelines for embodiment



Avoid an anthropomorphic appearance combined with non-anthropomorphic movements

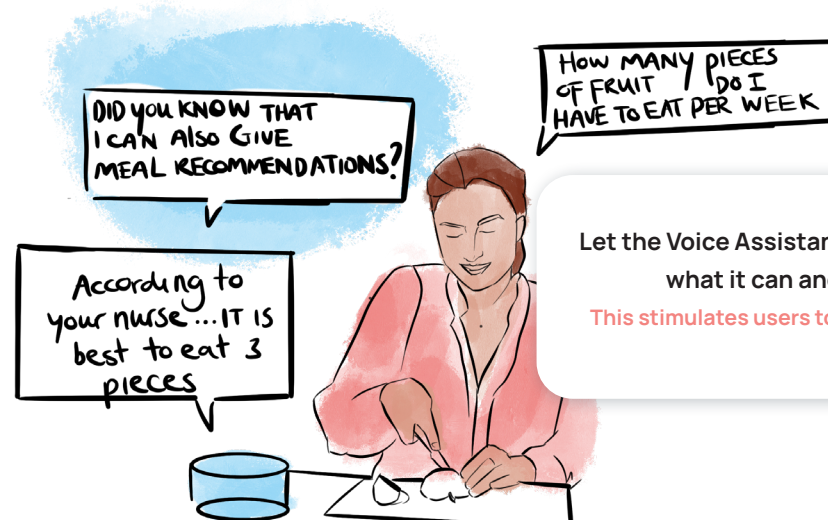
Embodiment with w will influence users to behave differently

Guidelines for usability



Engage the Voice Assistant in the entire process of a care pathway and not a single consultation

This makes the user feel as if the Voice Assistant is involved



Let the Voice Assistant be transparent in what it can and cannot do

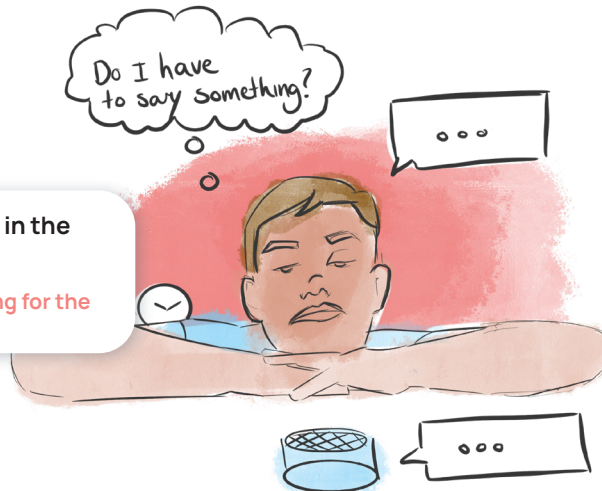
This stimulates users to use it's full abilities

Future principles for designing trustworthy VA for healthcare

Guidelines for usability

Do not allow too many silences in the conversation

This leads to an uncomfortable feeling for the user



Let the user validate themselves prior to Voice Assistant requesting personal data

This makes the user more comfortable



Give the user the option to leave the conversation in any moment

This makes the user feel more comfortable



Guidelines for understandability



Let the Voice Assistant be transparent in
what it did and did not understand

To avoid user irritations

Voice assistant should not give too much
information at once

To avoid user confusion



Future principles for designing trustworthy VA for healthcare

Guidelines for expertise



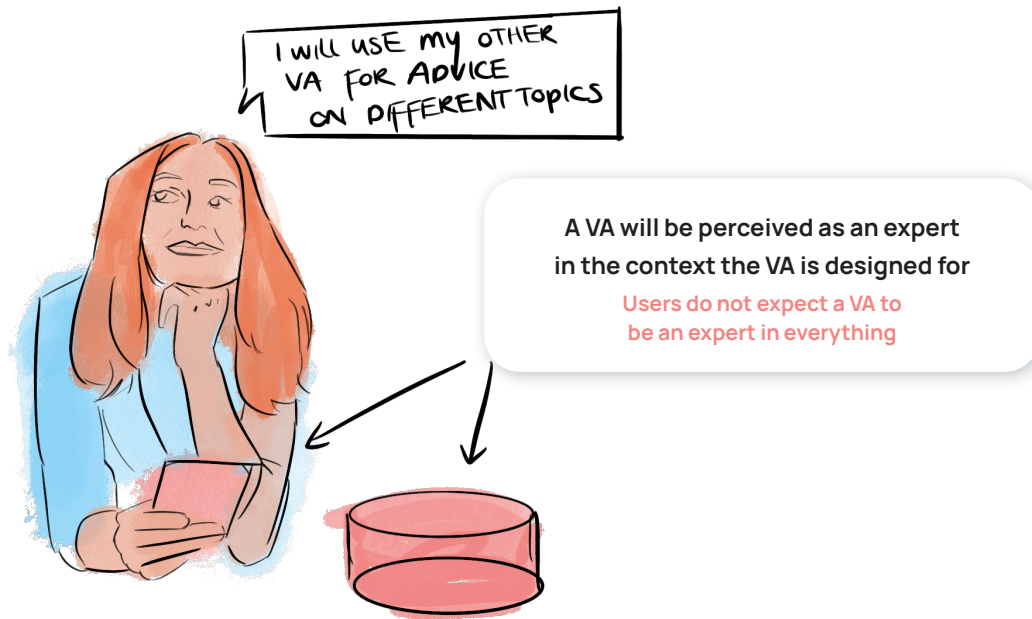
References help making the VA feel like an expert



Too many references make the Voice Assistant feel as a know-it-all

Future principles for designing trustworthy VA for healthcare

Guidelines for expertise



Conclusion

Healthcare pressure is leading to the deployment of new technologies such as Voice Assistants. To ensure long-term use and acceptance of the technology, the focus of the study has been on perceptions of trustworthiness. The main research question was as follows: **How to design Voice Assistants for trustworthy interactions in healthcare domains.**

As the healthcare domain is extremely broad, this research was specified on the Healthy Pregnancy Outpatient Clinic. Part of the Smarter Pregnancy initiative set up by Erasmus Medical Center's preconception group.

The context analysis showed that factors such as expertise and responsibility in the current consultation lead to trustworthiness. Responsibility is a factor that cannot be measured. This is a factor that the patient and nurse have to take the word on. This is why in this study the choice was made to focus on expertise. The VA was assigned expertise using references to the EMC.

Expertise is a commonly used measurement in previous research on trustworthiness. This research

shows that references can indeed help a VA appear trustworthy. However, expertise is 1 of many qualities that can make a VA trustworthy.

In order to develop a trustworthy VA for healthcare, the process undertaken in this study will have to be repeated several in other contexts. In each of these contexts, characteristics will arise that lead to trustworthiness. By identifying these characteristics, principles can be established as in Chapter 8. This will create a handbook of characteristics and guidelines leading to trustworthiness in VAs for healthcare.

Limitations

Target group

As appointed above, this research provides only a fraction of an answer to how trustworthiness can be engaged in Voice Assistants. Thereby, this research is the first step towards development of trustworthy VAs for healthcare. This research was conducted in a time span of about six months. As a result, concessions had to be made in the scope of this research. As a result, the focus of this research tended to be on the perception of the patient and less on the perception of the health worker or nurse. Although at the beginning of the study it was emphatically stated that the opinion of health professionals is essential for the acceptance of new technologies in healthcare. Moreover, this study also delved less into the perception of the partner, even though they are equally influential for a healthy pregnancy. To prototype the study, several experimental phases were completed. These included both dialogue design and embodiment. These experiments were mainly run with participants in an age range of 20-30 and female. This focused on women's perceptions of pregnancy and trustworthy voice assistants and less on those of men.

Conclusion

Limitations

Available hardware

For the Voice Assistant embodiment, the materials (hardware) to design a high-quality VA were not available. As a result, more common programmes like Adobe Character Animator were used. These programmes work as a good basis but remain somewhat static in terms of movements.

Using existing models for trustworthiness

To gain an understanding of trustworthiness, existing models were used. In particular, in this research, Mayer and TAM's model was used to find out the dimensions of trustworthiness and categorise designer guidelines. Although these models have been validated, it is valuable to consider other models as well. This limitation leads us to the recommendations for future research.

Recommendations

Using other measurements for trustworthiness

The context of this study is specific to the OCHP. Here, trustworthiness by expertise and responsibility arose. The choice was made to focus on trustworthiness by expertise. For future research, the other side of this interplay can be investigated, i.e. responsibility. Although responsibility is a difficult bond of trust to measure, it could provide interesting insights.

Using other contexts for trustworthy VAs

Besides the OCHP context, there are several scopes within healthcare that can be used for designing trustworthy VAs. With each of these scopes, it is interesting to analyse the interplay of trustworthiness so that new measurements for trustworthiness can be found out.

Stay critical

In this report, a short chapter has been dedicated to a critical view of the current development of Voice Assistants and the pitfalls that may arise. In particular, these pitfalls have been extracted from literature and previous research. For future research, these pitfalls can also be experimented with. In doing so, these pitfalls should be designed with care, as a single negative interaction with a VA can have a large impact on user perceptions of VAs overall.

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Appendix A

Interview Nurse 1.

Hoe vind je het om dit werk te doen?

Saai, begrijpt waarom zij dit moet doen namelijk voor academisch onderzoek maar kan zich voorstellen dat het overgenomen kan worden door een voice assistant.

Ik ben benieuwd hoe het consult eruit zal zien!

Nou verwacht niet te veel. Het is geen bijzonder proces en elke keer weer hetzelfde. Hiervoor deed ik iets wat ik leuker vond, maar ook heel heftig. Ik werkte namelijk als psychotherapeut. Dat was heel hard werken, maar je maakte tenminste wel weer elke keer wat mee.

Wat verwacht jij eigenlijk uit dit onderzoek te halen?

Ik hoop de eerste stappen zetten om voice assistants te implementeren in het PGZ consult. Ik kan mij voorstellen dat een voice assistant het niet alleen kan.. het zal vast nog jouw hulp nodig hebben.

Met de vragen die ik stel denk ik in het consult niet dat dat nodig is, maar het is goed dat ik met de onderzoeken erbij ben.

Zou je me een beetje door het proces mee willen nemen?

Ja, ik start nu mijn computer op. Werken jullie ook met HIX?

Nee dat ken ik niet

Goed nu gaat alles opstarten. Dat kan soms wel eens even duren.

Wachten

Ah kijk, daar zul je het hebben. Even checken wat voor consults we vandaag allemaal hebben. We hebben er in totaal 6.

Halen kop koffie

Oke, ik had gisteren al heel wat administratief werk gedaan maar ik heb nog wat tijd over dus ik ga even checken of dat er allemaal goed in staat.

Aan het stoplicht kan ik zometeen zien of ze aanwezig is, het stoplicht springt op oranje als ze er is. Even kijken, ze moest de gezondzwanger lijst invullen, even kijken of ze dat heeft gedaan. Dat heeft ze nog niet... oke, dan ga ik zometeen met haar de lijst doorlopen. Even kijken of zij wel een account heeft aangemaakt bij ons. Ja dat wel.

Daarna check ik vaak ook nog even de achtergrond van de patiënt. Heeft zij al een kind gehad. Normaal heb ik daar meer tijd voor of doe ik het de avond ervoor, nu heb ik dat nog niet gedaan.

Volgens mij is ze er of niet?

Ja dat klopt! Oke, dan ga ik nu in de meeting. Dat doe ik via Teams en op het tweede scherm houd ik dan vaak de zoekmachine voor BMI en de lijst met vragen of iets anders wat ik moet opzoeken.

Voert Consult uit.

Goh dat was wel een heel bijzonder consult. Het is trouwens niet heel normaal dat de patiënten aanwezig zijn! Al helemaal zo vroeg. Vaak vergeten zij dat zij een consult hebben. Goed, nu kijk ik of ik alles netjes ingevuld heb. Volgens mij wel, nou dan kan ik het in het systeem zetten.

Fysiek consult

Online consult

Begint met het dossier doorlezen, hierin staat persoonlijke data over de patiënten (man + vrouw). Maakt gebruik van code die op een beknopte manier aangeeft wat de eerdere ervaringen zijn met zwangerschap.

Vragen gaan over;

Gewicht

Lengte

Levensstijl

Sport

Roken

Alcohol

Drugs

Eetgewoonten

Koffie

Volkoren, wit

Groenten

Fruit

Vis

Snacks

Frisdrank

Zuivel

Supplementen

Beweging

Zowel telefonisch als via Outlook Teams.

Niet altijd even goed verstaanbaar. Soms worden antwoorden gegokt door verpleegkundige, omdat zij het niet goed kan verstaan. Door het antwoord dan nogmaals te herhalen weet zij of zij het goede antwoord invult.

Appendix A

Houdingen patiënten

Veel nieuwsgierigheid vanuit patiënten.

Vrouwen vaker aanwezig dan mannen.

SlimmerZwanger vragenlijst wordt niet altijd van tevoren ingevuld, hierdoor moet dit ter plekke door de verpleegkundige worden gedaan.

Vaak wordt niet opgenomen of mensen vergeten dat zij een online afspraak hebben staan. Wordt pas 2 dagen van te voren aangekondigd waardoor patiënt niet op de hoogte is. Nieuwe datum moet dan ingepland worden.

Wanneer patiënt een doel wil stellen zoals afvallen wordt een datum vastgesteld dat verpleegkundige en patiënt elkaar weerzien. Hierdoor ontstaat er een persoonlijke band tussen patiënt en verpleegkundige.

Interview nurse 2.

Zou je iets kunnen vertellen over de screening?

Ja, ik denk dat je wel weet over het Slimmer Zwanger en Gezond Zwanger platform? Daarin staan lijsten die die vrouwen en partners moeten invullen voordat zij bij het consult komen. Deze platforms zijn dus voor de screening en het gesprek bespreekt deze antwoorden. Doordat zij de screening hebben gehad kunnen wij een gepersonaliseerd consult doen, waarbij wij precies weten waar de aandachtspunten liggen.

En wat vind je van het spreekuur?

Ik denk dat het heel goed is. Ik denk dat er nog een aantal dingen onbekend zijn over zwangerschap en hoe zwanger te worden. Het is een moment waarbij vrouwen nog vragen kunnen stellen. Het is vooral handig bij vrouwen die zich verdiept hebben in de zwangerschap en interesse hebben in de informatie. Zij kunnen dan veel uit het gesprek halen.

Ik heb het idee dat er aardig veel bekend is bij vrouwen over zwangerschap en leefstijl, hoe denk jij daarover?

Ja, ik denk dat vrouwen wel weten dat zij bijvoorbeeld niet mogen roken en drinken. Maar voornamelijk het gedeelte wat vrouwen kunnen doen om zwanger te doen, welke supplementen zij kunnen slikken, daar is nog weinig interesse in. Terwijl dit heel belangrijk is voor de gezondheid van het kind. Hierbij gaat het dan om het slikken van foliumzuur, vitamine D, hoeveelheid calcium. Waarbij vragen zijn als wat is dan voldoende? Ik denk dat dit advies een onderbelicht thema is.

En hoe vind jij het om dit spreekuur te doen?

Leuk! Vrouwen zijn vaak geïnteresseerd. Daarnaast heb je ook genoeg tijd om het erover te hebben en is het niet zo vluchtig zoals andere spreekuren. Ik vond het minder leuk als ik het moest hebben over beladen onderwerpen als roken. Wanneer zij bijvoorbeeld moesten blazen en geen kindje kunnen krijgen, dan is het wel eens moeilijk. Het is dan vaak leuker als een vrouw al zwanger is, dan is het gelukt en kan je het over leukere dingen hebben.

En hoe vaak deed jij dit spreekuur?

Wij deden het met 8 onderzoekers. Wij wisselden elkaar dan af, en vaak 1 ochtend in de week. Het was dan een taak naast onze werkzaamheden. Voornamelijk de voorbereiding kostte veel tijd. Om het traject op te starten, of de vrouw de lijsten heeft ingevuld, dat was vaak tijdrovend. Vooral het activeren van Slimmer Zwanger kostte veel tijd. Dit kon soms wel de eerste 10 minuten van het spreekuur zijn, waardoor er minder tijd was voor advies.

Appendix A

En waren er andere onderdelen aan het spreekuur die tijdrovend waren of niet efficiënt?

Ja, het verwerken van data kon ook tijdrovend zijn. Er waren 3 verschillende platforms waar dit ingevoerd moest worden. Deze platforms waren dan niet aan elkaar gekoppeld waardoor het meer tijd kostte. Hier denk ik dat veel meer efficiëntie zou kunnen zijn. Als het je lukt om die platforms aan elkaar te koppelen zou dat fijn zijn haha.

En hoe ging dat data verwerken precies?

Dit deed je meteen na het consult. We hadden een standaard format, dat hielp erg. Na het consult vulde je deze in en zette je het in het patiëntendossier.

Had je een voorkeur in online consult of offline consult?

Nou voor het verwerken van data was het fijner om het offline te doen. Als je constant op een scherm kijkt kan het vrij onbeleefd overkomen. Bij online consults is dat minder onbeleefd of kan dat wel even tussendoor. Voor de rest had fysiek voor mij wel de voorkeur. Ik vond dat leuker.

