The Use Of Smart Glasses In The Elderly Wound Care

A research project and design proposal on the contribution of Smart Glasses to the elderly wound care.

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PREFACE

Dear reader,

In front of you is my thesis, the final deliverable of my graduation project, which marks the end of my time as a Design for Interaction student at the TU Delft. For the last six months, I have explored how Smart Glasses can be used in the elderly (wound) care sector. I learned a lot during this period. I overcame many challenges and got to know myself personally and as a designer much better. Moreover, it was super exciting to be a part of a company that wants to change the health care sector with innovative technology. As a designer, I want to do the same. I want to design and improve things that have added value for people, society and the world. Now looking back at what I achieved, I am pretty proud. Therefore, I would like to thank some people who have supported me during this journey.

First of all, I would like to thank my supervisory team, Evan and Mailin, for being there for me and being always enthusiastic about the project. You both made me realise that what I was doing was quite exciting every time we met. This motivated and stimulated me a lot during the project. Thank you both for being critical and kind. Evan, I liked talking to you from the moment I met you. I enjoyed your anecdotes and enthusiasm during the coach meetings. You gave me many new perspectives during the project. Mailin, you have shown me that I should not be too critical of myself and be more proud of what I have done. I appreciated that you took the time for me to help me with the content analysis I was struggling with. Thank you for giving me insights on how to improve my thesis writing.

Additionally, I would like to thank 1Minuut for their openness and the freedom they gave me within this project. Kevin, although you left the company for a new challenge, you stayed involved as a mentor. Thank you for your guidance during the project and the trust you had in me to decide things independently. I want to thank as well, Evi and Max from 1Minuut. They have put me in contact with customers and have given me many insights into the current state of the product and its use. They were always open to questions and helped me with the brainstorm session.

I also would like to thank all the caregivers that participated in the research. In these busy times, they managed to make time for me. Your stories and feedback were essential to the project and gave me many insides into the actual use of the Smart Glasses.

Lastly, I would like to thank my friends, roommate, boyfriend and my family for their support during my project. To study together, listen to my (sometimes not that interesting) stories, give me their opinion and let me have a break from graduation to think about something else.

All in all, I really enjoyed working on this project. I hope you enjoy reading my graduation report,

Best,
Karlijn de Jong

EXECUTIVE SUMMARY

With an ageing society and fewer people willing to work in healthcare, the pressure on the healthcare sector is growing. And next to that, the high workload increased even more with the COVID-19 pandemic. Next to these factors increase, caregivers need to make numerous decisions each day, is their work emotionally demanding and though to be done. When continuing to work in this way, the quality of care provision will decrease. Therefore technical solutions, like Smart Glasses, can be a way to reduce these high pressures and maintain or even improve the quality of care.

The company 1Minuut already offers an option with Smart Glasses to make knowledge easily, safely and everywhere available to the care provider. Two different Smart Glasses, the VuzixM400 and Google Enterprise 2, and their software Genzõ are already used in several elderly care organisations. Smart Glasses are mainly used to let an expert, like a wound specialist, remotely watch clients from another location. A nurse wears the Smart Glasses, and when video calling with the device, the expert can remotely watch along.

This project focused on two parts. First, the current use and experiences of Smart Glasses (mainly of 1Minuut) are explored and researched. The second part of the research consisted of developing a design proposal of how Smart Glasses can contribute to supporting caregivers in elderly wound care.

The first part started with explorative activities in the context of Smart Glasses. A better understanding was created of how the Smart Glasses and Genzõ of 1Minuut are working, are used, and by whom. Then literature research was performed to obtain more information on the experiences of other Smart Glasses users and researchers. Furthermore, two questionnaires and interviews were conducted by seven participants (clients of 1Minuut) who had all experiences with using Smart Glasses in the actual context of elderly care. A content analysis method was used to analyse the interviews. The project also concentrated partly on what is happening in the elderly (wound) care sector. So when coming up with a proposed design, in the end, this design would contribute to something that can improve or make the work of the elderly care staff easier.

The main results of the study were that Smart Glasses do offer many advantages, especially for the person watching along and the clients. Less effort needs to be made when experts can see an elderly client remotely, and time will be saved. Nurses receive expertise on distance and can act faster, which improves the provision of care for the elderly.

However, Smart Glasses are not yet fully used. This is mainly because there are not yet that many opportunities with and features for the Smart Glasses. In addition, nurses do not yet experience what is really in it for them. Some, especially elderly nurses, find it challenging to control. In conclusion, it takes them more time than it benefits them. Therefore nurses do not use the Smart Glasses much and choose the old manner.

Furthermore, current users mainly use the Smart Glasses when a call is scheduled. They mention that good communication between the nurse and the expert at a distance is essential, as is the reason for use. Therefore an implementation plan is necessary.

The second part of the study focused on proposing a design for how Smart Glasses can support caregivers in elderly wound care. In a short 5-step design sprint, a reporting tool for the Smart Glasses was proposed. This feature helps nurses report wounds with the Smart Glasses by voice. Smart Glasses wearers will be guided through different steps of the report. Closed questions are presented about the wounds, and commonly used answers are shown, which can be selected by saying the answer out loud. There is always an option to add another answer or report at another moment. Reporting can happen now directly in the client's room after the nurse has finished the tasks. When finished reporting, it will be automatically uploaded to the client's information file. This makes reporting more accessible, faster and more consistent.

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1. INTRODUCTION

This chapter provides information on the project and the assignment. The research questions will be presented as the design approach.

1.1 Project introduction

It is everywhere in the news and discussed these days; the pressure on healthcare is increasing. (CSB, 2016 and NOS, 2021). Due to the increasing number of elderly (CBS, 2022) and fewer people working in care (Sterenborg, 2022), the pressure on the nurses and the entire sector is growing. Nor did it help when the COVID-19 epidemic started. More people, especially elderly, needed (intense) care while the care staff could no longer cope, and the high workload continued to grow (Radboudumc, 2021). On top of that, working in care can be emotionally demanding (Captise, 2016) and hard work. Care workers need to make numerous decisions each day when interacting with patients. There is a risk of human error in this context, which can sometimes cause catastrophic results. The longer we continue to work in this way and deal with the high pressure and workload, the less good care we will be able to provide in the future. The introduction of new smart care technology in healthcare could help reduce these high pressures and maintain and improve the quality of care.

The company 1Minuut wants to help the care sector and make a change. They focus on developing innovative technical solutions with which (healthcare) knowledge and expertise are easily, safely and everywhere available to the care provider. They believe Smart Glasses can be this solution. Smart Glasses are wearable augmented reality devices that can add information to what the wearer sees. 1Minuut develops its own software called Genzõ that allows a Smart Glasses wearer to call another person remotely to watch the situation through a camera on the Smart Glasses (Figure 1). By implementing and stimulating the use of Smart Glasses and their software Genzõ within care, 1Minuut wants to increase labour productivity and realise more sustainable employability of care providers. Also, more (and heavier/complex) care can be provided with the same care capacity. As a result, caregivers stay involved in care for longer, are in good health and enjoy their work. The provision of care will be improved, benefiting the clients/patients because there is more time and attention for them.

1Minuut believes that Smart Glasses have the potential to make information, knowledge, and expertise (at a distance) more convenient and more safely accessible, which might help some of the problems described above. Some Smart Glasses are augmented reality Smart Glasses. These kinds capture and process the wearer's surroundings and add virtual elements (Rauschnabel, 2015). While other Smart Glasses are assisted reality Smart Glasses (Dwivedi et al., 2021) and only present data in front of a person's eye via a small display. The Smart Glasses the company is working with are the VuzixM400 and Google Glass Enterprise 2 (Figfures 2 & 3), which belong to the second group. More detailed information about the used Smart Glasses and their function and possibilities will be discussed in chapter 2.1. As mentioned, the company develops its own software called Genzõ, a communication platform on mobile devices and Smart Glasses. At the moment, users can chat, make video calls, and use & call with the Smart Glasses in a secured environment by using Genzõ. The software is ISO27001 & NEN7510 certificated, which can be safely used.