Komt dat omdat de band tussen jou en patiënt ook beter gevormd kon worden fysiek?

Nee niet perse, online was de band ook vrij goed.

En had je wel eens technische problemen tijdens het spreekuur?

Ja, je kon mensen soms niet verstaan. Maar we hadden elke vrijdag een studententeam die ervoor zorgen dat de patiënten al klaar zaten voor het spreekuur. Zo hoefde ik alleen nog maar op een knop te drukken en dan waren de patiënten gelijk aanwezig.

Maar als ik het goed begriep vond je het spreekuur eigenlijk best leuk om te doen?

Nou, ik vond het leuk omdat ik affiniteit heb met voeding en leefstijl. Ik had ook collega's die het helemaal niet leuk vonden. Ik denk dat het gaat om de interesses van de verpleegkundige en waar diegene in geschoold is. Lorette is bijvoorbeeld geschoold in psychiatrie en vind gesprekstechnieken bijvoorbeeld interessant. Hierdoor kan ik mij voorstellen dat zij het consult wel leuk vindt.

En wat vond jij van de systematiek in het consult?

Ja, ik houd daar wel van. Iedere patiënt is anders, en uiteindelijk laat je de antwoorden van de patiënt toch het gesprek leiden.

En de partners? Ik hoorde van Lorette dat zij nog wel eens niet kwamen opdagen?

Dat klopt. Dat vond ik heel vervelend. Vaak zorgde ik er dan voor dat er een nieuw gesprek werd ingepland. Ik denk dat het goed is als de partner aanwezig is. Het blijkt namelijk ook dat levensstijl veranderen makkelijker is met zijn tweeën dan alleen.

Hoe vond je de houding van de partners?

Ja, partners zijn vaak wel eager om mee te helpen. Maar ik heb ook wel eens gehad dat ze partners wat laks of ongeïnteresseerd waren omdat zij vonden dat het advies niet voor hen gold. Op een gegeven moment slaat dat wel om.

Komt dat doordat vrouwen misschien meer verantwoordelijkheid voelen?

Ja bijvoorbeeld..

En op het gebied van vertrouwen, had jij het gevoel dat vrouwen en partners de waarheid spraken?

Ja ik denk het wel. Soms vroeg ik nog wel eens voor de tweede keer een vraag, maar dan net iets anders geformuleerd als ik over iets twijfelde. Maar ik denk dat vrouwen en partners het liever ook anders zien als ze naar het consult komen. Ik denk ook dat de patiënten eerlijker zijn dan bij een specialist. Ook omdat er geen gevolgen zijn. Behalve bij een blaastest dan. Daarnaast zijn het vaak ook jongere meiden die bij het consult komen.

Is er dan nog een verschil tussen vrouwen die het voortplantings traject ingaan of al zwanger zijn?

Nee niet perse. Ik denk dat beide eerlijk zijn. Of ze moeten heel goed kunnen liegen.

En merkte je nog een verschil in het lezen van mensen online of offline?

Ja, online was vaak lastiger. Patiënten worden vaak ongemakkelijk bij bepaalde vragen over leefstijl. Offline kan je dat veel beter zien. Dan kan je ook vragen beter aanpassen, waardoor het gesprek minder direct is. Online begin je toch sneller met levensstijl en adviezen. Offline kan je beter op de patiënt aanpassen.

Appendix B

Interview participant 1.

E: Heb je voor je zwanger wilde worden iets aan je levensstijl veranderd?

D: Het enige wat ik heb gedaan is stoppen met anticonceptie, de pil, en daarna foliumzuur ben ik gaan slikken en voor de rest niks. Het klinkt heel stom maar ik dacht we kijken wel en mocht het dan lang duren en niet vanzelf. Dan gaan we stoppen met alcohol en dat soort dingen. Maar in eerste instantie probeerden we het gewoon zo natuurlijk mogelijk, geen stress. Doorgaan met het normale leven, maar dan wel het foliumzuur slikken. Als je stopt met de pil slikken is dat ook beter om te doen, maar dat was voor de rest het enige.

E: Oh ja, mag ik vragen hoe oud je bent en wat je nu doet?

D: Ik ben 24, op het moment zit ik thuis met mijn dochter. Maar normaal gesproken ben ik docent geschiedenis in Utrecht. Dat is wat ik in het dagelijks leven doe. En daarnaast sport ik ook nog. Ik ben fan van crossfit, dus dat doe ik 2 keer in de week.

E: Moest je daarmee stoppen door de zwangerschap?

D: Ik heb aan de verloskundige gevraagd of ik mocht sporten, dat mocht, ze vroeg wel welke sport. Daarbij zei ik dus crossfit, wat best een heftige sport is. Vooral die buikspieren moet je heel erg mee oppassen, maar uiteindelijk ben ik tot week 36 daarmee doorgedaan.

E: Oh dat is best lang?

D: Ja.. ik had langer door willen gaan, maar ik kreeg last van mijn schouder. En als ik moest bevallen met zo een last van mijn schouder dan zou het hem niet worden. Dus toen ben ik gestopt.

E: En hoe vond je het überhaupt om je levensstijl te veranderen? Je voeding, wat je niet in de zwangerschap mag doen?

D: Uhm, nee, voeding, ik ben dol op een wijntje. Als je zwanger bent weet je meteen dat je daarmee moet stoppen. Dat klinkt misschien cliché, maar je weet waarvoor je het doet. Als je blijft drinken weet je dat het niet goed is voor je baby. Daar had ik ook geen moeite mee om te stoppen. Qua eten scheelde me dat vrij weinig. Weet je wel, dat je hoort dat filet americain en carpaccio niet mag, dat maakte me niet uit. Ik had ook zo een app, weet niet eens meer hoe die heet, die heb ik ook meteen verwijderd. Dat is een app van voedingscentrum, daar typ je in wat je wel en niet mag eten. Dat hield ik wel vaak bij.

E: De zwangerhap? Kan dat?

D: Ja klopt! Die was ideaal.

E: En hoe kreeg je van de verloskundige informatie? Werkte je mee aan een bepaald traject?

D: Nee, die zeiden vooral of vroegen heel netjes "rook je, drink je" dan zeg je heel netjes "nee". Dan zeggen ze: ja dat moet je niet doen en waarom niet. Dan geven ze uitleg over voedingsmiddelen als koffie en drop. Daarna zeggen ze dat je een app kan downloaden waar je alles in kan vinden. Ja, en voor de rest gebruik je je gezonde verstand.

E: En wat vond je van dat gesprek?

D: Ja, ze moeten het waarschijnlijk gewoon verplicht doen. Omdat ja, er zullen genoeg vrouwen bij zitten die het niet doen. Maar ik had van ja ja, wist ik toch, duh. Maarja, ze moeten dat natuurlijk wel doen. Het is ook goed dat ze het doen, maar ik was overal al lang mee gestopt en wist het al dus ja..

E: En zocht jij veel informatie op tijdens de zwangerschap?

D: Ja, ik ben wel van het googlen. Dat is heel dom maar ik doe het wel.

E: Ga je dan naar specifieke sites of zocht je gewoon in de zoekmachine en keek je wat daaruit rolde?

D: Ja.. vaak zocht ik gewoon op google en kwam ik bij 24baby of zwangere portaal. Dat soort dingen.

E: Geloofde je dan vaak wat daarop stond?

D: Ja ik las wel vaak alleen de sites van verloskundigen en 24baby. Dan weet je dat er iemand achter zit die er werkelijk verstand van heeft. Bij sommige forums, die heb ik 1 of 2 keer gelezen, maar die zie je dat de 1 dit en de ander dat doet. Toen dacht ik wel, zo is het goed.

E: Heel begrijpelijk, want hoe kon jij eraan zien dat het gevalideerd was?

D: Ja misschien komt dat door mijn opleiding, maar ik kijk vaak naar de bronvermelding.

E: En had je momenten dat je onzeker werd van alle informatie?

D: Ja, nou vooral toen ik mijn haar had geverfd. Ik had highlights genomen, dat zit niet op de hoofdhuid, maar dan zegt de ene weer dat kan je echt niet doen. De ander weer wel, de kapper gaat toch ook niet stoppen met werken als ze zwanger zijn. Of op vakantie was ik 10 weken zwanger, toen was ik in Italië daar eten ze heel veel rauwe producten. Nouja, dan zit je ook wel eens op internet dat je denkt o mocht ik dit wel of niet. Daar word je onzeker van, omdat je dan niet altijd een eenduidig antwoord krijgt.

E: En ook dat vergelijken met andere vrouwen die er een mening over hebben.

D: precies, daar ben ik ook heel snel mee gestopt. En mijn man zei ook: als je denkt dat het goed is, is het goed. En anders, mocht het toch misgaan of iets eet wat niet helemaal goed is betekent niet meteen dat het helemaal verkeerd gaat.

E: Want hoe ging jouw partner met de zwangerschap om? Zocht hij veel informatie op?

D: Nee, mijn partner is heel nuchter. Dus die zei gewoon: je weet wat je wel en niet mag. En anders zet je het in de app. En als je het wel mag dan eet je het lekker wel, en anders niet en dan denk je er niet meer over na.

E: Oh, die dacht vooral heel structureel systematisch

D: Ja

E: Oh dat lijkt me wel heel fijn om te hebben

D: Ja dat was soms ook wel heel erg nodig.

E: En kwam dat denk je ook doordat jij het lichamelijke aspect had en hij niet.

D: Ja, dat denk ik ook wel. Ik voelde me als vrouw veel verantwoordelijker. Als ik iets verkeerd deed of doe dan is dat mijn verantwoordelijk. Dat begreep hij ook wel, maar

Appendix B

[...] ik bleef bijvoorbeeld wel sporten. Dat vond hij dan eigenlijk weer niet goed. Dan zei ik: ja ik heb mijn sport nodig, ik ben misschien zwanger maar ook mezelf. Die crosfit is dan net het uurtje waar ik gewoon mijn eigen ding kan doen. En.. dan voelde je bij hem een soort verantwoordelijkheid van "en ik moet op mijn vrouw letten en voor de baby, dat het niet de bedoeling is dat je straks te hard sport en er iets mis gaat".

E: Want konden jullie elkaar wel motiveren en stimuleren om gezonder te leven?

D: Ja, dat ging best heel goed. Mijn man rookte nog, die is tijdens de zwangerschap gestopt. Sowieso als de dochter er zou zijn, dan zou het verstandig zijn om te stoppen. Ook als hij rookte nam hij afstand. Maar nu is hij helemaal gestopt en dat deed hij ook uit zichzelf. Ik wilde hem niet forceren om te stoppen, maar dat deed hij echt zelf. Die verantwoordelijk in zien heeft hij gedaan. Hij dronk ook echt wel wat minder. Hij hoefde daar van mij ook niet mee te stoppen, maar bij een etentje en drankje dan mocht hij dat echt wel doen.

E: Had je partner ook bepaalde apps die hij gebruikte over de zwangerschap?

D: Nee.. nee.. dat was echt alleen ik.

E: En hoe was je relatie met de verloskundige, had je veel contact met haar?

D: Nou eigenlijk aan het begin niet. Ik had nergens last van en ging er puur heen voor de controle. Aan het eind van de zwangerschap had ik wat meer echo's nodig omdat mijn buik wat achterbleef en het kind in een stuit lag. Maar toen had ik veel contact, dat was ook heel fijn. Tijdens mijn bevalling had ik dan ook 2 verloskundigen waarmee ik was geweest, dus dat voelde ook wel echt vertrouwd. Dat was wel fijn.

E: Je vertrouwde dus wel je verloskundige?

D: Ja zeker!

E: Waarmee zou je die band kunnen vergelijken? Zijn dat vriendinnen of?

D: Het is meer.. vriendinnen niet. Maar meer je voelt je er niet ongemakkelijk. Bij de huisarts voel je je ongemakkelijk omdat je in 10 min. moet vertellen wat er aan de hand is. Zij gaan er echt voor zitten, ze hebben tijd, ze zijn professioneel maar kunnen ook een grapje maken en over zichzelf vertellen. Het is een soort dokter en professioneel, maar ze hebben ook hun professionele manieren zelf waardoor je gewoon makkelijk een klik krijgt, de 1 meer dan de ander, en daardoor voelt het ook niet gek als ze in je huis lopen.

E: Vertelden ze ook over hun eigen ervaringen van de zwangerschap?

D: Ja sommige wel, die zeiden dan hoe lang het duurde of hoeveel kinderen ze hadden. Ja, de 1 is heel nuchter. Dat is ook heel goed. Ik denk niet dat het vriendinnen zijn, ook geen kennissen, maar als je in het dorp loopt en je komt ze tegen maak je wel een leuk praatje.

E: Ah, ze komen wel uit de buurt?

D: Ja, de meeste wel.

E: En had je er dan geen moeite mee, dat je privé informatie moest geven, of het niet erover wilde hebben of was je heel open.

D: Nee, dat maakte me niet uit. Ze zeggen en vragen echt alles en daar hebben ze hun redenen voor. Maar ik had niet het idee dat ze daarna dan naar collega's gingen

en zeiden: oh jeetje, die doet dit en dat.

E: Het voelde vertrouwd en discreet?

D: Ja zeker.

E: En met hoeveel verloskundige heb jij samengewerkt of zijn er met jou meegelopen?

D: In barneveld zijn er 2 teams, het ligt eraan welke locatie je zit en dan krijg je het hele team te zien. Ik wilde graag thuis bevallen, dat is ook gelukt, en de verloskundige die je dan aan je bed krijgt die heb je als het goed is dan ook al gezien. Dus ja, ik denk dat het er vijf waren.

E: En het is fijn dat je dezelfde mensen ziet? Een soort herkenning?

D: Ja, zeker.

E: En kreeg je andere levensstijl voorschriften omdat je thuis wilde bevallen?

D: Nee, eigenlijk moet je een aantal spullen in huis hebben, daar helpt de kraamhulp je bij, en de verloskundige zegt dat je dit of dat moet doen. Ja, daar maakt het niet echt uit waar je gaat bevallen. Maar als je een specifieke voorkeur hebt voor thuis is het wel goed als je bepaalde dingen thuis hebt en een tas klaar hebt staan als je naar het ziekenhuis moet, de vluchtbox. Maar nee, niet echt het idee dat ik er rekening mee moest houden of extra dingen moest aanschaffen.

E: Ja precies, vond je dat er genoeg contact was tussen jou en verloskundige? Had je meer contact willen hebben of minder?

D: Nee, ja, ik vond het goed zo. Weet je wel soms, denk je wel eens dat ik dacht toen groeide mijn buik niet. Dan wilde mijn moeder dat ik ging bellen of nog een keer langsgaan. Dan vond ze 2 of 3 weken lang. Maar dan zei ik: ja als zij zeggen dat het goed is, waarom zou ik er dan volgende week weer gaan zitten. Het kost veel tijd, het is leuk om daar te zitten maar vaak is het: gaat het goed, ja het gaat goed, is er nog niets? nee ook ja joe.

D: ja ik was daar redelijk nuchter in. Ik dacht, zij houden het in de gaten. Als het goed is is het goed. En als ze me moeten doorverwijzen dan doen ze dat wel.

E: En, aan het begin van de screening. Toen je zei je al dat je heel goed wist wat je moest doen. Wat wel en niet mocht. Heb je je ook wel eens beoordeelt gevoeld? Of toch het idee dat de verloskundige heftig op je reageerde.

D: Nee eigenlijk niet. Het is echt zonder oordeel geweest.

E: Vind je dat belangrijk dat dat zo is?

D: Ja, ze zullen vast een mening hebben. En als ik er niet om vraag moeten ze die vooral voor zich houden. Maar in sommige gevallen kan ik me voorstellen dat ze wel duidelijk moeten zijn. Als ze bijvoorbeeld zouden vragen of ik drink en ik zou dat nog steeds doen, dan verwacht ik wel dat ze dan wel ingrijpen.

D: Maar goed, dat was voor mij niet nodig. Volgens mij deed ik alles ook heel keurig.

E: Merkte je ook dat daardoor die gesprekken veel korter waren,

D: Ja, als je overal ja op kan zeggen dan is het goed.

E: Voelde dat dan soms nutteloos?

D: Ja, ja dat zei ik eerder ook al. Voor mij was alles logisch, dan dacht ik "moet dit nu?"

Appendix B

maar ja, het hoort erbij.

E: Hoe lang kon zo een gesprek dan duren?

D: Ja, de eerste intake toch wel een half uur, drie kwartier.

E: dan wilden ze alle gegevens.

D: Ja, welke bloedgroep, waterpokken, wat voor beroep, welke levensstijl, sporten.

E: En de vervolg gesprekken waren dan veel korter.

D: Ja zeker, die waren niet langer dan een half uur.

Interview Participant 2.

Ev: Ik wordt enthousiast van het idee dat alles op 1 plek hebt, in plaats van daar een app, daar een app. Want dat maakte mij wel heel erg onzeker.

Em: Op wat voor manier dan?

Ev: Omdat in principe, iedere verloskundige zegt "google zo min mogelijk", er staan alleen maar horror verhalen op het internet. Je zou dit niet mogen eten.. het is heel zwart wit. Er wordt aangeraden om naar mensen te gaan die er verstand van hebben, er wordt niet voor niets voor gestudeerd in plaats van dat iemand een eigen site begint waar iedereen op kan reageren.