Figure 1: Smart Glasses use (1Minuut, 2022b)

At present, the focus of 1Minuut is mainly on implementing Smart Glasses in elderly care. The wearer of the Smart Glasses can use Genzõ to call a colleague (at a distance) who can watch along by the camera on the Smart Glasses. In this way, the wearer can communicate and perform actions simultaneously by having their hands free. The expert or specialist watching along can save (travel) time, give advice and watch along.

People are enthusiastic about the Smart Glasses, but unfortunately, the Smart Glasses are not used that much. Many novice users face difficulties when trying them out. They do not know or directly see the possibilities of the Smart Glasses and find it difficult to control this new technology. In addition, it is challenging to implement new technologies in the healthcare context. Caregivers must follow protocols and do not have much time to learn and implement new things. Therefore, not all people experience the advantages and are less eager to try the Smart Glasses and adjust their working methods.

Although the developments around Smart Glasses are under development, we as users and designers do not yet experience these exciting results. It takes time for companies to have a working product, and therefore it is challenging to integrate Smart Glasses in the actual context. Nevertheless, 1Minuut does see the value and possibilities of Smart Glasses and thinks way more can be achieved with them. Many ideas for new features and modules are on the table, ready to be developed; the only question is how exactly.

Figure 2: VuzixM400 (Vuzix, 2022)

Figure 3: Google Enterprise 2 (VR-Expert, 2022)

1.2 Assignment Introduction & Research Questions

The Smart Glasses and Genzõ software of 1Minuut are cautiously used in a couple of elderly care homes. Caregivers or nurses call with the Smart Glasses to experts at another place to get feedback, tips and extra expertise on the situation. Those expert people who are watching along are, for example, specialised doctors stationed in a hospital or a wound specialist who has a base location but has to travel to different care locations to visit clients. Calling and viewing are already possible, but the Smart Glasses have more potential. Because a screen is available to the wearer, more information can always be presented, like patient information or a protocol list. And with the constantly improved voice recognition technologies, even more functions and features can be added. But what should those functions look like on the Smart Glasses, and how should those be controlled? What do the Smart Glasses users, the nurses in the elderly healthcare sector, want? And what is actually possible? How to get the most out of use, and what kind of context will it be used? These big questions cannot be appropriately answered within 100 working days of this project. Therefore, during the project, I will focus on a specific case in elderly care, namely, treating a wound. This direction is chosen since, in elderly care, many complex wounds occur that are difficult to heal (Noordhoff, 2020). Each wound should be treated according to protocol. When recognising the type of wound you are dealing with at an early stage and is treated correctly afterwards, the wound will heal faster and, in the end, improve the quality of life. In addition, 1Minuut works with different use cases for calling with the Smart Glasses, and one of the use cases is wound care (observations at distance, for example). Therefore I have relatively easy access to this sector and can get in contact with Smart Glasses users.

This project aims to understand better the current use of the Smart Glasses and Genzõ software and propose a solution of how the Smart Glasses can contribute to elderly wound care. Therefore, the main research question is:

"How can the elderly care staff be supported with Smart Glasses in the elderly wound care?"

To answer this question, it is crucial first to understand what is happening in elderly (wound) care to know how Smart Glasses could contribute to the care providers' work. Therefore, it is essential to understand the way of working, to see what goes well in this sector and what can be improved. Two sub-research questions are created to get a better understanding of how Smart Glasses can contribute to the elderly wound sector:

- *"What is the current way of working in elderly (wound) care?"*
- *"What can be improved in wound care for the elderly?"*

Next, to answer the main research question and propose a solution, it is essential to get a clear overview of the current situation and use of Smart Glasses, both for the customers of 1Minuut and in general. Research is done on people's experiences with the Smart Glasses, what kind of situations they use them and what problems and advantages they have run into. When it is clear what is going on, we can see what needs to be improved and what could be possible with Smart Glasses in the elderly wound care sector. The two sub-research questions that belong to this part are:

- *"What are nurses' current experiences with Smart Glasses?"*
- *"What are the possibilities with Smart Glasses in the elderl care?"*

When the sub-research questions are answered, a better understanding of how Smart Glasses can contribute to supporting caregivers in wound care for the elderly can be given. Then a direction can be chosen for the design proposal by looking at the most interesting and promising research outcomes. A concept will be developed on how elderly care staff can be supported with Smart Glasses in elderly wound care.

The initial project brief can be found in Appendix 1.

Figure 4: Nurse with Smart Glasses (1Minuut, 2022a)

1.3 Project approach

The double diamond approach (Design Council, 2019) is a good way of describing the design process I went through to develop a proposal for how Smart Glasses can contribute to wound care for the elderly. The approach consists of two diamonds, where the first part of the diamonds diverges and then converges (Figure 5). More focus has been placed on the first diamond since the start of the project was quite broad. Here the context of the project is explored, and opportunities and bottlenecks or areas for improvement are defined. After choosing one specific direction, I could start developing a solution of how Smart Glasses could contribute to wound care by going through a short design sprint in the second diamond. In a short amount of time, a concept will be developed and delivered.

The first diamond consists of the Explore and Define phase.
Explore phase (chapter 2):
The project started very wide, so it is essential to get a clear overview of what we are working with. A description of the used Smart Glasses by 1Minuut will be given, as to how they are controlled and what the Genzõ software looks like. An overview of the intended use of the Smart Glasses will be presented as of the process the (elderly) care organisations go through when deciding to use and implement Smart Glasses within their organisation.

Define phase (chapter 3):
After the context has been explored, it is time to define what to focus on. Therefore, a literature study was performed to obtain information on the state of the art of Smart Glasses. It will explore what situations Smart Glasses are already used in and what advantages and pitfalls people have experienced. I also looked at what the literature says about current elderly (wound) care and what is going well and can be improved in this sector. Next to literature research, seven Smart Glasses and/or Genzõ users were interviewed and filled in two questionnaires to get data on their experience working in care and the Smart Glasses use. The interview was analysed with a content method, which gave insides about different themes related to the Smart Glasses use and working in the elderly care sector. At the end of the define phase, a direction to continue is chosen to develop a proposal of how Smart Glasses can contribute to elderly wound care.

The second diamond consists of the Develop and Deliver phase.
Develop and Deliver (chapter 4):
Due to time, it was decided to go through a short design sprint in which first ideas and concepts are created to follow up with a quick evaluation to come up with a final proposal of how the Smart Glasses can contribute to elderly wound care.