Em: Je zou eigenlijk behoefte hebben aan 1 plek waar professionele informatie op staat zodat je het niet zelf hoeft op te zoeken en als je het opzoekt dat het ook werkelijk goed is.

Ev: Ja absoluut, in principe zie je je verloskundige 1 keer in de maand. Aan het begin minder, aan het einde elke week. De verloskundige is de eerste persoon die überhaupt weet dat je zwanger bent. Dus je hoeft niet in principe naar de huisarts. Zodra je een positieve uitslag hebt plan je een afspraak in bij de verloskundige. Die zegt, rond de 7 weken mag je langs komen, dan krijg je de eerste echo en dan kijken of er een hartje klopt of het buiten baarmoederlijk is. Dan na 12 weken krijg je weer een echo, als die goed is is de kans op een miskraam zeer klein. Dan gaat het echt goed. Eigenlijk vanaf 6/7 weken ga je naar de verloskundige, tenzij je een miskraam hebt.

Em: Hoe vond jij die tussentijd van 7 weken voordat je naar de verloskundige ging, je had toen misschien al best wat vragen over je zwangerschap?

Ev: Nouja, ja. Ergens is het heel chill, want als je er dan heen gaat heb je direct is er iets zichtbaar of niet. Daarvoor weet je toch niks en kunnen ze het ook niet zien. Ze kunnen nog geen echo maken omdat het zo klein is en ook meer dat je denkt: je kan er nu wel heen gaan maar het heeft geen zin, want ze gaan toch niks zien en er komt toch niks uit. Dus ik vond het niet zo erg om te wachten. Ook omdat je, als je dan ernaar toe gaat heb je direct duidelijkheid.

Em: Had je dan wel onzekerheid over dat er überhaupt iets in je lichaam gaat groeien?

Ev: Ja zeker wel, je moet je levensstijl aanpassen. Je hebt geen idee wat mag. Ik wist natuurlijk wel dat je niet mocht drinken en roken, maar bijvoorbeeld dat je geen tonijn mag eten. Ook al is het gekookt, gebakken, dat mag gewoon niet omdat er bepaalde kwik in zit. Dat soort dingen heb je geen idee van en dan eet je dat. En dan gaan toch mensen die weten dat jij zwanger bent zeggen dat het slecht is. Dat vond ik heel vervelend.

Appendix B

Em: Vond je het vervelend dat mensen dat tegen jou zeiden?

Ev: Ja, absoluut. Dat blijft de hele zwangerschap. Iedereen heeft een mening over alles. Maar daar hebben mensen het wel moeilijk mee, wat mag wel, wat mag niet. De eerste 7 weken heeft het nog niet zoveel invloed omdat het zo klein is, maar je wil het toch direct goed doen. Dus daarin is die informatie heel fijn om te hebben, maar te veel is ook vervelend. Je wil ook niet 24/7 bezig zijn met informatie zoeken.

Em: Hoe kon jij filteren tussen alle informatie?

Ev: Advies van verloskundige, apps die ik voorgesteld kreeg. Ik mocht dan die geloven en geen enkele andere. Ga het niet google, vertrouw op die app. Iedereen weet dat bepaalde dingen niet mogen, maar het is ook niet erg als het wel een keertje gebeurt. Ik geloof de verloskundige, maar ik ga ook van mijn eigen gevoel uit. Je kan alles gaan volgen, maar vroeger werden er ook gezonde kinderen geboren. Je kan jezelf gek maken, maar dat heeft geen zin. Daan gaan die 9 maanden heel lang duren.

Em: Hoe reageerde je als je iets had gedaan wat niet 'mocht'?

Ev: Aan het begin schrok ik daarvan, ik voelde me heel schuldig. Dat ik het had verpest. Je moest ook lang wachten tot je weer een echo kreeg, dus het wachten tot je weer naar het hartje mag luisteren is dan vreselijk. Je hebt in die tijd geen idee hoe het gaat, omdat je het dan pas over 4 weken weer weet. Hoe verder je in je zwangerschap komt, hoe meer je jezelf gaat vertrouwen. Je gaat het voelen, dan wordt het minder spannend. Het wordt natuurlijk ook veel voelbaarder.

Het begin van de zwangerschap vond ik dus eigenlijk veel spannender. Je hebt geen idee wat er gebeurt van binnen, maar je weet wel dat er iets gebeurt. Je voelt je niet goed, je weet niet wat er gebeurt. Daarom is het zo fijn om 1 medium te hebben waar je dagelijks vragen aan kan stellen in plaats van dat je 4 weken moet wachten of op moet bellen.

Em: Wat had de verloskundige voor kwaliteiten voor jou? Wat voegde zij toe voor jou bij de zwangerschap.

Ev: Ik heb een hele positieve ervaring bij mijn verloskundige, je hoort ook wel eens andere verhalen. Ik vond het super chill dat ze zo kundig zijn. Je kan google naar dingen, maar als je er naar vraagt weet je dat het goed is. Ze heeft ervoor gestudeerd. Je weet dat je met een professional praat. Hierom moet de verloskundige ook wel echt blijven en moet het niet alleen het ziekenhuis worden. Bij de verloskundige heb je veel meer het idee dat je met een écht mens praat. Je bouwt een band op met iemand, voor 9 maanden lang. Je gaat steeds intieme vragen durven stellen. Het is echt een soort van maatje, ja dat is misschien heftig, maar het wordt degene die je proces begeleidt. Je gaat diegene echt

vertrouwen en je kan diegene alles vragen, waarbij je zeker weet dat er een goed antwoord uitkomt dat jou goed helpt.

Em: Wat is het goede woord voor die verloskundige?

Ev: Ja het is gewoon een soort rots gedurende je hele zwangerschap. Je maakt het met haar mee, de echo's, als er iets niet goed is, als er wel iets goed is. Je deelt zoveel van je zwangerschap met de verloskundige, zelfs de bevalling kan je met de verloskundige doen. Het is best wel intiem.

Em: Is dat fysieke contact dan heel belangrijk?

Ev: Ja absoluut, ik zou niet zonder kunnen.

Em: Uiteindelijk ga je de verloskundige dan meer zien, wordt die band dan anders?

Ev: Ja op een gegeven moment naar je bevalling aan het toeleven.

Em: Hoe gaat zo'n verloskundige daarmee om?

Ev: Ze laat het heel open. Iedereen heeft een ander beval plan. In principe weet je deskundige dat plan en vanaf week 30 ben je samen bezig, dit is wat je wil, dit is wat je nodig hebt. Daarin is het heel fijn om fysiek diegene te zien en daar contact mee te hebben.. Vanaf 33/34e week ga je er elke week heen.

Em: Had je behoefte om haar vaker te zien?

Ev: Nee dit is meer dan genoeg. Absoluut.

Em: En scheelt het dat je je partner had?

Ev: Ja absoluut, klinkt cliché maar je doet het samen. Ook voor de man is het zo ontzettend fijn dat je een verloskundige hebt. De man heeft geen idee wat er te wachten staat. Hij heeft geen idee wat de zwangerschap met iemand doet. Daardoor is het leuker als mijn partner mee gaat om het hartje te voelen of schopjes. En ook voor hem om met de verloskundige te praten, hoe hij moet handelen op bepaalde momenten.

Em: Wie van de 2 had het meeste behoefte aan informatie of dingen opzoeken?

Ev: Misschien mijn partner wel meer dan ik. Het was verschillend. Mijn partner meer praktische zaken, wat moet er mee naar de bevalling, wat moet ik doen en hoe kan ik je ondersteunen en ik eerder over mijn levensstijl, eten. Meer wat mij aangaat...

Em: Meer wat jou levensstijl beïnvloedt en je gedrag?

Ev: Ja precies! Voor mannen zou het wel heel fijn zijn als er een platform is met alle informatie.

Appendix B

Em: Ja voor mannen om informatie te vinden op een platform waar zij altijd terecht kunnen.

Ev: Klopt, mijn partner had vaker vragen dan ik. Ik wist het soms niet, maar dan dacht ik het zal wel zo en zo. Ik voel het wel aan. Mijn partner had dan geen idee. Hij ging dan veel eerder informatie opzoeken.

Em: Wat vond je ervan dat je partner dan informatie ging opzoeken?

Ev: Ja dat vond ik okay. Het is zo abstract voor een man wat er allemaal gebeurt natuurlijk.

Em: En qua emotie?

Ev: De eerste 20 weken vond ik heel zwaar. Ik moest veel overgeven, elke dag. Daaraan weet je gewoon dat je zwanger bent en dat het allemaal hormonen zijn. Dat vond ik pittig, ook omdat je emotioneel bent en je voelt je ziek maar je moet gewoon werken. Aan de buitenkant zie je nog niet dat iemand zwanger is. Dat zie je later natuurlijk wel. Dat vond ik heel pittig. Voor mij werd het daarna alleen maar makkelijker en leuker. Maar tuurlijk had ik last van hormonen. Ik was dan chagrijnig maar wist dat het nergens op sloeg haha. Maar ik kon er gewoon niet mee stoppen.

Je moet je eraan overgeven. Ik had het gelukkig niet erg, maar de eerste 20 weken vond ik het pittig omdat het nog niet visueel en voelbaar is. De eerste periode is ook spannend, wat mag nou wel en wat niet. Dat vond ik emotioneel heel pittig. Ook qua hormonen.

Em: Die factor dat je het moet geheim houden is vast ook moeilijk?

Ev: Ja.. wij hebben het na 12 weken verteld. Maar dan is het heel lekker, want dan heb je 12 weken die zwaar waren en dat je liegt. Maar je weet dat het erbij hoort dus je kan het makkelijk relativiseren. Maar je bent wel snel kapot na zo'n dag.

Em: Zocht je ook wel eens op internet over die emoties?

Ev: Nee, ja weinig. Ook omdat je, dat is heel zwart wit, als je verdrietig bent, dan krijgt je kind dat mee. Hierdoor voelde ik me schuldig als ik een klote dag had. En dan ga ik dat opzoeken op internet en dan ging ik me nog slechter voelen. Dus ik ga echt niet meer op google. Er staan ook fijne dingen op, maar heel veel google ik niet. Dan krijg je een kind met stress stoornis en moeder met postnatale depressie

Em: Dus het zorgt alleen maar voor stress

Ev: Ja, ja. Je wil er echt geen stress van en je mag het ook niet.

Em: En welke apps worden aangeraden?

Ev: De ZwangerHap, die is van de Nederlandse gezondheid ..., daar staat alles wat je wel en niet mag eten. 24baby is er 1, ook als je zwanger bent kom je in een soort zwangerschapsportaal. Ook daar staat allemaal info van deskundigen.

Em: En is dat informatie van jouw ziekenhuis specifiek?

Ev: Ja, maar je kan op dat portaal echt alles vinden. Ook van andere zorginstellingen.

Em: En daar kan je alleen komen als je zwanger bent?

Ev: Ja. Het het ook echt zwangerenportaal.

Em: Welke gebruikte jij het meest?

Ev: 24 baby, dan zie je per week hoe jouw kind is en wordt. Dat doen zij met een soort illustratie. Wat de ontwikkelingen zijn van jezelf en van je baby. Het zwangerenportaal heb ik ook veel gebruikt omdat daar echt onderzoeken op staan. Artikelen die echt door deskundigen zijn geschreven. Ik heb geprobeerd zo min mogelijk op te zoeken of wat dan ook.

Em: Wat is daar de reden voor?

Ev: Je kan jezelf zo snel gek maken. Het is al snel niet goed en overdreven. Als vrouw vind ik dat je op jezelf mag vertrouwen wat wel en niet goed is. In plaats van dat je je helemaal gek gaat maken wat je wel en niet nodig hebt, wat gevaarlijk is en wat niet gevaarlijk is. Je moet er ook van genieten.

Em: En het moederlijk instinct?

Ev: Ja, zeker. Daar mag je op vertrouwen.

Em: Dus bij een voice assistant mag het niet zomaar reageren?

Ev: Ja, nou meer van het is niet slim en niet het mag niet!

Em: Het mag geen strenge stiefmoeder worden?

Ev: Nee, precies. En dat is in die zin het chille van een verloskundige dat in een gesprek alles naar voren komt. Op het internet is alles zo zwart op wit, terwijl een VA zou zeggen dat mag niet dat mag wel, je mag hier zoveel van of hey je kan het wel eten etc. Maar let er op, niet te veel.

Em: Dat menselijke aspect?

Ev: Ja empathie, niet zo'n hele afgepaste robot.

Em: Had je er iets bij voor kunnen stellen dat de verloskundige een man had kunnen zijn?

Appendix B

Ev: Nee dat zou ik heel raar vinden. Ik vraag me af of het bestaat. Ik zou het heel weird vinden als het opeens een man zou zijn.

Em: Waar ligt dat aan? Van vrouw tot vrouw?

Ev: Ja, en je moet veel naakt en inwendig onderzoek. Bij een gynaecoloog gebeurt dat ook en dat is echt niet zo erg, maar als je weet dat je 9 maanden met iemand een traject aangaat voelt het ergens vertrouwd dat je een verloskundige hebt die zelf kinderen heeft gehad. Die begrijpt het echt, een man zal het nooit begrijpen.

Em: En zelfs op gebied van advies over levensstijl, een man zou dat doen... hoe zou je je daar over voelen?

Ev: Ergens dikke prima, maar ergens denk ik dat het toch meer deskundig word en zwart op wit. Zoveel procent is dat, zoveel procent is dit en daarom dit en dit.

Em: Is dat weer die empathie?

Ev: Ja, ja, ja. Een man zou nooit kunnen zeggen dat hij het zelf heeft geprobeerd of dat hij zoveel kinderen heeft of dit gezien en dat het daarom allemaal meevalt of juist niet.

Em: Kwam de verloskundige altijd naar jou toe of ging jij ernaar toe?

Ev: In principe ga je altijd daar naartoe, maar je mag 24/7 bellen en als je belt omdat er iets is dan komen ze altijd naar jou toe.

Em: En hoe voelde je bij dat 24/7 bellen?

Ev: Ik heb 2/3 keer gebeld zonder dat ik een afspraak had. Dat kwam doordat ik 's avonds opeens super veel bloed verloor en dacht shit is dit... kan dit of niet. Dan is het heel fijn dat je 's avonds kan bellen. Ook toen mijn bloeddruk heel hoog was, waar ik tijdens mijn zwangerschap veel last van had, dan komen ze naar je toe om de bloeddruk thuis bij je op te meten. Het is heel lekker dat het kan, een fijn gevoel dat er meerdere mensen zijn die 24/7 voor je paraat staan wil er iets zijn.

Em: Zo te horen belde je alleen als je het idee had dat het echt niet goed ging?

Ev: Nee, nee ik belde alleen bij urgentie. Toch het gevoel dat het 24/7 kon gaf heel veel rust.

Em: En ook dat het een echt mens is?

Ev: Nou dat zou ik niet eens perse hebben. Mocht er iets aan de hand zijn zou ik wel willen dat er 24/7 iemand naar je toe kan komen, maar als ik een vraag zou stellen en op een bandje afgespeeld worden en een goed antwoord zou daaruit rollen dan zou ik dat ook prima vinden.

Het nadeel hieraan is stel er is wel iets, of de verloskundige twijfelt, dat zou een

voice assistant niet hebben.

Em: En hoe vond jij het reizen naar de verloskundige? Vond je dat vervelend?

Ev: Nee dat was prima. Ik ging met de fiets, dat kon tot het einde.

Em: Je had niet de behoefte om meer vanuit huis te doen?

Ev: Nee, je zit al zoveel thuis, ik vond het heel lekker dat ik weg kon.

Em: Wat vond je dan van dat thuis vinden?

Ev: Ja heel taai, op een gegeven moment ben je echt aan het wachten. Je kan niet opeens 4 keer sporten of een nieuwe hobby starten, want daar ben je te moe voor. Maar je bent ook niet ziek, je zit er tussenin. Je bent vrij omdat je een kind krijgt, maar je hebt geen idee wanneer. Het is echt wachten en dat is heel taai.

Em: En kwamen er wel veel mensen langs?

Ev: Ja, gelukkig wel.

Em: Dus je was niet eenzaam?

Ev: Nee, het enige is wel. Daar heb ik geen last van gehad. Maar als je je uitgerekende datum voorbij bent dan gaan mensen niet meer langskomen of appen of bellen. Dat had mijn zus, en als zij dan belde naar mensen dan dachten ze "het is gebeurd". Dat zijn taaie dagen en dan kan je vereenzamen. Ja je durft zelf niks meer en mensen ook niet.

Em: Een soort eigen gevangenis, waarbij je wacht op iets heel erg leuks maar...En jij hebt een hele gezonde zwangerschap gehad toch?

Ev: Alleen dat ik ingeleid moest worden vanwege hoge bloeddruk

Em: En hoe doen ze dat dan? Dan moet je wel echt naar het ziekenhuis komen?