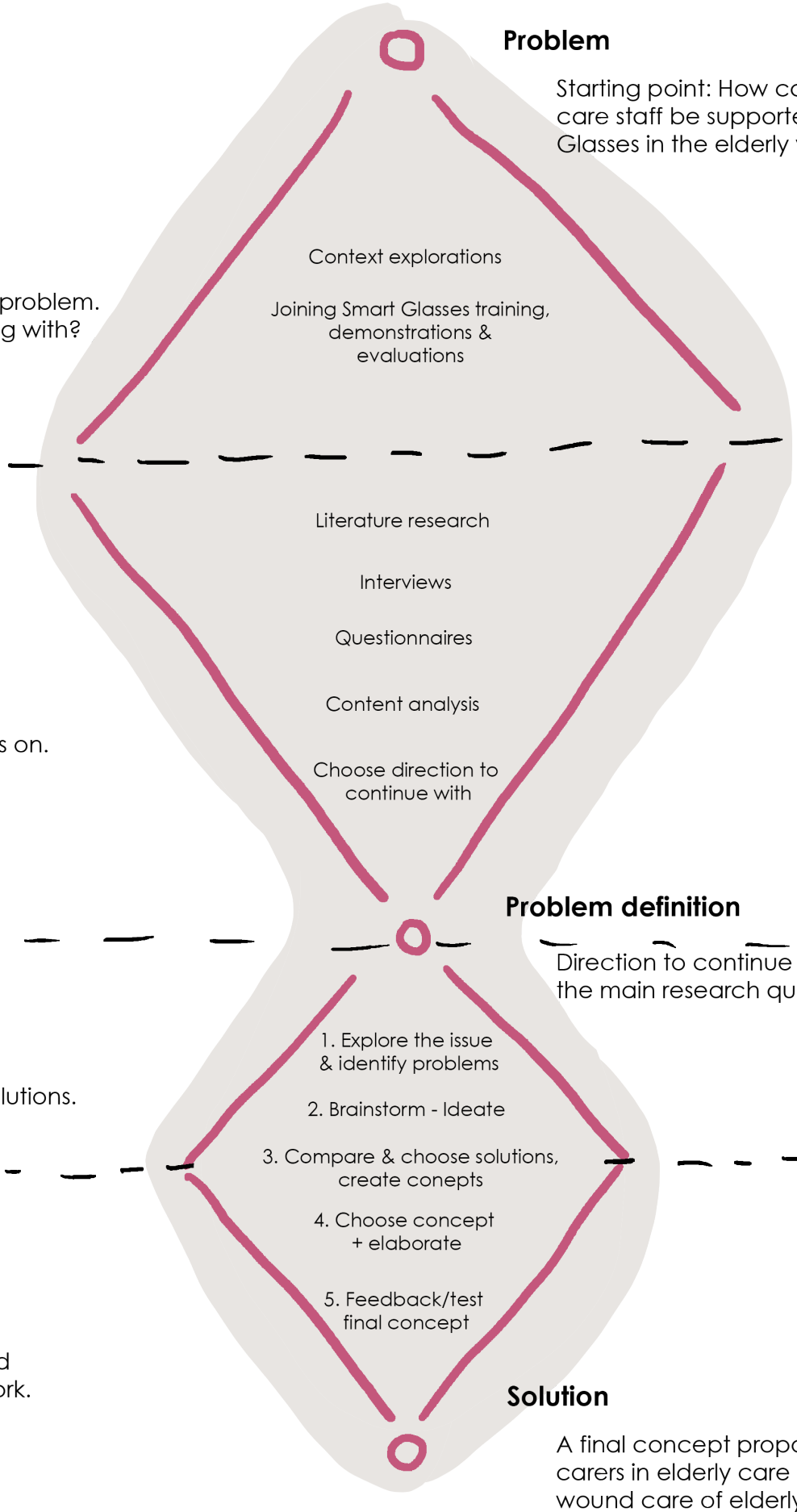


Image 5: Double diamond approach

2 DISCOVER

In this chapter, we explore the context of the Smart Glasses, their use and users to get a good idea of what we are dealing with. First, more information about the Smart Glasses 1 Minuut uses will be given, the VuzixM400 and the Google Glass Enterprise 2. Explained will be their characteristics and how they differ from each other. More information will also be given about what the Genzõ software looks like and how it is controlled. When we understand what the software and hardware contain, we look at its intended calling procedure, how people get to the actual use and the stakeholders involved when implementing Smart Glasses within an organisation. All this information is gathered by performing context explorative activities, talking to employees of 1Minuut, attending Smart Glasses training and evaluation conversations of 1Minuut.

2.1 Information about Smart Glasses

The company 1Minuut works with two parties that deliver different Smart Glasses, the VuzixM400 and the Google Enterprise Edition 2 (Figures 6, 7 & 8). Both Smart Glasses contain a built-in microphone, a high-resolution camera and run the proprietary developed software Genzõ (more about this software in chapter 2.2). Smart Glasses are wearable augmented reality devices that can present information to the wearer. The used Smart Glasses do not process surroundings or add virtual elements in the room; they only show information on the screen of the glasses and receive and play sound. This section will highlight the functions of both Smart Glasses and their similarities and differences.

Figure 6: VuzixM400 (Vuzix, 2022)

Figure 7: Google Enterprise 2 (VR-Expert, 2022)

Figure 8: Two nurses with the VuzixM400 (left) and the Google Enterprise 2 (right) (1Minuut, 2022c)

2.1.1 The VuzixM400

The VuzixM400 consists of a couple of components. On the frame, it is possible to easily insert two different components by a rail, the battery part on one side and on the other side the part with the buttons and the screen. When used, those two components should be continuously connected with a cable (Figure 10). When fully charged, the battery can run for 1,5 to 2 hours. The different components can also be attached to a head strap.

The VuzixM400 can be operated by three buttons on the side to which the screen is connected (Figure 11). There is also a touchpad on the VuzixM400. 1Minuut has switched off this touchpad to avoid confusion. Because the preferred control method is with buttons, and when pressing buttons, the user might accidentally touch the touchpad. Next to the buttons, it is also possible to control the Smart Glasses by voice; some word commands are already programmed, see on the right. Normally the commands used are in Dutch, the commands presented are translated. On this side, the turn-off button is placed as well. The screen has a couple of freedom movements to position the screen correctly (Figure 9). The user is still able to wear their own glasses underneath the VuzixM400.

Some voice commands:

To activate voice control:
"Hello Genzõ" or "Hello Vuzix"

To call someone:
"Call [First + Last name]"

To present who is on duty:
"Who is on duty?"

To start a recording:
"Start recording"

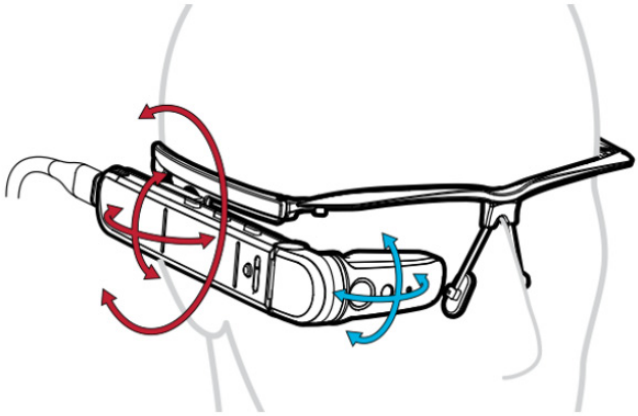
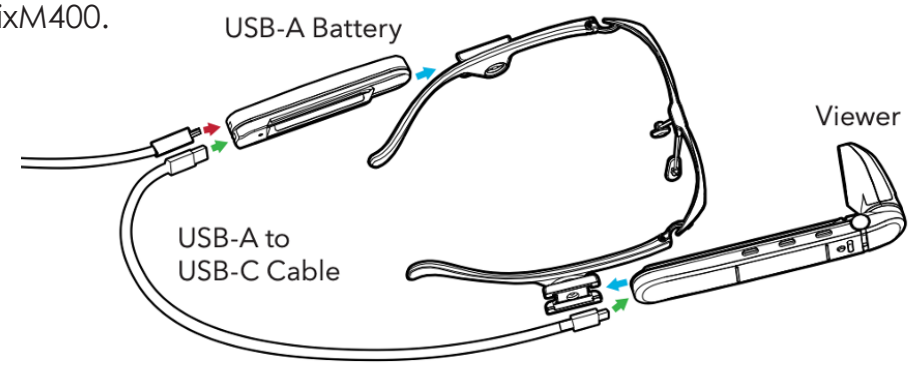
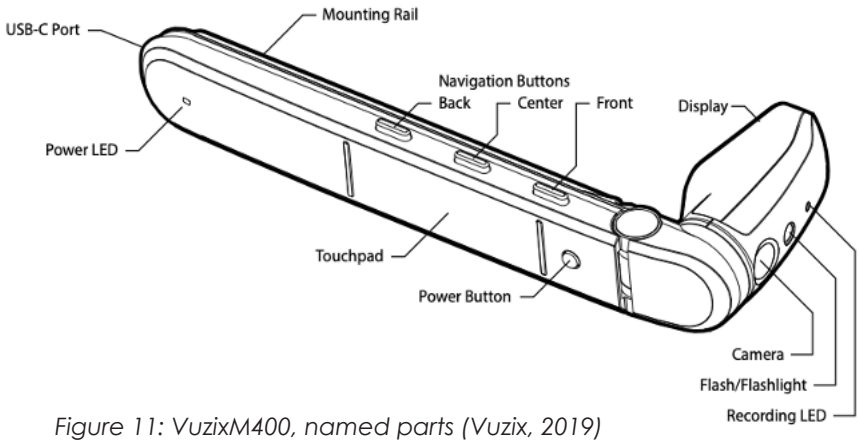