Ev: Ja 1 keer had ik minder leefgevoel, toen zijn Timon en ik 5 dagen lang elke dag naar het ziekenhuis geweest. Dan moest ik een CVG hartfilmpje en echos maken elke dag of alles wel goed was. Toen moest ik wel echt naar het ziekenhuis. En dus met die hoge bloeddruk en inlijving was ook volledig medisch.

Em: En terug naar die levensstijl, jij hoorde dat je zwanger was. Daarvoor had je normaal geleefd. Hoe ging je daarmee om?

Ev: Ik vond het heel lastig. Ik kwam er pas laat achter, eerst deed ik dingen en daarna mocht ik het niet meer. Dat vond ik ook niet eerlijk, dat mijn partner wel alles mocht en ik niet.

Ik moest mijn hele levensstijl aanpassen. Zonder dat ik dat eigenlijk wilde. Na de eerste echo wel, maar daarvoor eigenlijk echt niet. Dat vond ik zwaar, dat alles,

Appendix B

mijn levensstijl veranderde.

Em: Vond je het moeilijk om te vertellen hoe jouw levensstijl voor de zwangerschap was?

Ev: In Barneveld wel, in Amersfoort helemaal niet. De eerste twaalf weken zat ik bij Barneveld bij de verloskundige. Daar vond ik het heel lastig, ik had geen leuke verloskundige en daar worden heel suggestieve vragen gevraagd. Vooral over alcohol in combinatie met geloof. Ik werd afgezet als een alcoholist.

Em: Er was meteen een mening klaar?

Ev: Absoluut, in Amersfoort helemaal niet. Dan namen ze aan dat je wel meer alcohol dronk voor de zwangerschap.

Em: Hoe ging je ermee om dat een verloskundige niet fijn was?

Ev: Ik wist al dat ik weg ging. Dat Scheelde heel veel. Maar het was een onzekere start. Ik dacht shit heb ik iets slechts gedaan. Want voor je zwangerschap moet je eigenlijk al beginnen met folium zuur slikken en tot 12 weken, ik begon pas na 8/9 weken. Ik heb het zo'n lange periode niet geslikt, daardoor was ik bang dat mijn kind misschien een open ruggetje zou krijgen. Dus ik heb het nu maar 3 weken geslikt, terwijl sommigen het al jaren slikken of 12 weken voor ze weten dat het niet meer nodig is. Dat zijn nare dingen... maar het is helemaal goed komen!

En het is fijn dat de verloskundige dat gesprek wat empathischer aangaat.

Em: Want was dat vergelijken met andere vrouwen vervelend?

Ev: Nee, ja, er wordt tijdens de zwangerschap er veel vanuit gegaan dat iets normaal is en iets niet. Dat is sowieso wel lastig. Wat tegenwoordig normaal is vind ik weer overdreven omdat daar veel te veel over na wordt gedacht. Ik vind tegenwoordig het lastig dat er zoveel kennis overal over is. Je wordt, wat nu normaal is, vind ik al heel ver gaan. Ja dan vinden mensen mij als snel abnormaal of laconiek of wat dan ook. Je wordt sowieso vergeleken met de standaard. Dan dacht ik wat als ik de standaard niet als leidraad heb? Maar voor veel mensen is het heel ingewikkeld, want je wil het graag goed doen. Het gaat niet alleen om jezelf maar om het leven in je.

Em: Kan me ook voorstellen met influencers dat zij ook veel invloed hebben op zwangere vrouwen. Dat het misschien zelfs vervelend kan zijn.

Ev: Iedereen weet het wel beter. Dat is heel vervelend. Iedereen weet het beter en heeft ergens anders wel iets gelezen. Je moet ook snel iets laten, omdat je denkt: ja, ik wil niet ergens ziek van worden. Ikzelf ziek worden vind ik niet erg, maar je beslist in de zwangerschap ook over het leven van iemand anders. Je laat daardoor dingen staan. Niet voor jezelf maar voor het leven in jou. Denk dat

je daardoor ook wel echt jezelf kan gek maken.

Em: Had je het idee dat je jezelf wel eens wegcijferde en het kind op 1 zette, ook op het gebied van levensstijl.

Ev: Ja sowieso, ook natuurlijk omdat je dingen niet mag omdat je zwanger bent. Dat is al heel snel niet voor jezelf maar voor je kind in je. Je wil het heel graag, ook zelf, maar je doet het uiteindelijk voor je kind.

Em: Ja logisch, je wil een glaasje wijn maar je weet dat het niet goed is

Ev: Ja in die zin wil je het ook niet. Je wil het heel graag maar je wil het ook echt niet.

Em: Je zit constant in een soort tweestrijd

Ev: Ja, zeker.

Interview participant 3.

Zou je iets willen vertellen over jouw zwangerschap tot nu toe?

Ja, ik kan je nu al vertellen dat ik het er maar moeilijk mee heb. Ik gebruik nu de Zwangerhap veel. Ken je dat? Dat is zo een app waar je je voedsel kan testen of je het wel mag eten. Ja, ik weet wel al veel, maar nog steeds zijn er dingen als vis, groenten of fruit, vooral rauwkost, waar ik veel twijfels over heb. Ik vind dat ook heel erg moeilijk.

Ik ben naar Kroatië geweest. Daar kreeg ik dan borrelplankjes, sla, vis, en alles moest ik opzoeken of eigenlijk gewoon overslaan. Dat vond ik helemaal niet leuk. Daarnaast twijfel je over alles.

En je partner? Zoekt hij veel op?

Ja, dat valt tegen. Mijn partner of vriend denkt wel mee maar zoekt het niet op. Vooral op vakantie vroeg hij er dan eerder naar. Of ik het wel mocht eten. Maar ik denk dat ik veel meer de verantwoordelijkheid voelde. Ik denk ook eigenlijk dat in vis meeste beperkingen zit. Sommige zijn dan wel goed, andere niet. Maar het is dan wel goed om vis te eten begrijp je? Er valt erg veel weg, vooral borrel. Maar het meest lastige vond ik dus rauwkost. Ja, dat heeft te maken met katten die buiten poepen. In kattenpoep zit een bacterie die slecht is voor de baby. Hierdoor mag je dus ook niet de kattenbak verschonen, goed je groenten wassen etc. Ook in restaurants is dat moeilijk. Er staat dan wel dat iets dagvers is, maar wat is dagvers in hun ogen? Ja het geeft een soort gewetenswroeging. Ik ben niet direct gestrest als ik iets heb gegeten, maar door al die regeltjes begin je soms toch te twijfelen. Je gaat meteen denken dat 1 ding heel veel consequenties kan hebben. Die verantwoordelijkheid die je voelt om het goed te doen is dan zo groot. Ik heb ook wel eens dat ik dan wel wat at, maar dan achteraf spijt had.

En kreeg je wel genoeg informatie over voeding van je verloskundige?

Nou ik heb eigenlijk nog helemaal niet zo lang contact met mijn verloskundige. Voorafgaand helemaal niet zelfs. Toen heb ik zelf een afspraak gemaakt bij het echocentrum om het hartje te horen kloppen. Hiermee kan je ook checken of de kans op miskraam minder groot is. En krijg je ook meer bevestiging dat het kindje gezond is.

En wanneer kreeg je contact met je verloskundige?

Ik kreeg toen een hele lijst toegestuurd met allemaal vragen.

Wat vond je daarvan?

Ja prima, ik dacht dat hoort erbij. Daarna kwam dan de intake, die duurde iets langer. Volgens mij heb ik bij de intake iets van een uur gezeten. Toen gingen we

door de hele vragenlijst. Ik vond dat best raar, dat dat gesprek pas na 11 weken was. Ik had al een kindje in mijn buik en had het idee dat het al behoorlijk gegroeid was. Er had al zoveel foetus kunnen gaan in die tijd, maar goed. Ja ik vond dat best gek.

Slik je medicijnen om de zwangerschap te bevorderen?

Ik slik foliumzuur, dat zit in zo een mama compleet pil.

En gaf dat rust?

Nou ik had een moment dat ik mij licht voelde in mijn hoofd door foliumzuur. Hierom ging ik dan ook mijn zusjes en moeder, die zijn allemaal verloskundigen, bellen. Ik dacht dat het te maken had met ijzergebrek of misschien een lagere bloeddruk. Daardoor voelde ik me wel iets zwakker en ben ik meer gaan letten op m'n eten.

En zijn er nog andere dingen die je hebt veranderd aan je levensstijl?

Ik ben meer melk gaan drinken, ik nam altijd al wel normale yoghurt maar geen melk. Ik nam havermelk in mijn koffie. Nu neem ik altijd een glas melk bij het eten.

Gaat de zwangerschap je goed af? Is het duidelijk voor je wat wel en niet mag?

Nou er zijn niet zoveel mensen om mij heen die zwanger zijn, ook niet die het zijn geweest. Dit geeft wel onzekerheid. Ik zou graag met anderen erover willen praten.

Ik kan een verloskundige niet dit gevoel bieden?

Nee, ik heb een aparte verloskundige, dus dat is dan niet mijn zusje of moeder. Daar heb ik voornamelijk een professionele band mee. Bij heftige dingen zoals bloedverlies bespreek ik wel met mijn echte verloskundige. Maar vaak als ik het advies dan niet helemaal begreep of ik was het er niet mee eens dan kon ik nog even met mijn zusje of moeder praten. Het is dan fijn om verloskundigen te vergelijken.

Ik denk sowieso voor eerste keer zwangerschappen dat je wil praten over bepaalde gevoelens. Ken je die consulten waarbij meerdere vrouwen bij elkaar komen? Dat heet iets van synch advies. De eerste keer dat je bij de verloskundige komt ben je alleen, maar daarna kan je gewoon zelf je bloeddruk opmeten, gaat de verloskundige naar het hartje luisteren en kijkt waar de baarmoeder zit. Dan daarna kom je bij allemaal vrouwen waar je je ervaringen kan delen. Het is een soort bijeenkomst met andere vrouwen.

Appendix B

En terug naar e-health, wat vond je daarvan?

Zwangerhap, pushberichten over eten. zwangerschaps+, nieuw verhaaltje, vrijdag samen voorlezen, dat is een leuk moment.

En hoe wist je welke e-health er allemaal was?

Gegoogled wat er was. Ouders van nu, verhaaltjes over zwangerschap. Topics, kijkt ze niet naar. Online fora.

En hoe is jouw relatie met je verloskundige tot nu toe?

Verloskundige spreek ik bijna niet, professioneel, 1 keer per maand of als ik me ergens zorgen over maak. Verloskundige niet veel waarde, vooral ook door familie.

Zou je de behoefte hebben aan een hechtere band?

Ja, elk moment is 50/50, zo voelt het, is het positief negatief, bij nipt, bij echo's Ik vind dat Apps, geeft meer kennis dan de verloskundige. Vooral de Kenmerken van bepaalde week, wat voel je, vertaling naar jouw eigen zwangerschap

En zijn er bepaalde dingen die je nu mist terwijl je zwanger bent?

Ja hockey. Sporten mag wel, maar hockey viel al heel snel uit.

Ik heb me nu ingeschreven bij klasjes waar je mag sporten met andere vrouwen.

Ik moet zeggen dat ik geen roze wolk voel van de zwangerschap

Voor de twijfels, taboe's rondom zwangerschap. Veel mensen alleen maar over gezonde zwangerschap. Dat vind ik moeilijk.

Interview Minha

Hi I am Emma, student at Design for Interaction. I am now doing my graduation project for Human Centered Design and my chair is Maria Luce Lupetti. I am investigating the space of trustworthy interactions between voice assistants and humans in the healthcare domain. Specifically for the screening of pregnant women or women and partner wanting to become pregnant. In this screening advice is given about change of lifestyle before and during pregnancy.

I am trying to find the balance between the responsibility of patients to listen to a voice assistant and confirm the importance of the advice the voice assistant is giving, some kind of authority. Hand in hand with this responsibility and authority there is trustworthiness, in which a lot of tensions exist between the institute Erasmus of which the data from all the pregnant women is gathered, the nurses gathering this data and patients being truthful during the screening.

Is it possible to hear a bit more about your project. Visually, a mockup or anything to get some context. It would be great to see. It is not common in my previous group at HTI, but at IDE we did have some visual stuff.

Presentation of the overview that I have done. Show how parties are involved in the research. I have done research in the risks, while keeping this risks in mind I have done field research. The nurse has a consultation with pregnant women and the partners. This shows how there is already a distance in the interaction between nurse and patient. They have also told me how they would like voice assistants to be implemented and that there are opportunities to use voice assistants.

Let me just kinda pause here for a bit.
Do you think trust is a measurable concept?

Well that is interesting because I am working with Erasmus and they have told me to come up with a couple of outcome measurements. Which I don't think that there actually are.. They want me to know how I test my prototype with which parameters. But I think that there is not one specific measurement, there are so many tensions and factors that could influence it. That also makes it kind of difficult. This also makes it difficult to get into one direction.

Well I could tell you a bit more about my project. It is about the cryptocurren-

cy. And it was published at GCSH they are like sociologists. Trust shouldn't be measurable it should be a shared grounding work instead of a measurable concept. Some knowledge from philosophy's they offered a different starting point according to Strauss and also some other work. But I understand that you have a different stakeholder. I get it, they have their specific idea. You can step up with the more academic stuff that they want, which is actually quite hard to do.

I also saw that trustworthiness is also about seeing familiar or doing familiar interactions. Which is different from what academics want trust to be.

Who do you work on the stakeholder side there?

Mainly nurses and the research department gathering data from the pregnant women, women wanting to become pregnant. They want to know about the lifestyle from the pregnant women to do research. Yet, there is tension because nurses are more taking care of the patients and want to know how the patients are doing. While the institution want to get data and know less about the patients.

I wonder how much of that will figure into your project. It is your masters thesis right? You will have some extra pages on your plate, but you are not in a situation in which you can please everybody. But at least, it can be an interesting bit to discuss.

How have you dealt with that though? To have potential disagreements and tensions between stakeholders. How have you managed it.

For now, there are so many opportunities. I am trying to see them as an opportunity. Mainly in the factors of authority and trustworthiness and listening to the voice assistant is what I want to focus on.

In what stage of the experiment are you now?

Still in the experimental stage and field research. I want to know how the interaction is and find as much information on what opportunities I can grasp onto. And look further in.

So which... of course there is you representing IDE, the hospital, the group of nurses, the hospital administrators and the patients. These are the 4 main stakeholders. Do you focus on one group more than the other.

Not yet really

And what method are you doing?

Research through design and speculative design.

Appendix C

Are you more on the things side, the physicality of it, the embodiment and also the what it can say, the content aspect of it. I guess research through design is addressing both. Do you have a starting point or preference.

I started now with writing content. I think this is also a safe choice, because I am not the best in prototyping and making coming physical. This is why I am now moving more to the embodiment side. In which I not only want to make voices but also make avatars or even deep fakes to evoke certain interactions.

So could you tell me a bit more about the deep fake aspect of it?

Well, especially when you are talking about deep fakes there is some kind of stigma or taboo around it. It is not trustworthy at all, that is also why I want to look into it. For myself but also for others to think why they think about deep fakes at a certain way.

There is the thing, the way it looks side, the content side and underneath the content you are adding in the deep fake aspect. Hmm, yeah I guess we could call that many things. Depending on the audience they might have an immediate opinion about deep fakes which is not trustworthy at all. So, then, in the way you are describing it. What could a deep fake do?

I can imagine that it is more of a way to explore the interactions instead of really being the end-result. Imagine what reactions you could evoke with a deep fake, but using it for healthcare, I think because there is a stigmatic taboo around it it is very hard to use in the healthcare domain.

Because you said that I will ask something different now. How necessary is it to call it a deep fake or are you playing around with the identity of the agent or the thing. Look, if you are mimicking a human nurse, or you as a researcher, if it is mimicking some real human being or artificial human being then it is an agent pretending to be human. People could pick up on that, in stead of the agent mimicking another agent or trying to be itself as a robot. So...

That would be super interesting because then you are matching characteristics such as what gender should it be, what age, which all could be interesting parameters to use for my research. Then, the name of deep fake, is to mimic something right?

Yeah, you could look it up. But, it doesn't need to mimic. If you are interested in playing around, then you can. That is the speculative aspect right. There is the content of what it says and How it is presented, right. And the deep fake is then how it is presented and related to the content. If it is mimicking some accent

for example it does not have to be some deep fake. Because it is mimicking some accent. But I think the tension that you mentioned earlier on, the hospital wanting something a little different than the patients and the nurses right. And then, you can imagine the identity of the person giving the message is important because people choose to trust. As well as the speculative nature of the content that they say. I think it is easy to be yea, mixing everything in when we call something speculative. But if you do have time and if you wanna do this a bit deeper. It is good to find out what you are exactly speculating about. It is enough work to do the agent, enough to do the content, the embodiment, you could have matrix of what you want to speculate. Is it a future nurse, different types of voices, how it talks.

Do you have a preference in what to speculate?

Well, I was thinking about creating personalities based on demographics such as gender, age but also make stereotypes such as a friend nurse, aunt nurse etc. Trying to compare these with each other and how they evoke certain interactions. I think that is more on the personality side and how patients might have preference in choosing personalities and say I want a mother nurse or friend nurse. That is personalized in some way.