Figure 9: VuzixM400 freedom of movements (Vuzix, 2019)





Charging the battery
Assembling the M400 mounting system
Power to M400 from Battery

Figure 10: VuzixM400 elements (Vuzix, 2019)

Figure 11: VuzixM400, named parts (Vuzix, 2019)

2.1.2 The Google Enterprise Edition 2

This Smart Glasses consists only of one component and is controlled by a touchpad instead of buttons. The voice commands also apply to these Smart Glasses. There is only one button, the on/off button, placed at the end of the thicker side (Figure 12). The screen of this Smart Glasses is different from the screen of the VuzixM400 (Figure 13). It consists of a glass block in which a screen is projected (Missfeldt, n.d.). Compared to the VuzixM400, the frame of the Google Glass is much smaller and, therefore, much lighter. Since the battery is incorporated into the frame and is much smaller, the battery life is also shorter. Fully charged, it can last up to 1.5 hours.

As mentioned, the way of control is by touch. A touchpad on the right side controls the glasses (Figure 14). It is possible to swipe up or down, to the front or back and tap.

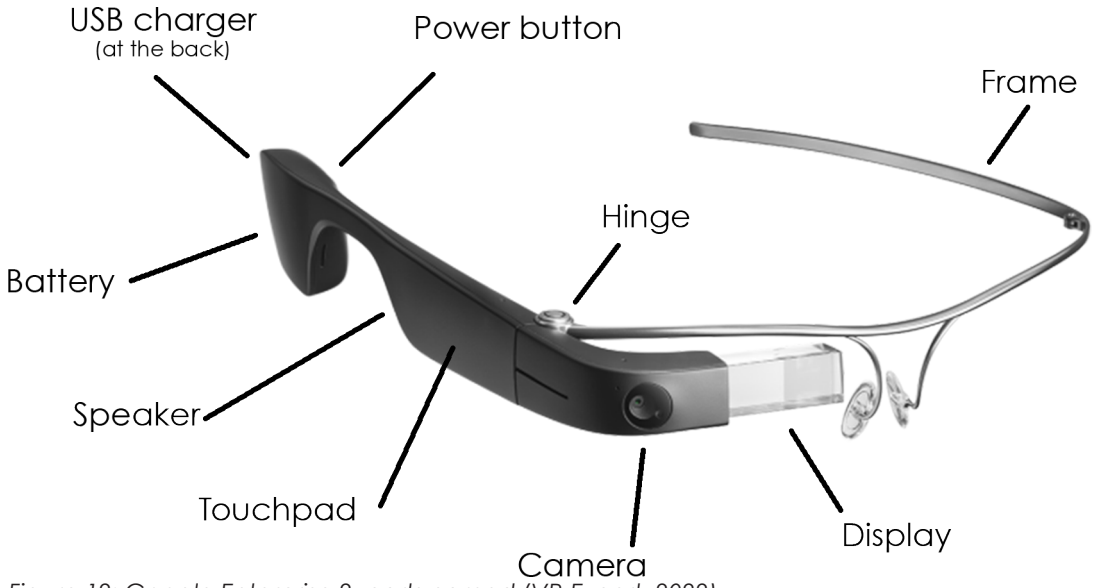


Figure 12: Google Enterprise 2, parts named (VR-Expert, 2022)

Figure 13: Google Enterprise 2, prisma - screen (VR-Expert, 2021)

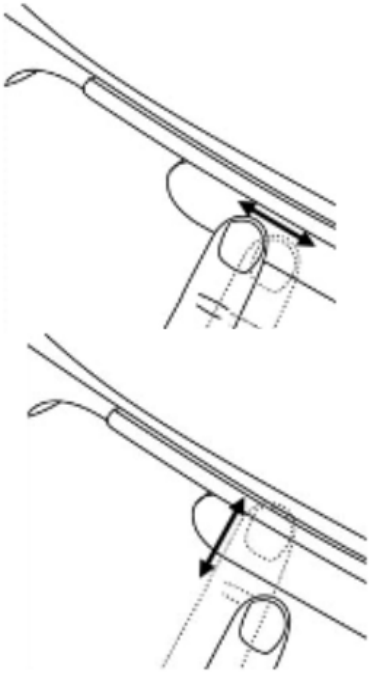


Figure 14: Google Enterprise 2, touch control

Although the VuzixM400 an d the Google Enterprise 2 can do precisely the same things, how they look and how they are controlled and charged are different. See the figure 15 for an overview of the differences.

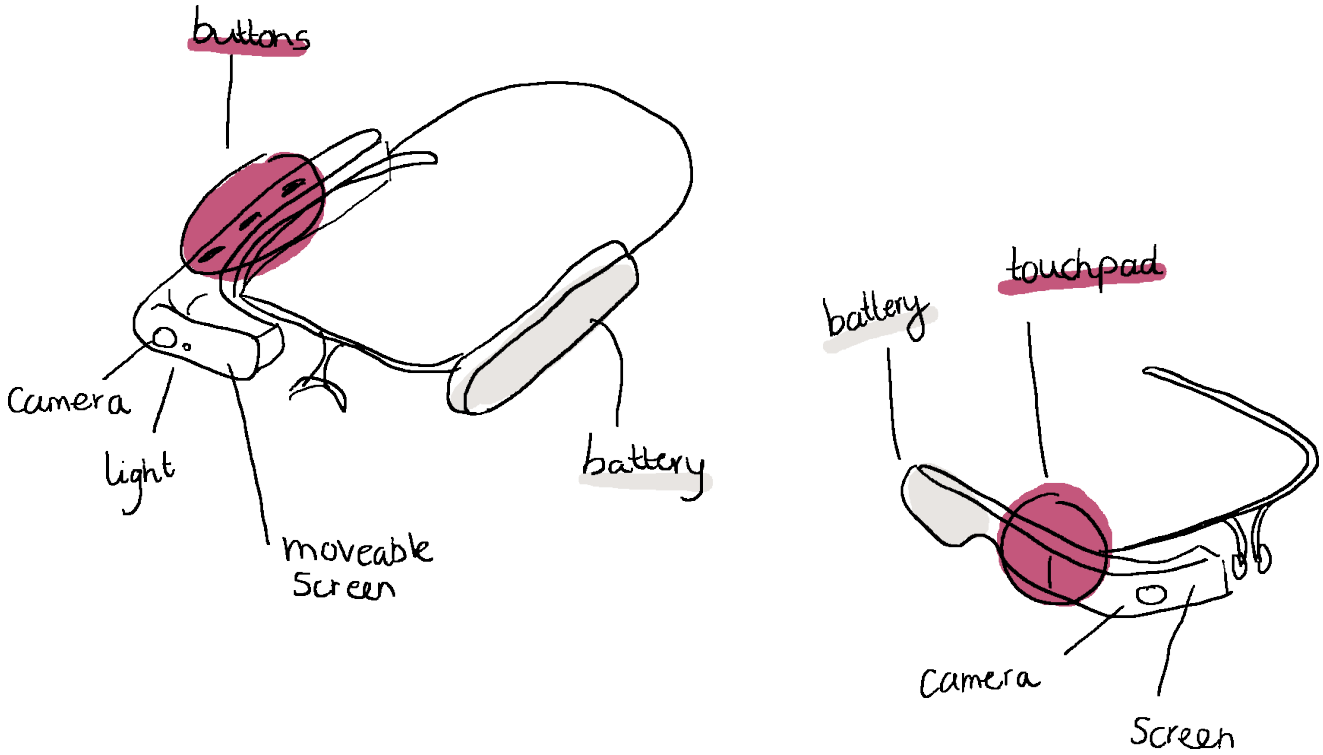


Figure 15: Overview of the differences between the two used Smart Glasses (left Vuzix, right Google Glasses)

2.2 How is it used? ~ The Genzõ Software

This part explains how the software Genzõ exactly works and the possibilities. The Genzõ software consists of two parts. The first part is an application that runs on a mobile device like a phone or tablet. This app (Figure 16) can be downloaded in the Appstore or Playstore. The other part of the Genzõ software is the application on the Smart Glasses. The use of the Smart Glasses and Genzõ is mainly to make it possible for a wearer (a nurse, for example) of the Smart Glasses to video call another person, or vice versa, and for that person to remotely observe the situation with the camera on the Smart Glasses (to watch along). As a Smart Glasses wearer, both devices and apps are needed. Because when to log in on the Smart Glass, you first need to log in on the mobile app. To watch along, the app on a mobile device is only required. First, information about the software on the phone/tablet will be given to later focus on the software on the Smart Glasses. Finally, the steps and options of using it as a wearer and remote watcher will be presented.

Figure 16: Genzõ application

2.2.1 Genzõ Software on the phone

The first thing to do when making use of Genzõ, as a wearer or person who watches along, is to create an account in the Genzõ within the users' health organisation. When an account is created, it is possible to log in (Figure 17). After logging in, the user first sees their contact list with all the organisation's people using the Genzõ software (Figure 18). Per person, you can see by the circles next to their picture whether they are available and have recently been logged in. Next to their names in the contact list are placed blue circles; when clicking on those, it is possible to make a call to a phone/tablet or the Smart Glasses. Calling by phone is even possible with facetime.

It is possible to use personal or group accounts for the users as an organisation. The difference is that there are fewer accounts. Although there is a disadvantage when choosing group accounts, it is not always known who is on the account and who is logged in.

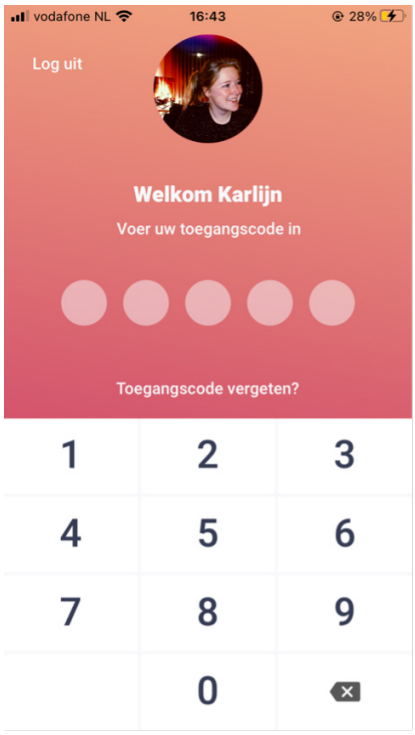


Figure 17: Inlog screen

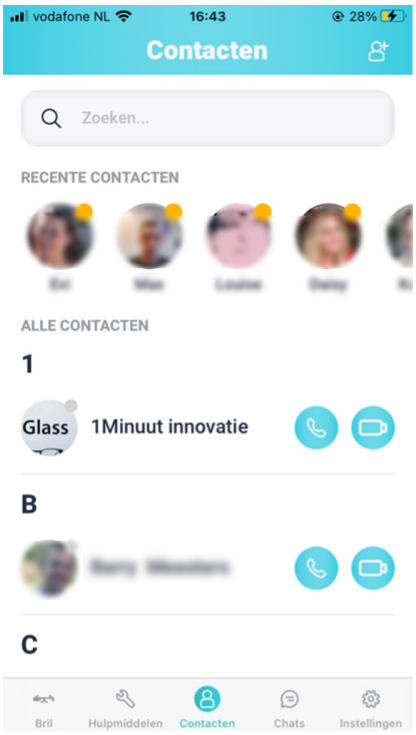


Figure 18: Contact list

Clicking on a person in the contact list gives more information about their role, the organisation they belong to, and the location they work (Figure 19). Chatting with others within the app is also possible, either personally or in groups (Figure 20), personally or in groups, like WhatsApp.

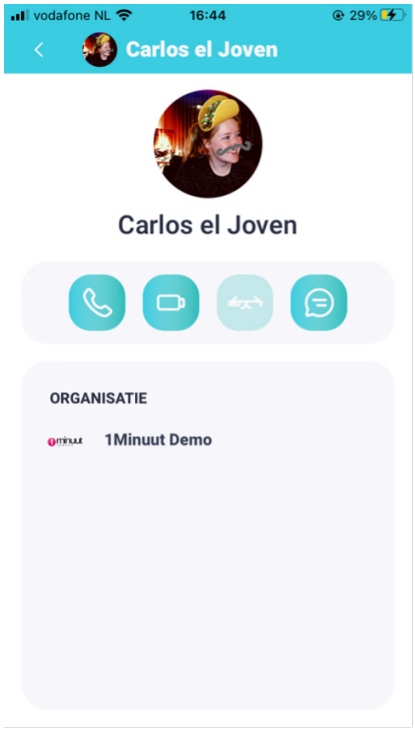


Figure 19: Other contact information

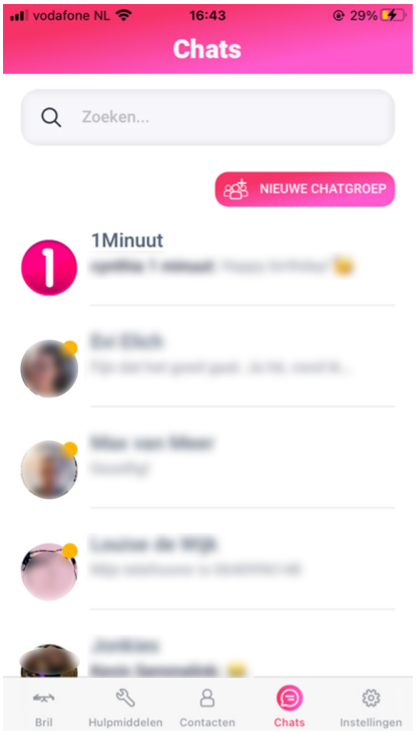


Figure 20: Chat

Another tab visible at the menu bar at the bottom is 'hulpmiddelen' or 'helping tools' (Figure 21). Here, users can find tools that might help them during their work 'medical calculation' (Figure 22) and some 'instruction videos' about the Smart Glasses and their functions (Figure 23).