No that is good, then it is going somewhere. You could look at it still a bit more critically. What does the role of a nurse represent. Why do have nurses in the first place, what are they fulfilling. Of course healthcare, but we have doctors as well, nurses are for care giving role. Associated with.. current reality does not give a lot of time for that. You have to be efficient. There are medical expert. But if your results show that the nurses do care, even with the efficiency prioritized and they have the patients needs by heart. That have to be shown in results first. The thing they probably want to carry on is nursing as in a caregiving profession. Then, that is something you should ask them. How would they see the future nurse practice. Are we gonna still gonna call nurses nurses, what are they gonna represent? And then you have a very specific medical domain or process in mind. It is not just, recovering from cancer, but you have a notion in which.. bring up the gender dynamic as well. It is easily gendered as a topic. And then you know, we have a ongoing project in our department in the artificial womb project, it is a fake womb. The baby will be put in the womb, especially prematurely, in this womb you can grow a baby instead of a woman's body. When you think about future speculation you have to think about everything in hand. Other progress and technology in medicine, so the conversation will be different if a patient have the decision for the artificial womb.

Yes, for this research it is interesting because the screening is structural and systematic, so nurses don't really feel the connection with the patient.

Appendix C

They said themselves that it could be done by a robot, because there are always the same questions. Yet at the same time the patients want to get personalized feedback and the attention that everyone gets. The nurses feel like it is boring, which is interesting tension. Something to play with, because patients want a caring nurse yet nurses think it is not something to easily take care in. A voice assistant or avatar could help with giving every patient the same attention.

Yeah, no for sure, yeah exactly. So then we are ending up in a slightly different world than initially imagined. But I think you thought a lot about this to actually also go there. So.. yeah then, its role, you have these imagines roles of these stakeholders with changing technologies. Yet, what role in any, what voice based agents should play to go even crazier. You could even have the voice of the future child, it is strange, I don't even know how well received it will be practical people but it is something to bring up by stakeholders.

Yes, because how I can imagine that is that then the baby is going to tell the mother how to live during pregnancy. So, I would talk it over with Luce, she knows this context much better. You gotta get your requirements, stakeholder satisfaction in mind and I don't know your educational program as much. But I think that subject of the future baby would be interesting. Because usually clickable buttons are made into some conversational or a chatbot, and you know that is not how a good conversation is designed. So, it is not just like taking multiple choice and taking clickable interface into a conversation. It is deeper than that. I usually go for a slightly less generic options.

I agree with you, more of the extreme things or the things that make people scared is what they want to talk about.

Yeah.

Yeah, I think such thing is really nice to think about. Because I am working on a more experimental design it gives the opportunity to do this right?

Yeah, no for sure. I think it would, I just don't know your program as well as other people or your coach would. I usually wouldn't do safe choices, but the safe choice would be like here are some options women should keep in mind, rather than a nurse talking which is perfectly fine. But push it a bit and go into the roles and intentions behind the roles and the kind of speculative world you might foresee. You know what what I know I think Luce might be interested in keeping it weird as well haha.

What was your role often in the research? Was it more doing prototypes or more research?

Yeah, I guess I imagined often the identity of things more specifically. With

Vincent, I already, it is about things I get annoyed with and the lack of creativity how we designed agents and conversations. I was also not happy with how we were thinking about mental health. So there is the tool, which is the agent like Vincent, and the topic which is mental health. That is so big, right? And then you have all the productive rights or what not right? It is really big. And I wanted to think about it in a different way in how we choose to call something a mental health problem. That is where I was unhappy with focussing on symptoms, negative symptoms that prioritize using negativity in stead of upholding positivity in what it means to be well. So then I went more into literature and more deeper into compassion and self compassion and converted those scales into how it could talk. So we did not do the scale and played it as questions like a chatbot but more as how the items at the scale convert to conversational material in a more natural way rather than people having develop certain forms or getting education about compassion. They just saw the other side of not being compassionate, so I did more of the background work and I worked with amazing students who were able to immediately get it and have their own twist to, like, Vincent's personality. They named the bot Vincent, not me. Initially I think I wanted it to be not a human being, the bot, but it fits. So then there was more of the construction of like how do we think of this personality, how does it talk? Yeah, with the ground of literature in our head. And yeah, we worked that way and I think initially they were were better at doing the nitty gritty of the prototype itself but I would say dialogue flow has changed a lot since we began. Because we started using dialogue flow when it was sort of beta, and now it is very businessy. And I would not say it is hard to design a chatbot, there are so many different platforms you can use to also visually sort of construct it. So you do not really need programming skills. But that sort of like the analogy of people ask you know what kind of pencil should I make, rather than how should I draw. How should I draw should be the conversation. But they don't focus on that and they really talk like how should I carve this pencil and they say use RAZA, use Dialogue Flow. In the end it does not really matter, you have some time to figure that out. But at that point conversation design can get hard, because you need to get that identity through that conversation. Well and now at this point I am maybe just rambling a bit too much.

Yes, but I like it. Sometimes you can get so many information from the internet. So many research has been done and it is so impressive what people manage to do. But at the same time I also want to add something. It is a difficult topic but also so interesting.

O yes, it is definitely. It is good that you are in your masters, because someone in the bachelors would not manage to do this. So how has Maria Luce has been advising you to approach this project?

So she actually has been saying that I should experiment with the different

programs, but also do research in the field and get to know what patients need and what the stakeholders need, what they think of the interaction and what aspects they find most important in the screening. It is now more field research, and now she's leading me more into the prototyping and getting to know the programs.

I don't know if I am actually helping, whatsoever..

Yes you are!

It is good to see what you guys are cooking up over there, it is relevant.

Yet, is there specifically something you'd like to know.

Now not really, actually what you were "rambling" about has helped me a lot.

I wanted to have your opinion on certain things you have done and how you look at the steps I have taken and I actually think you have done that.

That is good to hear. You know, different people will tell you different things. I might just make it a bit more radical. You might be even more comfortable with the stakeholder to prioritize.

But if you want to be more radical, it might be nice to talk with the patients. They give you access right?

Well.. sometimes they are a bit difficult about given away contact data. But I know some pregnant women myself and I could also talk to their partners because they are also involved with the data.

Oh well that's great. Because then you can recruit some participants on your own right? Like, women are pregnant, and partners are people who plan to have children, and with an X number of .. right? They probably offer payment for participation?

Yeah probably a gift or something

What is also interesting is that the partner is also involved in the conversation. Which could make it a two on one conversation. Do you have some information or research on that?

Hm, yes so that could be approached in two ways, either just as a topic or as a methodological problem. So.. I think group dynamics are interesting and difficult to carry out in terms of research. So if you imagine you researcher inviting two people who are partners and co-interviewing them. Then, you are sort of regulating their relationship in a way. So it is a methodological challenge of what is the pro and con, lets say of meeting with one person separately and then putting their opinions together through you as a researcher versus having both of them at the same time and see how they regulate each other. Because, maybe they don't always agree about the timing of birth, whatever have that they go through. They do not always have to be on the same page, but they want to appear to you as if they are on the same page. I mean or they can have no problems at all. But you do not know what their relationship is actually like, so they are

gonna perform to you as they are a couple. Well, then you are gonna get totally different results I assume. And one is easier because you are interviewing two people at the same time and it is gonna be easier for you and persons separately where you can keep it shorter and do it one on one. So there is the aspect of methods and different people talking through a single interview or a focus group, regulating dynamics in a focus group. So only women, only partners, only nurses, that is a more focus group approach. The data you will get will be different, but in focus groups you care more about group dynamics and how they agree and disagree with each other and negotiate about what the definition are. But it will be interesting methodologically because you will get so many different results. On the content side.. I am not sure about literature.. you might go to nursing literature. Nursing literature has a lot of really well informed.. let me look at.. have you looked care ethics in nursing? This is not like design literature, but.. if you look up care ethics in nursing you will find a lot and you will have to specify more or report with patients, pregnant women and you will see a lot of papers.

So then they talk about.. you know look at how they write, because they report quality data very distinctly then how designers would do it. So the framing will be different. And if you are more concerned with design literature. There is so much work done in woman's bodies. I think it is KTH.. Yeah, you know the conference designing interactive systems, there has some consistent work coming out of that. So this one..

It is more a personal exploration.

It is different than from your research.

And this one is more KI, you should at how they report qualitative data and results. I don't see too much on the topic you are researching, but female sexuality, parenthood, motherhood. There is a lot.

I normally look at methods first, how should I frame your work. Who are they influenced by? The more you do this, the more you see how data is generated to get one form of knowledge or conclusion; But everyone will do this differently.

Yeah, I think this topic is more relevant. It is different, it is practice based research.. maybe kind of take a look at what has been going on and look at literature from different areas and nursing literature. You will see there is a gap. There is a noticeable gap, and it is good the you are doing this research in this time.

Test: First impression Google Mini

U1: Oke..

O: Eerste indruk?

U1: Uhm

O: Het is experimenteel, daardoor is het natuurlijk niet volledig representatief voor hoe het uiteindelijk zal worden. Ik zou je willen vragen of je toch voor kan stellen hoe dit zou zijn in de context zoals deze bedoelt is.

O: wat is je indruk van de stem?

U1: Uhm, ik vind het grappig want het doet me denken aan Siri. Een standaard stem die je al kent, ik zou het fijn vinden als er een nieuw geluid is. Daarnaast is het best wel robotisch. Maar ik heb niet het idee dat ik met mijn telefoon-app praat of google translate, maar ik zou toch een iets minder bekende...

O: Hoe vind jij het om met een google mini over roken te praten?

U1: Nou nu.. ansich niet perse moeite om mee te praten alleen nu komt het echt snel en ik heb nog geen vertrouwensband met de voice assistant. Ik had het liever willen hebben over bijvoorbeeld kan ik filet american eten en dan vind ik dat handig. Roken is gewoon een lastig onderwerp. Nu komt er niet echt iets uit onverwachte hoek en het is ook nog een wellerend iets. Waarschijnlijk heb ik geen zin om dit te horen dus steek ik mijn kop in het zand tijdens de zwangerschap.

O: En überhaupt het idee dat een voice assistant advies gaat geven over de zwangerschap? Wat vind je daar van?

U1: Ja, eigenlijk heel handig. Je bent ergens eten met vrienden en er staat iets op het menu en je wil weten of dat kan of tot welke hoogte. Dan zou ik graag een vraag willen stellen of ik iets kan eten. Denk dat dat heel handig is. En dat consultatie, ik bedoel vraag en antwoord. Alleen ik denk dat dat lastig is om na te bootsen zoals het met een mens zou gaan.

O: Want wat vind je er dan van dat ik hier ernaast zit terwijl jij met Google Mini praat?

U1: Daar heb ik helemaal niet over nagedacht. Zou in de echte context dit dan ook zo zijn? Ik weet namelijk nu dat het een test is dus daardoor vind ik het niet zo raar.

O: En als het geen test zou zijn en iemand zou erbij zitten.

U1: In mijn eigen woonkamer?

O: Ja, bijvoorbeeld.

U1: Ik zou denken, waarom praat ik nu met een tussenweg eigenlijk met jou. Jij

bent het brein hierachter. Indirect ben ik dan met jou gewoon aan het praten, dus dat zou ik gek vinden.

O: En als ik een verpleegkundige zou zijn

U1: dan al helemaal! Dan denk ik waarom voer ik het gesprek niet gewoon met de verpleegkundige.

U1: Ik denk in het groter geheel, als we meer voice assistants in de toekomst gaan gebruiken dat we er überhaupt ook wel meer op gaan vertrouwen. Als het verwikkeld is in ons systeem ben je sneller bereid het te vertrouwen, omdat je er ook meer ervaring mee hebt.

U2: Ik vind het ook wel echt niet soepel genoeg. Ik heb sneller een gesprek met jou dan dat jij aan de google mini hebt gevraagd of het volume harder kan.

O start weer met voice assistant

Muziek wordt opgezet - afrikaans christelijke muziek

O: wat vinden jullie ervan dat de google mini nu muziek opzet?

U1: Hoort dit bij de test?

O: Nee

U1: Oke, ja ik vind dit onprofessioneel. Bij een vraag als "wat is het weer" en hij reageert met muziek zou ik het niet erg vinden. De technologie is er nog niet, laat het maar zitten.

U3: Ik zou het gewoon nooit meer proberen. Ik heb het een kans gegeven en als hij het niet doet dan ben ik er meteen klaar mee.

U1: Zeker met dit, heel veel vrouwen als ze zwanger zijn vinden zij het allerbelangrijkst dat ze juist advies krijgen. Ik kan me dan voorstellen dat ze het nog sneller opgeven, juist omdat ze gewoon serieus advies willen.

U3: En je wil gewoon snel wat vragen en als het dan zoveel tijd kost, dan denk ik: ja, daar heb ik geen zin in.

Test: open-ended versus closed questions Google mini

O: Wat vond je hiervan? Merk je een voorkeur in de manier van bevragen?

U1: Ik moet eerlijk zijn dat ik beide vormen van bevraging niet top vind. Een schaal van 1 tot 10 maakt het wel makkelijk om korte en snelle communicatie te hebben.

U2: Kan me voorstellen dat dat dan ook handig is voor jouw context van zorg.

O: Wat bedoel je met beide vormen niet top?

U1: Ja, zoals ik al eerder zei vind ik dat de technologie er nog niet helemaal is. Hoe dan de voice assistant vragen stelt maakt voor mij niet uit. Het werkt gewoon nog niet.

O: Maar je kan je wel voorstellen dat het stellen van vragen op een gesloten manier efficiënter kan zijn?

U2: Ja ligt eraan hoe lang de vragen zijn toch?

U3: Anders zou ik dit nooit kunnen onthouden haha.

U1: Ik denk als de technologie er eenmaal is dat voice assistants ook niet met behulp van schalen praten, maar echt gewoon zoals een verpleegkundige.

O: Want?

U1: Ja, het gebruik van schalen maakt het gesprek zo oppervlakkig en statisch

U3: Het lijkt me voornamelijk handig voor kort en bondige gesprekken. Niet voor diepe gesprekken over gezondheid ofzo.

Test: Prenatale zorg bot - urgentie

O: Stel je wordt doorverwezen, want vind je daarvan?

U1: In dit geval heel goed. Maar aan de andere kant wil je niet dat mensen er misbruik van maken. Ik vind het goed dat de optie er is of dat je een apart nummer zou moeten bellen.

O: Wat vind je ervan dat het een man is?

U1: Ja, ik vind dat dus niet erg. Als de stem maar open, betrouw, opgewekt is.

O: ook in deze context?

U1: Ja dat vind ik lastig want ik ben niet zwanger. Ik voel wel een afstand met een robot, hierdoor maakt het mij niet uit of het een man of vrouw is. Ik kan me voorstellen dat dat bij andere misschien wel is.

U2: Nee, vorige beter. Ik wil een vrouw, zachter en verzorgender. Ik zou met zwangerschap hebben dat een man het niet begrijpt, daar zou ik al frictie mee hebben.

U1: Het maakt mij echt niet uit, als ik maar een klik of vertrouwensband heb.

U2: Nou bij een man zou ik hem toch niet vertrouwen.

U1: Ja als je de keuze hebt zou ik wel een vrouw doen. Alhoewel mannen zijn vaak puur klinisch

U2: En misschien hebben mannen meer bewondering voor het vrouwelijk lichaam en hoe zwangerschap werkt?

Test 3. Prenatale zorg bot - mannelijke stem

Bij "in de eerste" moet antwoord herhaald worden

Eind wisselt naar advies van vrouw

O: Wat is je indruk?

U1: Gek dat stem naar vrouw overslaat. Daardoor heb ik echt het idee dat het geen mens is.

Stem van de vrouw vond ik ook echt heel vervelend. Toch was die van de man beter. Ik denk omdat de meeste voice assistants die ik ken vrouwelijk zijn en dit gewoon even wat anders is. Het is een nieuwe stem met meer intonatie. Wel veel robotischer dan jouw stem. Maar ik vind het "mag ik wat vragen" ook heel belangrijk. Het is geen eenrichtingsverkeer. Hij klonk ook opgewekt. Het is geen zwaar weer gesprek, je bent gewoon zwanger. Dat is juist leuk.

U1: Ik moet wel zeggen, dat ik mij besef dat je bij een mens moet antwoorden en bij een bot niet.

Test: Google Mini eigen geluiden

U1: Even snel qua inhoud, hij vraagt niet of ik wil stoppen. Ik zou dat ergens in doen. Voor de rest vind ik de stem veel fijner. Menselijker en minder dan wat je kent. Dit heeft iets persoonlijker touch.

O: waar ligt dat aan?

U1: Hm ja dat is moeilijk want dit was jouw stem. Maar de vorige kwam zo bekend voor en doet me veel te veel denken aan google. Bij deze stem, dat hese vind ik het fijn. Maar je zou ook kunnen kijken naar een wat meer intrinsieke stem die wel menselijk is. Ik vond ook de mhm leuk tussendoor.

O: wat voegt dat toe?

U1: dat maakt het minder staccato.

U3: Ik vond het ook 1000 keer beter. Gewoon minder, de vorige is meer tech in kinderschoenen. Hierdoor zou ik moeten lachen. Bij deze zou ik dat minder moeten.

U1: En ik denk ook... nou misschien is die stem ook minder gespecificeerd op dit. Terwijl jij het ingesproken met in je achterhoofd waar het om gaat. Hierdoor is het toch wat gevoeliger qua tonen, ademen, ik vind het daardoor veel beter.

O: wat vond je ervan dat ik de test overnam?

U1: ja dan denk ik wel dat het gefaald is. En ook wel dat het kansloos en in de kinderschoenen staat. Dat dit bij mijn volgende zwangerschappen ook geen verschil gaat maken.

O: en kan je bij deze je wel meer voorstellen dat het in de toekomst van waarde kan zijn?

U1: Ja, als ik naar het ziekenhuis zou gaan en ze zouden zoiets laten horen denk ik wel dat ze al een stap verder zijn. Het hele consult dat overgenomen wordt door een telefoon is misschien nog ver weg, maar wel dat er al nagedacht wordt over tone of voice etc.

O: En het script verschild nu, merkte je dat en vond je het beter of slechter?

U1: Ja het was wel meer een gesprek ipv dat wel lerende. Waarom, wat is je motivatie, wat zijn je valkuilen, hoeveel heb je het geprobeerd, tips, doorschakelen etc. Echt hulp dienen ipv advies geven.

U1: Ik vind het bizar dat Siri al jaren bestaat en toch zo slecht is.

Appendix F

Voor dit onderzoek worden er twee robots getest die gebruikt kunnen worden voor het Spreekuur Gezond Zwanger. De test wordt op dit moment in het Erasmus Medisch Centrum gehouden. Het is de bedoeling dat het spreekuur uiteindelijk ook thuis met de Voice Assistant of Chatbot gedaan kan worden, zodat de patiënt niet naar het ziekenhuis hoeft te komen en de verpleegkundig specialist een andere taak kan vervullen.

Script test Chatbot/Voice Assistant - autoriteit door referenties

Algemeen

Goedemorgen, vandaag zal ik met u het eerste deel van het spreekuur 'Gezond Zwanger' bespreken. Ik ben Robin, hoe voelt u zich vandaag?

Als het goed is heeft u de vragenlijst van het Slimmer Zwanger platform ingevuld, klopt dat?

Is u zelf iets opgevallen bij het invullen van de Slimmer Zwanger vragenlijst?

Advies

Vielen u andere dingen op bij het invullen van de vragenlijst?

Dan verwijs ik u nu door naar uw verpleegkundig specialist. Ik hoop u hiermee voldoende geholpen te hebben.

Tot ziens!

Hoe gaat het met de dagelijkse groente inname van u en uw partner?

Fijn!

Deskundigen bevelen aan om een half bord groenten per dag te eten. Dit staat gelijk aan 250 gram groenten.

Goedemorgen, ik ben Robin, hoe voelt u zich vandaag?

Heeft u de vragenlijst van het Slimmer Zwanger platform ingevuld?

Dan zullen we samen één van de vragen bespreken, is dat goed?

Hoe gaat het met uw dagelijkse groente inname?

Ik beveel aan om een half bord groenten per dag te eten. Dit staat gelijk aan 250 gram groenten. Lukt dat?

Goedemorgen, vandaag zal ik met u het eerste deel van het spreekuur 'Gezond Zwanger' bespreken. Ik ben Robin, hoe voelt u zich vandaag?

Als het goed is heeft u de vragenlijst van het Slimmer Zwanger platform ingevuld, klopt dat?

Is u zelf iets opgevallen bij het invullen van de Slimmer Zwanger vragenlijst?

Hoeveel vis eet u per week?

Het is goed om 2 maal per week vis te eten. Vis is rijk aan gezonde vetten en vitaminen.

Een teveel aan vis is daarentegen schadelijk. Dit kan er namelijk voor zorgen dat u een te veel aan metalen in uw lichaam krijgt als dioxine en kwik.

Als u geen vis eet dan kunt u supplementen slikken. Volgens deskundigen hoeft u dan niet meer over uw inname in te zitten. Hierbij is het belangrijk dat u niet zowel supplementen als vis of schaaldieren eet.

Dan verwijs ik u nu door naar uw verpleegkundig specialist. Ik hoop u hiermee voldoende geholpen te hebben.

Tot ziens!

Script test Chatbot/Voice Assistant - autoriteit door referenties

Voeding

Groenten:

Deskundigen bevelen aan om een half bord groenten per dag te eten. Dit staat gelijk aan 250 gram groenten.

Fruit:

Volgens de richtlijnen van het Erasmus is het goed om 2 stuks fruit per dag te eten. Fruit bevat antioxidanten, die kunnen helpen bij de rijping van eicellen.

Vegetarisch:

Deskundigen van het Erasmus attenderen u erop dat u genoeg eiwitten eet. Dit kan via bijvoorbeeld vleesvervangers, noten, linzen of bonen. Maar ook met alternatieve supplementen als vitamine B12, ijzer en magnesium kunnen eiwittekorten tegenhouden.

Vis/schaaldieren/visproducten:

Volgens voedingsrichtlijnen is het goed om 2 maal per week vis, schaaldieren en visproducten te eten. Vis is rijk aan gezonde vetten en vitaminen. Een teveel aan vis is daarentegen schadelijk. Dit kan er namelijk voor zorgen dat u een te veel aan metalen in uw lichaam krijgt als dioxine en kwik. Als u geen vis eet dan kunt u supplementen slikken. Volgens deskundigen hoeft u dan niet meer over uw inname in te zitten. Hierbij is het belangrijk dat u niet zowel supplementen als vis of schaaldieren eet.

Hartige snacks:

Het wordt door deskundigen van het Erasmus geadviseerd om zo min mogelijk snacks te gebruiken. Snacken zorgt voor een schommeling in de bloedsuikerspiegel. Dit is volgens deskundigen slecht voor de zwangerschap.

Zoete snacks:

Het advies van specialisten van het Erasmus is om zo min mogelijk snacks te eten. Zoete snacks bevatten veel suiker. Hierdoor krijgt u ongemerkt veel calorieën binnen.

Vezels en B vitaminen

Door een gezond inname van vezels en B vitaminen blijft u verzadigd. Volgens deskundigen van het Erasmus MC krijgt u hierdoor minder snel de behoefte om te snacken. Hierdoor blijven uw bloedglucosewaarden stabiel.

Kant-en-klaar en fast food maaltijden

Volgens deskundigen van het Erasmus zitten er veel ongezonde vetten en zout in kant-en klaar en fast food maaltijden. Dit is niet goed voor uw gewicht.

Frisdrank

Volgens deskundigen van het Erasmus is het beter om helemaal geen frisdrank te drinken. Frisdranken met suiker bevatten veel calorieën zonder dat u er vol van zit. Uw verpleegkundige raad aan om frisdrank te vervangen met bijvoorbeeld water of thee.

Lever

Volgens deskundigen van het Erasmus kan lever schadelijk zijn tijdens de zwangerschap voor uw ongeboren kind. Aangezien de eerste weken van de zwangerschap heel belangrijk zijn, en u dan niet weet dat u zwanger bent, is het volgens deskundigen belangrijk dat u al voor de zwangerschap stopt met de inname van lever en leverproducten.

De interactie met mij is afgelopen. Ik hoop u genoeg geïnformeerd te hebben. Het gesprek zal nu opgevolgd worden door de verpleegkundige specialist.

Extra supplementen

Deskundigen raden aan om te kijken naar de achterkant van het potje. Neem niet boven de 100% aanbevolen dagelijkse hoeveelheid of referentie inname.

Appendix F

Zuivelproducten

Deskundigen adviseren om tijdens de zwangerschap dagelijks één gram calcium binnen te krijgen. Op die manier kan het risico op vroeggeboorte, zwakke botten bij de ongeboren baby en een te laag geboortegewicht namelijk worden verkleind. Als u geen zuivelproducten neemt kunt u vervangers als bonen en noten nemen.

Script test Chatbot/Voice Assistant - autoriteit door referenties

Leefstijl

Gewicht

Deskundigen raden aan om uw gewicht stabiel te houden door gezond te eten met voldoende groenten en fruit en genoeg te bewegen.

Alcohol

Volgens verpleegkundig specialisten van het Erasmus is teveel alcohol slecht voor uw gezondheid en geeft een verhoogd risico op een miskraam. Hierom raden deskundigen aan om te stoppen met het drinken van alcohol voordat u zwanger bent.

Roken

Roken door zowel mannen en vrouwen wordt door deskundigen ten zeerste ontraden aangezien het slecht is voor (een voorbereiding op) een zwangerschap.

Slapen

Volgens deskundigen is slaap tijdens de zwangerschap erg belangrijk voor u en de baby. Een slechte nachtrust kan negatieve invloed hebben op uw immuunsysteem. Dit kan weer een effect hebben op de baby, die reageert op alles wat er in het lichaam van de moeder gebeurt.

Volgens deskundigen heeft één nacht slecht slapen geen groot effect op de baby. Maar als u structureel weinig tot niet slaapt en hier veel last van hebt, is het goed om uw slaappatroon eens onder de loep te nemen.

Stress

Volgens deskundigen kunt u door stress minder gezond gaan eten en slechter slapen. Hierom raden verpleegkundig specialisten aan om te bekijken waar de stress vandaan komt en of er iets aan te doen is.

Beweging

Door deskundigen wordt aangeraden om dagelijks 30 minuten te bewegen en 1 keer per week een hartslag verhogende activiteit te doen van een uur. Dit hangt af van hoe vaak u bewoog voor u zwanger was.

Foliumzuur

Volgens deskundigen kunt u al met foliumzuur slikken beginnen voordat u zwanger bent. Het advies is om minimaal 4 weken voor de zwangerschap tot een zwangerschapsduur van 10 weken 0,4-0,5 mg foliumzuur te gebruiken. Volgens experts van het Erasmus is dit nodig om bijvoorbeeld de kans op het krijgen van een kindje met open ruggetje of een stoornis waarbij er geen hersenen worden aangelegd te verkleinen.

Heel goed dat u foliumzuur gebruikt! Ook al kan het even duren voordat u zwanger wordt, wordt door deskundigen geadviseerd om toch door te gaan met het slikken van foliumzuur.

Heeft u epilepsie of komt er een open ruggetje voor in de familie? Vraag dan uw huisarts of gynaecoloog om advies. Het kan namelijk zijn dat u meer foliumzuur nodig heeft.

Script test Chatbot/Voice Assistant - Eigen autoriteit

Voeding

Groenten:

Ik zou u aanbevelen om een half bord groenten per dag te eten. Dit staat gelijk aan 250 gram groenten.

Fruit:

Als verpleegkundig specialist raad ik u aan om 2 stuks fruit per dag te eten. Fruit bevat antioxidanten, die kunnen helpen bij de rijping van eicellen.

Vegetarisch:

Ik wil u erop attenderen dat u genoeg eiwitten eet. Dit kan via bijvoorbeeld vleesvervangers, noten, linzen of bonen.

Vis/schaaldieren/visproducten:

Ik raad u aan om 2 maal per week vis, schaaldieren en vis producten te eten. Vis is rijk aan gezonde vetten en vitaminen. Als u geen vis eet dan kunt u supplementen slikken. Als u dat neemt hoeft u er niet over in te zitten. Hierbij is het belangrijk dat u niet zowel supplementen als vis of schaaldieren eet.

Hartige snacks:

Ik adviseer u om zo min mogelijk snacks te gebruiken. Deze snacks bevatten vaak ongezonde vetten en zout. Dit is niet goed voor uw gewicht. Snacken zorgt voor een schommeling in de bloedsuikerspiegel. Dit is slecht voor de zwangerschap.

Zoete snacks:

Ik raad aan om zo min mogelijk snacks te eten. Zoete snacks bevatten veel suiker. Hierdoor krijgt u ongemerkt veel calorieën binnen.

Vezels en B vitaminen

Ik raad aan om een gezond inname van vezels en B vitaminen te hebben. Hierdoor blijft u verzadigd en minder snel de behoefte om te snacken. Hierdoor

blijven uw bloedglucosewaarden stabiel.

Kant-en-klaar en fast food maaltijden

Er zitten veel ongezonde vetten en zout in kant-en klaar en fast food maaltijden. Hierom raad ik aan zo min mogelijk kant-en-klaar maaltijden of fast food maaltijden te eten. Dit is niet goed voor uw gewicht.

Frisdrank

Ik raad aan om helemaal geen frisdrank te drinken. Frisdranken met suiker bevatten veel calorieën zonder dat u er vol van zit. Hierom raad ik aan om frisdrank te vervangen met bijvoorbeeld water of thee.

Lever

Lever kan schadelijk zijn tijdens de zwangerschap voor uw ongeboren kind. Aangezien de eerste weken van de zwangerschap heel belangrijk zijn, en u dan niet weet dat u zwanger bent, raad ik aan om te stoppen met de inname van lever en leverproducten.

De interactie met mij is afgelopen. Ik hoop u genoeg geïnformeerd te hebben. Het gesprek zal nu opgevolgd worden door de verpleegkundige specialist.

Extra supplementen

Ik raad u aan om te kijken naar de achterkant van het potje. Neem niet boven de 100% aanbevolen dagelijkse hoeveelheid of referentie inname.

Zuivelproducten

Ik adviseer u om tijdens de zwangerschap dagelijks één gram calcium binnen te krijgen. Op die manier kan het risico op vroeggeboorte, zwakke botten bij de ongeboren baby en een te laag geboortegewicht namelijk worden verkleind. Als u geen zuivelproducten neemt kunt u vervangers als bonen en noten nemen.

Script test Chatbot/Voice Assistant - Eigen autoriteit

Leefstijl

Gewicht

Ik raad u aan om uw gewicht stabiel te houden door gezond te eten met voldoende groenten en fruit en genoeg te bewegen.

Alcohol

Ik weet dat teveel alcohol slecht is voor uw gezondheid en het een verhoogd risico geeft op een miskraam. Hierom raad ik u aan om te stoppen met het drinken van alcohol voordat u zwanger bent.

Roken

Roken door zowel mannen en vrouwen wordt ten eerste ontraden aangezien het slecht is voor (een voorbereiding op) een zwangerschap. Hierom raad ik u aan om zo snel mogelijk te stoppen met roken.

Slapen

Slaap tijdens de zwangerschap is erg belangrijk voor jou en je baby. Een slechte nachtrust kan negatieve invloed hebben op uw immuunsysteem. Dit kan weer een effect hebben op de baby, die reageert op alles wat er in het lichaam van de moeder gebeurt.

Natuurlijk heeft één nacht slecht slapen geen groot effect op de baby. Maar als u structureel weinig tot niet slaapt en hier veel last van hebt, is het goed om uw slaappatroon eens onder de loep te nemen.

Stress

U kunt door stress minder gezond gaan eten en slechter slapen. Hierom raad ik u aan om te bekijken waar de stress vandaan komt en of er iets aan te doen is.

Beweging

Ik raad u aan om dagelijks 30 minuten, 1 keer per dag of minstens 1 keer per week een hartslag verhoogde activiteit te doen. Dit hangt af van hoe vaak u bewoog voor u zwanger was.

Foliumzuur

U kunt met foliumzuur slikken beginnen voordat u zwanger bent. Het advies is om minimaal 4 weken voor de zwangerschap tot een zwangerschapsduur van 10 weken 0,4-0,5 mg foliumzuur te gebruiken. Dit is nodig om bijvoorbeeld de kans op het krijgen van een kindje met open ruggetje of een stoornis waarbij er geen hersenen worden aangelegd te verkleinen.

Heel goed dat u foliumzuur gebruikt! Ook al kan het even duren voordat u zwanger wordt, adviseer ik u om toch door te gaan met het slikken van foliumzuur.

Heeft u epilepsie of komt er een open ruggetje voor in de familie? Vraag dan uw huisarts of gynaecoloog om advies. Het kan namelijk zijn dat u meer foliumzuur nodig heeft.

Appendix F

Good morning, today I will discuss with you the first part of the Healthy Pregnancy consultation. I'm Robin, how are you feeling today

You have filled in the questionnaire of the 'Slimmer Zwanger' platform, is that right?

Did you notice anything while filling in the 'Slimmer Zwanger' questionnaire?

Advisory advice.

Did you notice anything else while filling in the questionnaire?

Then I would like to refer you to your nurse specialist. I hope I have helped you sufficiently.

See you soon!

Good morning, I am Robin, how are you feeling today?

Have you filled in the questionnaire of the Healthy Pregnancy platform?

We will discuss one of the questions together, is that OK?

How is your daily vegetable intake?

I recommend half a plate of vegetables a day. This is equivalent to 250 grams of vegetables. Do you think you take this amount?

What kind of vegetables do you eat?

Vegetables:

Experts recommend eating half a plate of vegetables a day. This is equivalent to 250 grams of vegetables.

Fruit:

According to the Erasmus guidelines, it is good to eat 2 pieces of fruit a day. Fruit contains antioxidants, which can help the maturation of egg cells.

Vegetarian:

Experts at the Erasmus point out that you should eat enough protein. This can be done with meat substitutes, nuts, lentils or beans. But alternative supplements such as vitamin B12, iron and magnesium can also prevent protein deficiencies.