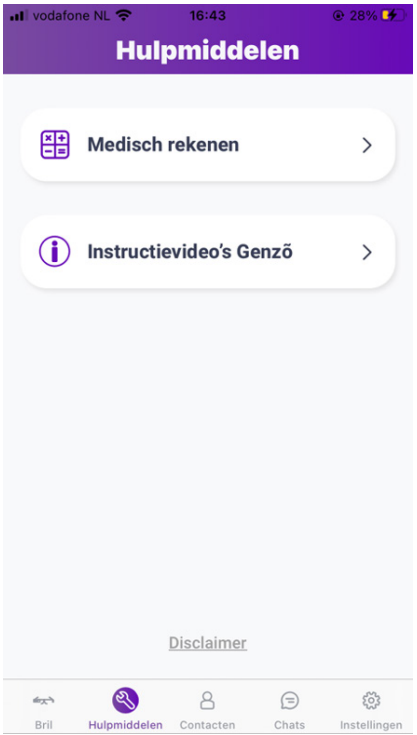


Figure 21: Helping tools

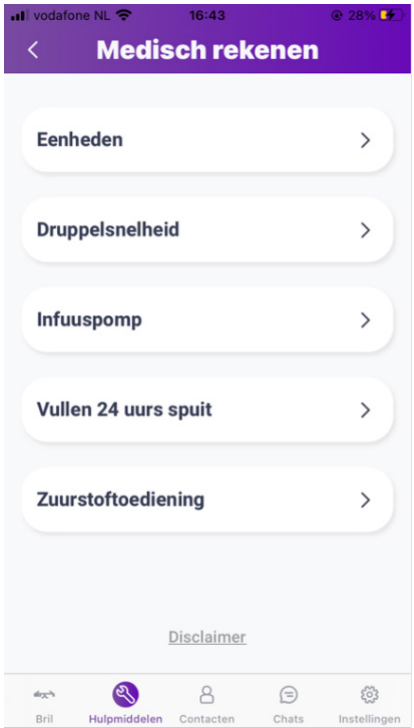


Figure 22: Helping tools; medical calculation

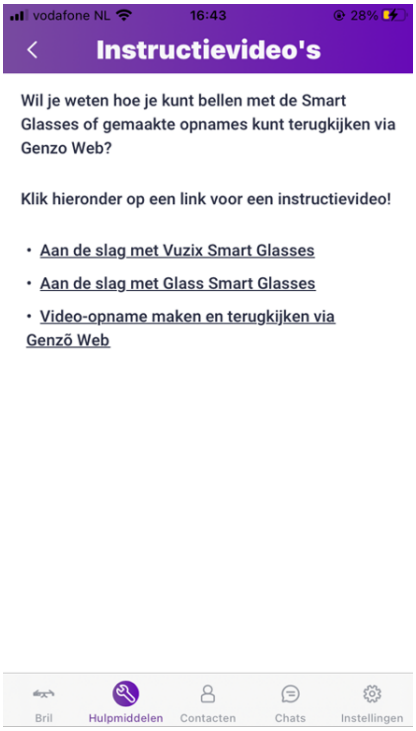


Figure 23: Helping tools; instruction videos

The tab on the far right in the menu bar brings the user to 'instellingen' or 'settings' (Figure 24). Here they can see their profile, some frequently asked questions, the customer service details, a link to Genzõ Web, and some app settings. Genzõ Web is a website to which recorded videos with the Smart Glasses are uploaded. The users can share this link with people they want to share the video with.

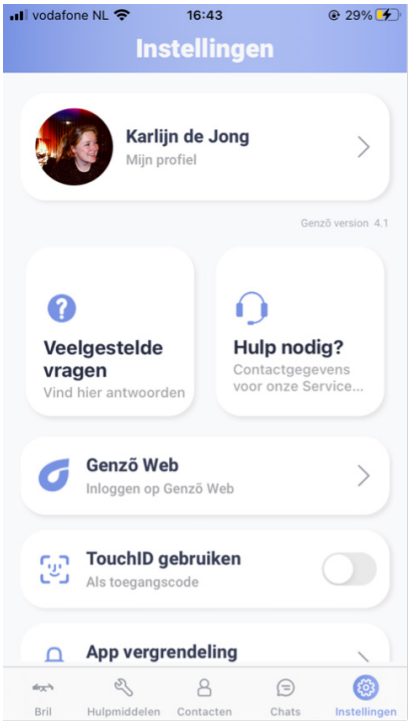


Figure 24: Settings

Figure 25: QR-code

When intending to wear the Smart Glasses, the user also needs to log in. This is done by first logging in on the mobile device and then going to the 'Bril' or 'Glasses' tab in the menu. Here the user, the Smart Glasses wearer, can find a QR code that needs to be scanned with the Smart Glasses (Figure 25). The wearer of the Smart Glasses is now logged in and is automatically logged out of the mobile device, as it is only possible to be online on one device.

2.2.2 Genzõ Software on the Smart Glasses

The other software part of Genzõ runs on the Smart Glasses. The first two things you have to do as a wearer to use the Smart Glasses are turning them on and connecting the Smart Glasses to the internet. Often, health organisations use Mifi-boxes that ensure a strong and reliable internet connection. A QR code is presented on those boxes, which can be scanned easily with the Smart Glasses (Figure 26). If not using an amplifier, the wifi can be selected manually, and a password can be filled in by clicking on a button.

Figure 26: Connect to wifi

When the Smart Glasses is connected to the internet, the user, the wearer, can log in. This is done by scanning the QR code on the mobile device, as explained in the previous part. The Smart Glasses wearer first sees figure 27 on the screen, which tells them what to do. After pressing a button, they can scan the QR code (Figure 28).

If logged in successfully, the wearer will be guided to the main menu on the Smart Glasses (Figure 29). Here they see all the different people within their organisation, whether they are online, offline, or recently logged in. Depending on which Smart Glasses is used, they can see the way of controlling at the right side of the screen. Figure 30 shows instructions for controlling the Google Glasses Enterprise 2.

Figure 27: Explanation to scan to log in

Figure 28: Scan QR code

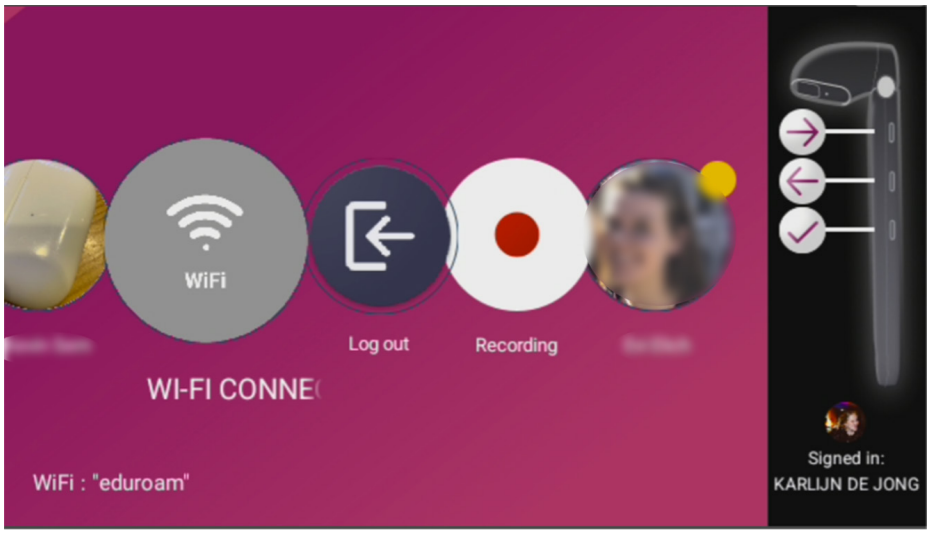


Figure 29: Menu Smart Glasses

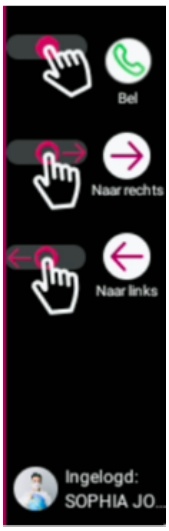


Figure 30: Control Google Glasses

The wearer can scroll through the menu and select the person they want to call. There is also an option to record videos. When the wearer has finished using the Smart Glasses, they must log out so that the following Smart Glasses user does not have to do so.

2.2.3 Intended calling procedure

Figure 31 gives an overview of how the call between a person wearing the Smart Glasses and the person watching along is established. It does not matter who calls who, but they both must be online and have time to call. Next, it will be described what both parties see on their screen.

Figure 31: Establishment of a call

The Smart Glasses wearer
When answering the call with the Smart Glasses, the wearer films live their view/situation to the person who watches along. The wearer can turn on or off the light during the video call, see or not see the video they film themselves and end the call (Figure 32).

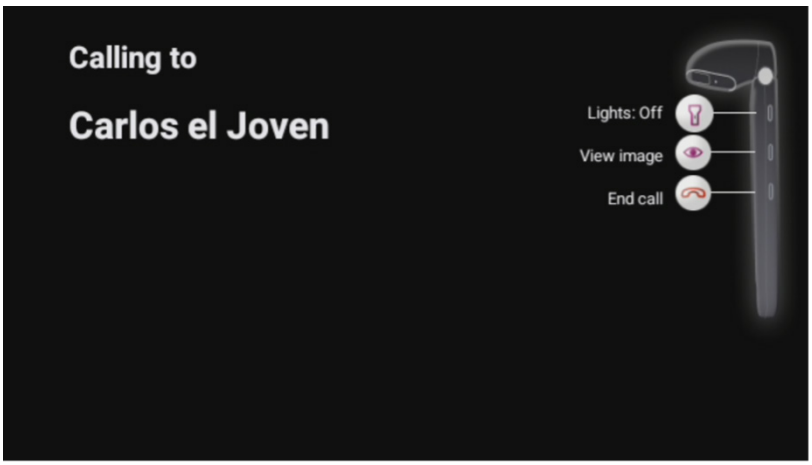


Figure 32: Screen of the Smart Glasses wearer

The person who watches along (at a distance)
The viewer sees what the wearer is filming. During the call, the viewer has a couple of options; he/she can point, draw, or type something to the wearer (Figures 33, 34 & 35). The wearer will see those annotations directly on the screen of the Smart Glasses.

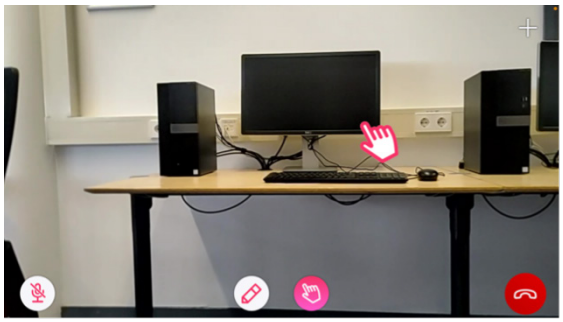


Figure 33: Option to point at something

Figure 34: Option to draw something

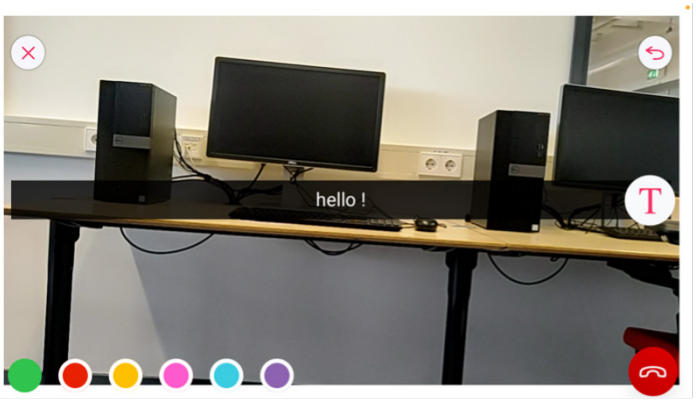


Figure 35: Option to type something

2.3 Steps towards actual use

Before health organisations start using Smart Glasses, they have to go through several steps. This section shows briefly which steps customers of 1Minuut go through from the first introduction with Smart Glasses until they can use the product independently. The steps are:

1. First introduction Smart Glasses – Demonstration
2. Setting up contract
3. Implementation plan
4. Training
5. Pilot
6. Evaluation
7. Continue

- 1. First introduction Smart Glasses – Demonstration
  If an organisation is interested in Smart Glasses, they can apply for a demonstration of the Smart Glasses. 1Minuut will come by introducing what Smart Glasses are and what they can add to their company. Presented will also be some use cases for which the Smart Glasses can easily be used, like watching along at wounds, observing elderly with misunderstood behaviour (like dementia), or watching students remotely as they carry out an assignment.

- 2. Setting up the contract
  When the organisation wants to continue, a contract needs to be signed. In this phase, they will decide what situation the Smart Glasses will be used in and who will be involved with the project.

- 3. Implementation plan
  Before beginning to train everybody for the Smart Glasses use, it is essential to have a clear implementation plan. Before getting started with the project, it must be clear who is involved in the project, what situations the Smart Glasses will be used, if the internet connection is stable and to whom users need to go if they encourage problems. And what is also essential, all those involved must agree on the use and practice.

- 4. Training
  If everyone is aware of the agreements, the training phase can start. The training will explain how to operate the Smart Glasses and the software. What to pay attention to when calling is also discussed. People can try out the Smart Glasses for themselves.

- 5. Pilot
  Once everyone has been trained, the health organisation tries to use the Smart Glasses for a certain period themselves.

- 6. Evaluation
  After a certain period, an evaluation will be performed with the organisation and 1Minuut. Discussed will be how the use went, what when well and what could be improved

- 7. Continue
  If the pilot phase is successful, the organisation will continue to use the Smart Glasses and tries to implement them further within their organisation. If not, the implementation plan must be adjusted, or other solutions must be found.

2.4 Stakeholder overview

A stakeholder overview was created to present an overview (Figure 36) of all the people involved with Smart Glasses.

Smart Glasses and Genzõ users can be placed in two categories: users who wear the Smart Glasses and users who watch along. Nurses who work at elderly homes are the wearers most of the time. Specialists or doctors, who are at another location than the elderly, watch along. They may be in the hospital or another care location of the specific healthcare organisation.

The other group involved are the elderly clients. Instead of a specialist visiting them, they are now seen through the Smart Glasses worn by a nurse. The elderly see fewer (unfamiliar) people, caregivers, and do not have to go to a hospital for an appointment.

Most of the time, the board of an elderly health organisation decides to start using and implementing Smart Glasses. They determine who will be using them and who will lead the project. Many different people will be involved with the Smart Glasses within the health organisation. The ICT should be up to date on the new change, as do staff members and other doctors and specialists.

1Minuut provides the software Genzõ and the Smart Glasses and helps the organisations with the implementation plan of the Smart Glasses. They deliver the Glasses, have a customer service platform, provide training and help evaluate the organisation's Smart Glasses use after some time.

The makers of the Smart Glasses are separate stakeholders in this story. 1Minuut does not influence the hardware of the Smart Glasses since those come from other companies, Vuzix and Google.