Fish/shellfish products:

According to dietary guidelines, it is good to eat fish, shellfish and fish products twice a week. Fish is rich in healthy fats and vitamins. However, too much fish is harmful. It can cause an excess of metals in your body, such as dioxin and mercury. If you do not eat fish, you can take supplements. According to experts, you then no longer need to worry about your intake. It is important not to eat both supplements and fish or shellfish.

Savoury snacks:

It is advised by experts at Erasmus to have as few snacks as possible. Snacking causes a fluctuation in the blood sugar level. This, according to experts, is bad for pregnancy.

Sweet snacks:

The advice of specialists at the Erasmus is to eat as few snacks as possible. Sweet snacks contain a lot of sugar. This means that you unwittingly consume a lot of calories.

Fibres and B vitamins

A healthy intake of fibre and B vitamins keeps you satiated. According to experts at Erasmus MC, this reduces the need to snack. As a result, your blood glucose levels remain more stable.

Ready-made and fast food meals

According to Erasmus experts, ready-made and fast food meals contain a lot of unhealthy fats and salt. This is not good for your weight.

Appendix F

Soft drinks

According to Erasmus experts, it is better not to drink any soft drinks at all. Soft drinks containing sugar contain many calories without filling you up. Your nurse recommends replacing soft drinks with water or tea, for example.

Liver

According to Erasmus experts, liver can be harmful to your unborn child during pregnancy. Since the first few weeks of pregnancy are very important, and you don't know you're pregnant then, experts say it's important to stop taking liver and liver products before you get pregnant.

The interaction with me has ended. I hope I have informed you enough. The conversation will now be followed up by the nurse specialist.

Additional supplements

Experts recommend looking at the back of the jar. Do not take above the 100% recommended daily amount or reference intake.

Dairy products

Experts recommend a daily intake of one gram of calcium during pregnancy. This can reduce the risk of premature birth, weak bones in the unborn baby and low birth weight. If you do not consume dairy products, you can use substitutes such as beans and nuts.

Weight

I recommend that you keep your weight stable by eating healthily with plenty of fruit and vegetables and getting enough exercise.

Alcohol

I know that too much alcohol is bad for your health and increases the risk of miscarriage. Therefore, I recommend that you stop drinking alcohol before you become pregnant.

Smoking

Smoking by both men and women is strongly discouraged as it is bad for (a preparation for) pregnancy. I therefore advise you to stop smoking as soon as possible.

Sleep

Sleep during pregnancy is very important for you and your baby. A poor night's sleep can have a negative impact on your immune system. This in turn can have an effect on the baby, who reacts to everything that happens in the mother's body.

Of course, one night of bad sleep does not have a great effect on the baby. But if you structurally have little to no sleep and this bothers you a lot, it is good to take a close look at your sleeping pattern.

Stress

Stress can make you eat less healthy and sleep worse. Therefore, I recommend looking at where the stress comes from and whether something can be done about it.

Exercise

I recommend 30 minutes of increased heart rate activity daily, once a day or at least once a week. This depends on how often you exercised before you were pregnant.

Folic acid

You can start taking folic acid before you are pregnant. The advice is to take 0.4-0.5 mg of folic acid at least 4 weeks before pregnancy until 10 weeks. This is necessary to reduce the risk of having a baby with spina bifida or a brain disorder.

Very good that you are taking folic acid! Even though it may take some time before you become pregnant, I recommend that you continue taking folic acid.

Do you have epilepsy or does spina bifida run in your family? Ask your doctor or gynaecologist for advice. It may be that you need more folic acid.

Appendix G

Welwillendheid

Zie je de meerwaarde van het gebruik van een robot tijdens het Spreekuur Gezond Zwanger in plaats van een verpleegkundig specialist? En zo ja waarom?
Wat vond je van het reactievermogen van de robot tijdens het Spreekuur?
Kunt u zich voorstellen dat robot in de toekomst gebruikt zullen worden voor dit spreekuur?

Competentie

Vond u dat de robot over het algemeen goed werkte tijdens het Spreekuur?
Had u het idee dat de robot wist waar zij het over had?
Beschouwde u de robot als bekwaam om dit spreekuur te houden?

Integriteit

Vond u de robot geloofwaardig tijdens het spreekuur?
Had u het idee dat u alles kon delen met de robot?
Had u het idee dat de robot u begreep?
Denkt u dat dat de robot het beste met u voor had?
Zou u deze robot vertrouwen met het informeren over uw gezondheid?
Voelde het comfortabel om het consult met een robot te doen?

Benevolence

Do you see the added value of using a Voice Assistant during the Healthy Pregnant consultation? If so, why?
What did you think of the responsiveness of the Voice Assistant during the Consultation?
Can you envision Voice Assistants being used for this consultation in the future?

Competency

Did you feel that the Voice Assistant worked well during the Consultation?
Did you feel that the Voice Assistant knew what she was talking about?
Did you consider the Voice Assistant competent to conduct this consultation?

Integrity

Did you find the Voice Assistant credible during the consultation?
Did you feel you could share everything with the Voice Assistant?
Did you feel that the Voice Assistant understood you?
Do you think the Voice Assistant could tell good from bad?
Could you make your health depend on this Voice Assistant?

Trustworthy voice assistants for the Outpatient Clinic Healthy Pregnancy consult

**Version 1.0
July 6th, 2022**

Research protocol
Version 1.0, July 6th, 2022

Page 1 of 6

Appendix H

PROTOCOL TITLE *Trustworthy voice assistants for consultation at the outpatient clinic healthy pregnancy consult*

Protocol ID	OZBS72.22208
Short title	<i>Trustworthy Voice assistants for OCHP consult</i>
EudraCT number	<i>Not applicable</i>
Version	<i>1.0</i>
Date	<i>July 6th, 2022</i>
Principal investigator	<i>Dr. M. Rousian</i>
Sub investigator	<i>E. Hagens (Student TU Delft)</i>
Sponsor	<i>Erasmus MC, Dept. Obstetrics & Gynecology</i>
Subsidising party	<i>Not applicable</i>
Independent expert (s)	<i>Not applicable</i>
Laboratory sites	<i>Not applicable</i>
Pharmacy	<i>Not applicable</i>

Appendix H

PROTOCOL SIGNATURE SHEET

Name	Signature	Date
Head of Department: <i>Prof. dr. E.A.P. Steegers</i>		
Principal Investigator: <i>Dr. M. Rousian</i>		
Sub investigator: <i>E. Hagens (student)</i>		

SUMMARY

Rationale: The Outpatient Clinic Healthy Pregnancy (OCHP) is a blended care consultation for couples or individuals to ensure that the (pre)pregnancy period proceeds as healthily as possible. These conversations can be held before, during and after the pregnancy. Many problems associated with pregnancy and diseases later in life arise before conception and in the first 10 weeks of pregnancy; the so called *periconceptional period*. During this period, the gametes sex reproductive cells of the woman and man mature and, after fertilization, develop into an embryo with the child's organs and the placenta. Years of scientific research have shown that a healthy diet and lifestyle are important for the health of gametes-reproductive cells, the course and outcome of the pregnancy, and having a healthy child. At the OCHP consultation, future parents receive systematic questions using standardized protocols, to formulate an individualized, tailored advice regarding lifestyle and nutrition. An appointment at the OCHP consultation is made up of systematic questions that are asked of patients on a structural basis.

Health education and influencing health behavior change among patients is mostly done face-to-face. Automated health dialogue systems - especially those using speech and other audiovisual media - mimic this form of interaction to communicate health information to users in a format that is intuitive and dynamically personalised. In some ways, health dialogue systems can be even better than interaction with a human healthcare provider. A problem

Research protocol

Version 1.0, July 6th, 2022

Page 3 of 6

OZBS72.22208 Voice assistants for PGZ

with face-to-face meetings with healthcare providers is that all providers function in a healthcare environment where they can only spend a very limited amount of time with each patient. Time pressure can lead to patients feeling too intimidated to ask questions, or to ask for information to be repeated. Another problem is "fidelity": healthcare providers do not always follow recommended guidelines perfectly, which leads to considerable variations in the provision of health information between healthcare providers. Finally, many people simply do not have access to all the health professionals they need, due to financial or scheduling constraints. Even if health dialogue systems are less effective than one-to-one counseling, they can reach a much larger proportion of the population. (Bickmore & Giorgino, 2006)

The popularity of Voice Assistants (VA) has been growing over the past few years. Many positive user outcomes have been recorded, such as engagement, trust, rapport, and ease of use in the domain of healthcare (Kocaballi et al., 2019). This research will explore the opportunity for VA to be used during the OCHP consultation. This VA will be responsible for giving advice about health, it is therefore important that patients experience the VA as user-friendly and trustworthy. The consultation consists of a number of fixed questions that must be answered. This systematic structural set-up of the OCHP consultation is suitable for implementing VA. In addition to the set-up, the conversation topic lifestyle at the consultation creates potential in different research directions. After all, talking about the user's lifestyle is personal. A user may feel embarrassed about habits such as alcohol consumption or smoking. A VA can take away this shame because it has no prejudices. On the other hand, getting pregnant is a special event that comes with responsibilities. As a result, using a VA can feel impersonal and the user may have difficulty trusting the system. Finally, trust in Artificial Intelligence (AI) is frequently discussed in recent research and European protocols. Trust is an important aspect for a VA to be accepted and used. This is why the focus of this research will be on trustworthiness.

Objective: Design trustworthy interactions between voice assistants and users in healthcare, particularly in the Outpatient Clinic Healthy Pregnancy.

Study design: Prospective cohort study, in which qualitative research will be performed and qualitative interviews collected.

Research protocol

Version 1.0, July 6th, 2022

Page 4 of 6

OZBS72.22208 Voice assistants for PGZ

Study population:

- Women and their partners with a pregnancy wish and pregnant women, consulting the outpatient clinic of the Erasmus MC (Department of Obstetrics and Gynecology).
- Nurses/midwives/health care-takers, involved in the Outpatient Clinic Healthy Pregnancy consultation.

Written permission will be requested in advance in order for participants to participate.

Intervention: Voice assistant, several prototypes of voice assistants (VA) will be tested.

Main study parameters/endpoints:

Characteristics and demographics such as; age, ethnicity, gender, medical history, cultural background, ethnicity, socioeconomic status and personal and lifestyle factors such as smoking, obesity and nutrition lead to different patient perceptions of the Voice Assistant. Within this perception it is most important how reliable users find their VA and confidently believe they can model and predict their actions. This trust is measured with the help of the psychometric instrument previously used on decision support systems, adapted from M. Madsen and S. Gregor (Madsen &Gregor, 2000) and their measurements of Human-Computer Trust. The following study parameters are used in this instrument;

Cognition-based trust:

- Reliability
- Understandability
- Technical Competence

Affect-based trust:

- Faith
- Personal Attachment

These main parameters show the Overall Perceived Trust.

Nature and extent of the burden and risks associated with participation, benefit and group relatedness: For this study, pregnant women or women with a pregnancy wish and their partners in Outpatient Clinic Healthy Pregnancy consultation are tested. This consultation is about the lifestyle (changes) and nutritional habits of the patients. Lifestyle is personal and therefore with the given parameters as trust an interesting research direction to look into. The European commission of Artificial Intelligence (AI) has recently set regulations for trustworthy AI. This research will find out if the patient can establish trustworthy Research protocol

OZBS72.22208 Voice assistants for PGZ

interactions with a Voice Assistant. A VA will be developed with personal characteristics that may lead to trust. This is why it is important that the user group is included in the design process. The participants have to interact with the VA and think along with potential improvements. The test group (N=30) therefore does more than just testing, but is also involved in the design process. The test will take place once, during the OCHP consultation, led by a nurse or by doctors working on the department of Obstetrics and Gynecology. The nurse specialist or healthcare provider will be present during the testing. The specialist healthcare provider can act as a back-up, so that when the VA cannot give a response, the specialist can take over the conversation. This means that nurse, healthcare provider and VA will work together. This is why it is important that the perspectives of e.g. nurses, midwives, doctors, are included in the design of the VA. This means that In this way, nurses healthcare providers are also seen as test participants, as they are involved in the final design. The burden is minimal since the same questions are asked as in the current OCHP consultation. The additional time required will be 15 - 30 minutes. A few minutes will be spent conversing with the actual prototypes. The majority of the test will consist of questions about the Voice Assistant. Topics discussed in these questions can be found in the appendices.

2. REFERENCES

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- Kocaballi, A. B., Berkovsky, S., Quiroz, J. C., Laranjo, L., Tong, H. L., Rezazadegan, D., Briatore, A., & Coiera, E. (2019). The Personalization of Conversational Agents in Health Care: Systematic Review. *Journal of Medical Internet Research*, 21(11), e15360. <https://doi.org/10.2196/15360>
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Research protocol

Version 1.0, July 6th, 2022

Page 6 of 6

Proefpersoneninformatie voor deelname aan medisch-wetenschappelijk onderzoek

Betrouwbare spraakassistenten voor het Spreekuur 'Gezond Zwanger'

Inleiding

Geachte heer/mevrouw,

Met deze informatiebrief willen we u vragen of u wilt meedoen aan medisch-wetenschappelijk onderzoek. Meedoen is vrijwillig. U krijgt deze brief omdat u deelneemt aan het Slimmer Zwanger traject. U leest hier om wat voor onderzoek het gaat, wat het voor u betekent, en wat de voordelen en nadelen zijn. Het is veel informatie. Wilt u de informatie doorlezen en beslissen of u wilt meedoen? Als u wilt meedoen, kunt u het formulier invullen dat u vindt in bijlage B.

Stel uw vragen

U kunt uw beslissing nemen met de informatie die u in deze informatiebrief vindt. Daarnaast raden we u aan om dit te doen:

- Stel vragen aan de onderzoeker die u deze informatie geeft.
- Praat met uw partner, familie of vrienden over dit onderzoek.

1. Algemene informatie

Het Erasmus Medisch Centrum (Erasmus MC) heeft dit onderzoek samen met de Technische Universiteit Delft (TU Delft) opgezet. Hieronder noemen we het Erasmus MC steeds de 'opdrachtgever'. Onderzoekers voeren het onderzoek uit in het ziekenhuis. Aan dit onderzoek zullen 30 personen uit Nederland deelnemen.

De Medisch Ethische Toetsingscommissie (METC) van het Erasmus MC heeft voor dit onderzoek een verklaring "niet WMO-plichtig onderzoek" afgegeven, MEC-2022-0471. Dat betekent dat dit onderzoek door de onderzoeker is aangemeld bij deze METC en niet valt onder de wet medisch-wetenschappelijk onderzoek met mensen.

2. Wat is het doel van het onderzoek?

Dit onderzoek focust zich op de interactie met een spraakassistent en een chatbot. Een spraakassistent is een digitale assistent die met behulp van het herkennen van spraak gebruikers helpt met geven van informatie en het uitvoeren van taken. Spraakassistenten worden gebruikt in slimme apparaten zoals mobiele telefoons, Siri, en slimme speakers, Alexa en Google mini. Bij dit onderzoek wordt er een stap verder gezet in de interactie tussen spraakassistent en gebruiker. Hierbij wordt onderzocht:

- Hoe betrouwbaar een spraakassistent overkomt bij de proefpersoon.
- Of de spraakassistent voldoet aan de verwachtingen van de proefpersoon.
- Of de proefpersonen de nieuwe spraakassistent en chatbot gemakkelijk kunnen gebruiken en begrijpen.

Om deze betrouwbaarheid te meten wordt de spraakassistent vergeleken met een chatbot. Een chatbot is een gesprekspartner die automatisch antwoord geeft op gestelde vragen en reacties. Een chatbot kan grote delen van gesprekken overnemen, met als doel dat een mens dit niet meer hoeft te doen. Hierdoor kan er meer tijd besteed worden aan andere taken.

3. Wat is de achtergrond van het onderzoek?

De populariteit van spraakassistenten en chatbots zijn de afgelopen jaren toegenomen. Er zijn veel positieve reacties uit eerder onderzoek gekomen op het gebied van vrouwen en gebruiksgemak in het veld van de gezondheidszorg. Toch worden spraakassistenten nog niet getest bij huidige zorgverlening. Dit is een ander verhaal voor chatbots, deze worden in de huidige zorg al gebruikt bij het maken van afspraken of voor het stellen van korte vragen.

Voor dit onderzoek worden de mogelijkheden verkend om spraakassistenten in te zetten tijdens het Spreekuur 'Gezond Zwanger' en vergeleken met de functies van een chatbot. De spraakassistent en chatbot zullen beide verantwoordelijk zijn voor het bespreken van de vragenlijst Slimmer Zwanger, die wordt afgenomen voor het Spreekuur 'Gezond Zwanger'. Het bespreken van deze vragenlijst is belangrijk voor de zorg van patiënten en het verzamelen van gegevens voor onderzoek in de toekomst. Dit betekent dat de spraakassistent grote verantwoordelijkheid op zich zal nemen. Hierom is het belangrijk dat patiënten de spraakassistent en chatbot als betrouwbaar ervaren. Daarnaast kan een spraakassistent of chatbot het werk verlichten van de verpleegkundige die het spreekuur moet uitvoeren.

4. Hoe verloopt het onderzoek?

Hoelang duurt het onderzoek?

Doet u mee met het onderzoek? Dan duurt dat inclusief het spreekuur in totaal 30 minuten.

Stap 1: bent u geschikt om mee te doen?

We willen eerst weten of u geschikt bent om mee te doen. Daarom kijkt de onderzoeker eerst naar uw medische geschiedenis. De onderzoeker zal vragen naar uw afkomst om ervoor te zorgen dat het uiteindelijke ontwerp van de spraakassistent of chatbot gebruiksvriendelijk en betrouwbaar is voor iedere patiënt.

Let op: het kan voorkomen dat u gezond bent, maar dat u toch niet geschikt bent om mee te doen. De onderzoeker zal u daar meer over vertellen.

Stap 2: het gebruik van spraakassistenten

Tijdens het consult zult u een aantal minuten praten met een spraakassistent of chatbot. Deze zal vragen hoe het met u gaat en een vraag evalueren uit de Slimmer Zwanger vragenlijst.

Voor dit onderzoek maken we 4 groepen:

- Groep 1. De mensen in deze groep krijgen spraakassistent 1.
- Groep 2. De mensen in deze groep krijgen spraakassistent 2.
- Groep 3. De mensen in deze groep krijgen chatbot 1.
- Groep 4. De mensen in deze groep krijgen chatbot 2.

Met behulp van loting wordt bepaalt in welke groep u wordt ingedeeld.

Stap 3: onderzoeken en metingen

Voor het onderzoek is het nodig dat u aanwezig bent op het Spreekuur 'Gezond Zwanger' in het Erasmus MC.

We doen de volgende onderzoeken:

- U gaat spreken met een spraakassistent of chatbot.
- U volgt het consult met de verpleegkundig specialist.
- U bespreekt de ervaring met de spraakassistent of chatbot met de onderzoeker na afloop van het consult.
- U kunt vragen stellen over het consult of de spraakassistent of chatbot aan de onderzoeker en verpleegkundig specialist.

Wat is er anders dan bij gewone zorg?

Normaal spreekt u met de verpleegkundig specialist tijdens het Spreekuur Gezond Zwanger. Het gesprek met de spraakassistent of chatbot zal een toevoeging zijn aan het spreekuur, waarbij een vraag wordt besproken van het spreekuur die eventueel ook met de verpleegkundig specialist besproken kan worden.

5. Welke afspraken maken we met u?

We willen graag dat het onderzoek goed verloopt. Daarom maken we de volgende afspraken met u:

- U spreekt met de spraakassistent of chatbot op de manier die de onderzoeker u heeft uitgelegd.
- Als er informatie mist of er zijn onduidelijkheden ontstaan bij het adviesgesprek, dan geeft u dit aan bij de verpleegkundig specialist na het gesprek met de spraakassistent of chatbot.

6. Van welke bijwerkingen, nadelige effecten of ongemakken kunt u last krijgen?

Het gebruik van de spraakassistenten of chatbots tijdens het consult kunnen leiden tot slechte informatieverwerking. De volgende situaties kunnen voorkomen:

- De spraakassistent of chatbot werkt niet naar behoren doordat deze de persoon niet (goed) verstaat.
- De spraakassistent of chatbot werkt niet naar behoren door een foutmelding in de data.

Het wordt verwacht dat dit bij 20% van de patiënten voorkomt. Indien deze situatie zich voordoet, zal de verpleegkundig specialist het consult weer overnemen, zodat de patiënt altijd de juiste informatie krijgt en daarmee voorkomen wordt dat er miscommunicatie optreedt.

7. Wat zijn de voordelen en de nadelen als u meedoet aan het onderzoek?

Meedoen aan het onderzoek kan voordelen en nadelen hebben. Hieronder zetten we ze op een rij. Denk hier goed over na, en praat erover met anderen.

U heeft zelf geen voordeel van meedoen aan dit onderzoek. Maar met uw deelname helpt u de onderzoekers om meer inzicht te krijgen in de werking van spraakassistenten en chatbots in de zorg. Als u meedoet aan dit onderzoek betekent het niet dat u andere informatie verkrijgt dan tijdens het normale consult.

Meedoen aan het onderzoek kan deze nadelen hebben:

- Meedoen aan het onderzoek kost u extra tijd.
- Het gewone consult kan uitgesteld worden, omdat eerst de interactie met de spraakassistent of chatbot plaats zal vinden.

Wilt u niet meedoen?

U beslist zelf of u meedoet aan het onderzoek. Wilt u niet meedoen? Dan krijgt u de gewone begeleiding tijdens het consult.

8. Wanneer stopt het onderzoek?

De onderzoeker laat het u weten als nieuwe informatie over het onderzoek komt die belangrijk voor u is.

In deze situaties stopt voor u het onderzoek:

- Het einde van het hele onderzoek is bereikt, hiermee wordt bedoeld dat het Spreekuur 'Gezond Zwanger' is voltooid. De onderzoeker zal u uitnodigen voor een nagesprek.
- U wilt zelf stoppen met het onderzoek. Dat mag op ieder moment. Meld dit dan meteen bij de onderzoeker. U hoeft er niet bij te vertellen waarom u stopt. U krijgt dan weer de gewone behandeling van het Spreekuur 'Gezond Zwanger'. Met uw toestemming zal de onderzoeker u nog wel uitnodigen voor een nagesprek.

- De onderzoeker vindt het beter voor u om te stoppen. De onderzoeker zal u nog wel uitnodigen voor een nagesprek.

Wat gebeurt er als u stopt met het onderzoek?

De onderzoekers gebruiken de gegevens die tot het moment van stoppen zijn verzameld.

9. Wat gebeurt er na het onderzoek?

Krijgt u de resultaten van het onderzoek?

Ongeveer 2 maanden na uw deelname laat de onderzoeker u weten wat de belangrijkste uitkomsten zijn van het onderzoek. Wilt u dit niet weten? Dan kan dat aangegeven worden in het toestemmingsformulier in de bijlagen.

10. Wat doen we met uw gegevens?

Doet u mee met het onderzoek? Dan geeft u ook toestemming om uw gegevens te verzamelen, gebruiken en bewaren.

Welke gegevens bewaren we?

We bewaren deze gegevens:

- uw geslacht
- uw geboortedatum
- gegevens over uw gezondheid
- (medische) gegevens die we tijdens het onderzoek verzamelen

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. Ook hebben we deze gegevens nodig om de spraakassistent en chatbot verder te ontwikkelen.

Hoe beschermen we uw privacy?

Om uw privacy te beschermen, geven wij uw gegevens een code. Op al uw gegevens zetten we alleen deze code. De sleutel van de code bewaren we op een beveiligde plek in het Erasmus MC. Als we uw gegevens verwerken, gebruiken we steeds alleen die code. 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 naam en andere persoonlijke gegevens zonder code inzien. Dit zijn mensen die controleren of de onderzoekers het onderzoek goed en betrouwbaar uitvoeren. Deze personen kunnen bij uw gegevens komen:

- Een controleur die voor het Erasmus MC werkt.
- Nationale toezichthoudende autoriteiten. Bijvoorbeeld de Inspectie Gezondheidszorg en Jeugd.

Deze personen houden uw gegevens geheim.

Hoelang bewaren we uw gegevens?

We bewaren uw gegevens 15 jaar in het Erasmus MC.

Kunt u uw toestemming voor het gebruik van uw gegevens weer intrekken?

U kunt uw toestemming voor het gebruik van uw gegevens op ieder moment intrekken.

Maar let op: trekt u uw toestemming in, en hebben onderzoekers dan al gegevens verzameld voor een onderzoek? Dan mogen zij deze gegevens nog wel gebruiken.

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.
- Als u klachten heeft over de verwerking van uw persoonsgegevens, raden we u aan om deze eerst te bespreken met het onderzoeksteam. U kunt ook naar de Functionaris Gegevensbescherming van het Erasmus MC gaan. Of u dient een klacht in bij de Autoriteit Persoonsgegevens.

Waar vindt u meer informatie over het onderzoek?

Na het onderzoek wordt op <https://repository.tudelft.nl> een samenvatting van de resultaten van dit onderzoek getoond. U vindt het onderzoek door te zoeken op 'Trustworthy Voice Assistants.'

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

Het gebruik maken van de spraakassistent voor het onderzoek kost u niets extra. U krijgt ook geen vergoeding als u meedoet aan dit onderzoek.

12. Kopje verzekeringen? Verzekering voor proefpersonen

Als u deelneemt aan het onderzoek, loopt u geen extra risico's. De onderzoeker hoeft daarom van de medisch-ethische toetsingscommissie (METC) van het Erasmus MC geen extra verzekering af te sluiten.

13. Heeft u vragen?

Vragen over het onderzoek kunt u stellen aan het onderzoeksteam. Heeft u een klacht? Bespreek dit dan met de onderzoeker of de arts/verpleegkundig specialist die u behandelt. Wilt u dit liever niet? Ga dan naar de klachtencommissie van het Erasmus MC. In bijlage A staat waar u die kunt vinden.

14. Hoe geeft u toestemming voor het onderzoek?

U kunt eerst rustig nadenken over dit onderzoek. Daarna vertelt u de onderzoeker of u de informatie begrijpt en of u wel of niet wilt meedoen. Wilt u meedoen? Dan vult u het toestemmingsformulier in dat u bij deze informatiebrief vindt. U en de onderzoeker krijgen allebei een getekende versie van deze toestemmingsverklaring.

Dank voor uw tijd.

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 web browser.

STUDENT DATA & MASTER PROGRAMME

Save this form according to the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".

Complete all blue parts of the form and include the approved Graduation Project Brief in your Graduation Report as Appendix 1!

family name	Hagens			Your master programme (only select the options that apply to you):		
initials	ECW	given name	Emma	IDE master(s):	☐ IFD	☒ Dfl
student number	4544412			2 nd non-IDE master:	☐ STD	
street & no.				individual programme:	- - - (give date of approval)	
zipcode & city				honours programme:	☐ Honours Programme Master	
country				specialisation / annotation:	☐ Medisign	
phone					☐ Tech. in Sustainable Design	
email					☐ Entrepreneurship	

SUPERVISORY TEAM **

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

** chair	Maria Lucre Lupetti	dept. / section:	HCD /
** mentor	Willem van der Maaden	dept. / section:	HCD / DA
2 nd mentor	Melek Rouslan		
	organisation: Erasmus MC		
	city: Rotterdam	country:	The Netherlands

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.

Comments (optional)
I have also partnered up with GoldfZrh, with their experience in digitizing healthcare they will help me to contextualize data back to the project and make it more tangible

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



Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF

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

chair Maria Luce Lupetti date 17 - 05 - 2022 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: 30 EC
Of which, taking the conditional requirements into account, can be part of the exam programme 30 EC
List of electives obtained before the third semester without approval of the BoE

Initiate to Graduate

☒ 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 _____



Designing trustworthy voice assistants for healthcare, case of midwifery

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 01 - 05 - 2022 end date 28 - 10 - 2022

INTRODUCTION **

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

In this research I will explore the potential function of Voice Assistants in the healthcare domain of midwifery, more specifically for Poly Gezond Zwanger. A midwife is a trained health professional who cares for mothers during the pregnancy, delivery and after the birth of their babies. PGZ is a consultation in which pregnant women are informed and advised about a healthy diet and lifestyle in which they are guided before and during pregnancy. PGZ is seen as the first step of ANC. Use of Antenatal care (ANC) early in the pregnancy is professionally considered important to ensure that appropriate ANC is arranged and, therefore, good quality and quantity of information with education are delivered to improve pregnancy outcomes (Al-Ateeq & Al-Rusaess, 2015). According to research, Dutch women experience a different feeling about their physical and mental health during pregnancy than normal. This causes them to feel unsure about what they are experiencing and a lack of confidence. They are able to restore this confidence by finding knowledge that counters what they have felt. Dutch women value autonomy during the pregnancy. Therefore, they search for a midwife they are able to trust and could provide them with information, options and support (Fontein, 2010).

CA's promise to enhance user experience by enabling personalization, around the clock availability, and immediate response times. The popularity of CA's has been steadily growing over the past few years. Many positive user outcomes have been recorded, such as engagement, trust, rapport, and ease of use, in several domains, such as education, healthcare and customer service. An example of such VA is implemented with Alexa, Symptom Checker, which aims to support users in discovering possible causes of their reported symptoms by answering a series of questions. Despite the potential benefits of CA, there are ethical problems that arise from the use of many contemporary CAs. First, the appearance and behavior of CAs are likely to design biases such that certain stereotypes are reinforced and strengthened. Second, the knowledge base and respective Machine Learning (ML) models are influenced to be bias, resulting in systematic errors that may create unfair outcomes. Finally, as CAs operate on user data and may, in fact, be used to collect enormous amounts of (sensitive) data, user privacy becomes an important issue. While CAs have the potential to improve user outcomes, developers and providers may need to increasingly follow ethical considerations in the design of CA to ensure the well-being of their users. (Wambsganss et al., 2021)

I have partnered up with Erasmus MC to get access to data and do research in the context. This way I get a better understanding of the PGZ process, the health care providers, midwives and patients. The possibilities of voice assistants at PGZ will be investigated and whether they are suitable for (partial) taking over the consultation. This reduces the workload for care providers and accelerates the process of the PGZ.

- Al-Ateeq, M., & Al-Rusaess, A. (2015). Health education during antenatal care: the need for more. International Journal of Women's Health, 239. <https://doi.org/10.2147/ijwh.s75164>
- Fontein, Y. (2010). The comparison of birth outcomes and birth experiences of low-risk women in different sized midwifery practices in the Netherlands. Women and birth, Elsevier, 23(3), 103–110. <https://doi.org/10.1016/j.wombi.2010.01.002>
- Wambsganss. Höch. Zierau. Söllner. T. A. N. M. (2021). Ethical Design of Conversational Agents:

space available for images / figures on next page

Personal Project Brief - IDE Master Graduation



introduction (continued); space for images

image / figure 1:

image / figure 2:

Personal Project Brief - IDE Master Graduation

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 goal of this graduation project is to explore the design space of voice assistants for the PGZ consultation. I want to investigate how VAs should approach and converse with pregnant women/have a wish to become pregnant. The result will be different properties for voice assistants. These properties should lead to a VA that is able to converse with women in a trustful manner.

My research questions will be the following; How can voice assistants be used in the field of health care, specifically PGZ (Poly Gezond Zwanger), to build a bond of trust with patients?

PGZ stands for Poly Gezond Zwanger and is the first consultation women will have when they are pregnant or have a childwish. In this consultation advice is given about the lifestyle during pregnancy. I will be focussing on aspects of diversity and inclusion. Different personalities of VAs will be developed that could be matched with the demographics of the patient. To answer my research question I will set up several subquestions such as;

- How can a voice assistant converse with patients while taking demographics such as; age, cultural background and education into account? (Personalization)
- What interaction qualities lead to a bond of trust between a voice assistant and a pregnant woman during the PGZ consultation? (Reliability)
- What characteristics of a voice assistant lead to a more human-like interaction? (Understandability)

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.

This research will be approached with "Research Through Design" in which different voice assistants will be conceptualized with the help of online prototyping tools such as Voiceflow and Adobe XD.

A series of VA prototypes will form the spine of this project. These prototypes are used to embody the processes and notions from theory and transform them into experience. This will help me as a designer to drop the respective jargons and frameworks and to meet in the common playing field of everyday language and experience.

The final deliverable will be research artifacts of which each artifact have tested different aspects of the interaction between VA and patient at PGZ. The insights delivered by the different prototypes are being applied in several personas, each with its own personality and demographics. Finally, one final-prototype will be delivered that shows an overview of the explorations I have done in the design space. Next to this prototype, a set of recommendations will be made for future research to improve future VAs for healthcare. These recommendations will be recorded in a report.

Personal Project Brief - IDE Master Graduation

PLANNING AND APPROACH **

start date	1 - 5 - 2022
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28 - 10 - 2022

end date



Personal Project Brief - IDE Master Graduation

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.

At the start of the master, in the course C&C, Context and Conceptualisation, I had to write a paper on Artificial Intelligence in combination with Well Being. Searching the internet I came across several studies and papers on voice assistants. My interest grew, not only because the studies were very interesting, but also because I could imagine that the use of voice assistants will grow in the future (and is already growing). For C&C I wrote about voice assistants and what perception users have of the female Dutch voice of Siri. I had a lot of fun having different conversations with the users and hearing their views which I was able to translate into a visual result.

In the course of the master I also prototyped voice assistants myself. For example, I made a smart mirror for the ITD course that acted as a mediator between housemates. The mirror stimulated conversation between the users.

During my electives, I focused on designing for cultural impact and lifestyles. My goal in taking these courses was to increase my awareness of different cultures and lifestyles. Again I had a lot of fun conversing with the target group and converting the different views into a physical concept.

With the help of this graduation project I want to get more in depth knowledge on Voice Assistants; how to apply them in current systems such as in healthcare. I want to experiment with different prototyping tools to make voice assistants. As a result, I not only broaden my own knowledge about voice assistants, but I also want to make voice assistants more understandable and manageable for users.

In previous courses I have been more focused on the analyse and research phase. For my graduation project I want to take my project a step further by starting in an early phase with development and prototyping.

My ambition for the future is to be an expert in voice assistants and the application of VA in current and future systems.

FINAL COMMENTS

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