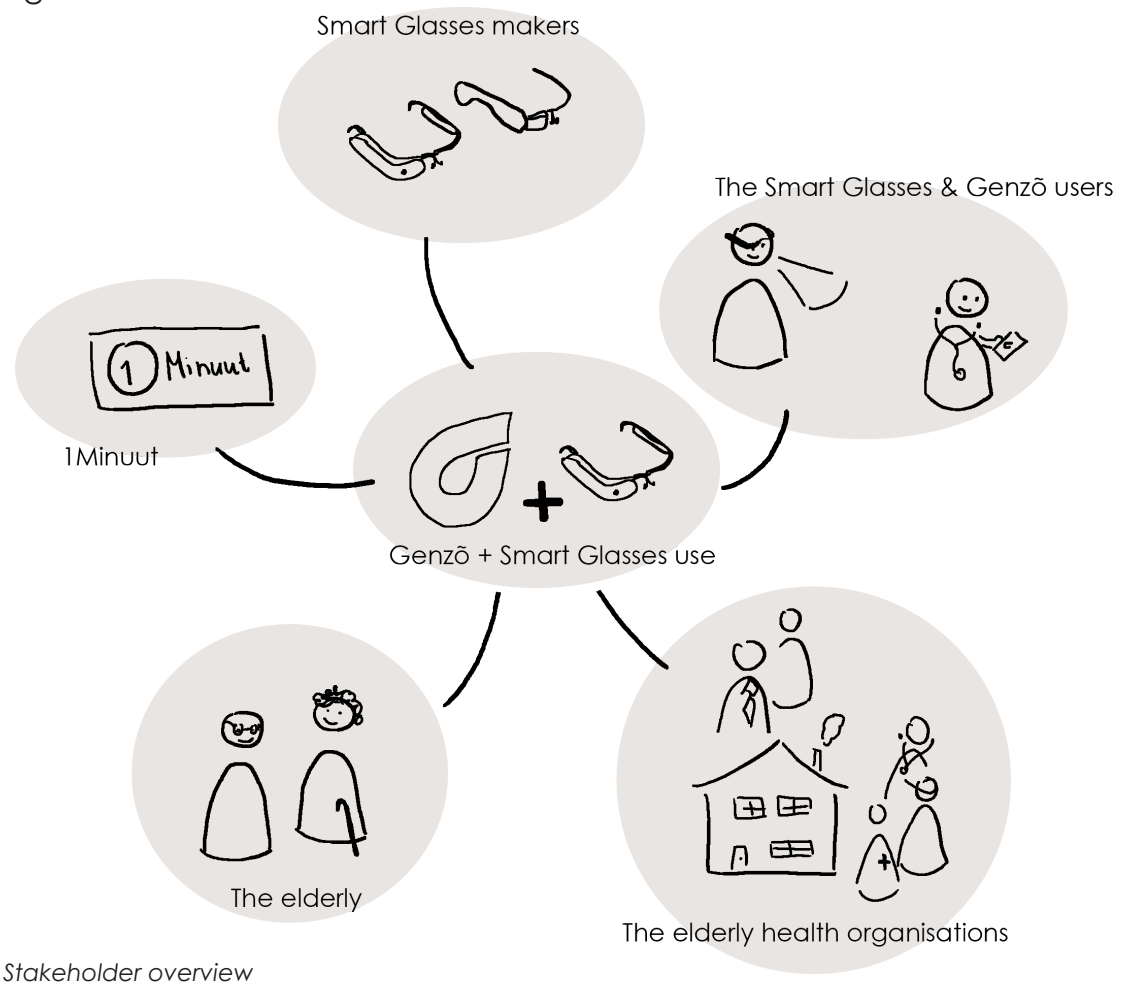


Figure 36: Stakeholder overview

3 DEFINE

In this chapter, the Define phase of the first diamond is presented. In order to propose a idea for the implementation of Smart Glasses in the elderly (wound) care, information and data is collected about recent experiences and future possibilities. Moreover, the current way of working in the elderly (wound) care is analysed. This data is collected by literature research, questionnaires, interviews, and content analysis. First, the literature research will be presented. Secondly, the methods will be explained to continue with how those are executed. Next, the results will be shown with the most exciting findings. At the end of this chapter, the sub-research questions are being answered, and a direction is chosen to come up with a solution of how the Smart Glasses can help nurses and contribute to elderly wound care.

3.1 Literature research

Literature research was performed to gather more information about the current state and possibilities for the use of Smart Glasses. There is focussed on situations in which Smart Glasses have already been used in order to see what could be improved when using Smart Glasses in wound care for the elderly. Also, small desk research was performed to get some information on the way of working in the elderly (wound) care sector.

The approach of this study was to search for literature and other articles via Google Scholar and reference lists in existing journal articles. Some of the search terms used are 'Smart Glasses', 'History of Smart Glasses', 'Situation of use Smart Glasses', 'Advantages Smart Glasses', 'Wounds and Smart Glasses', and 'Teleconsulting Smart Glasses'. The used sources were assessed for relevance to the sub-research questions and topicality (±10 years old). The sub-research questions are:

- *"What are the current experiences of nurses using the Smart Glasses?"*
- *"What are the possibilities with Smart Glasses in the elderl care?"*

The desk research approach was to search for articles and information via Google. The search terms used are 'elderly nursing tasks', 'reporting in care', and 'treating wounds'.

The use of Smart Glasses is on the rise. More and more often, we see them popping up in different sectors. Although they were not directly intended for use in healthcare, the industry recognises their potential, and research and development are increasing. First, a couple of use situations will be described with their experiences. This is followed by a section that given more information on Smart Glasses and teleconsulting (providing consult from a different location). Next, a small section will highlight the experiences of Smart Glasses usage in the wound care sector. Finally, some drawbacks of the (current) use will be presented.

Situations of use

Boillat et al. (2019) study was about using Smart Glasses for surgical safety checklists. They show that Smart Glasses can be used as safety or completion checklists. The study has compared completing the checklists using Smart Glasses, with the regular way of completing checklists. The list performed with the Smart Glasses had a higher completion rate, and the time was reduced compared with traditional ways of following the checklists. Using a checklist might also be interesting in the wound sector since nurses need to follow different protocols and have several tasks to complete during the day. The study of Boillat et al. (2019) mentioned as well potential features like automatically documenting and making notes in the patient's medical record. This might be an exciting area for future developments.

Another sector where Smart Glasses can also be used is the education sector. Some advantages and applications of the Smart Glasses are seen in the study of Kumar et al. (2018). Like using the devices for documentation of lectures, on-site report preparations, or recording lectures. Kumar et al. (2018) say that Smart Glasses can be of value for and can even improve the education sector. Therefore, Smart Glasses might be beneficial to educate (new) nurses. Or to let them record what happens in their situation, to look back later and see what could be improved.

Two other sectors where the Smart Glasses are already in use or have been researched are the electronics manufacturing sector and factories. For the first sector, the Smart Glasses were used as assistance in picking orders and setting up the assembly of machines (Terhoeven et al., 2018). At some factories, Smart Glasses are already used as a supporting tool for shop-floor operators (Syberfeldt et al., 2017). Smart Glasses show the potential to support the wearer in making choices and assisting them, which might also be of interest in (the wound) care sector, where people need to make numerous decisions each day.

A significant advantage of Smart Glasses is having contact with an expert and having access to information without using yout hands. The studies of Zhang et al. (2022) and Muensterer et al. (2014) also say that hands-free working is an excellent advantage, as is remote consultation. Zhang et al. (2022) state that EMS (Emergency Medical Services) personnel is optimistic about using Smart Glasses during prehospital encounters. The study identifies four different potential applications areas of how Smart Glasses can contribute to the work of EMS. The areas are: enhancing teleconsultation, automating patient data collection and documentation, helping with decision making and situation awareness, and augmenting quality assurance and training. Muensterer et al. (2014) also say in their study about the use of Smart Glasses in pediatric surgery that the Smart Glasses were useful for searching for unfamiliar terms or syndromes. The Smart Glasses might have great potential in the wound sector to provide information about wounds and how to treat them.

Smart Glasses & Teleconsulting
The Smart Glasses and Genzõ from 1Minuut are used in different situations, but most of the time they are used for teleconsulting. Teleconsulting is, according to Ologeanu-Taddei et al. (2017), 'A doctor, based in one location, gives a consultation to a patient, who may or may not be supported by some other healthcare professional, at some other location. The patient and/or the healthcare professional provide the doctor with the data they need to make a diagnosis at a distance'. The study of Bashshur et al. (2014) proves that teleconsultation can improve health outcomes. It can reduce hospitalisation, hospital visits and can prevent illness.

Using Smart Glasses for (wound) care
Janßen and Prilla (2022) say that although teleconsulting is valuable, there has not been much research or literature on how teleconsulting with head-mounted devices is done in care. They mention in their paper three essential factors during teleconsulting; having their hands free all the time, having a mobile solution for teleconsulting because they do not have a fixed workplace, and the time it takes to use the Smart Glasses must be short, so the interaction is easy and fast in the short time the nurses have with the client. Therefore, the interviews are focussed on how Smart Glasses and Genzõ software of 1Minuut is perceived. By these interviews, more information is gained about the good aspects of using Smart Glasses and how the usage of Smart Glasses can be improved.

Drawbacks of the use of Smart Glasses
However, before Smart Glasses can be implemented and deployed in real situations, some aspects need to be changed. Zhang et al. (2022) mention that improvement areas are within the hardware limitations, human factors, reliability, workflow, interoperability, and privacy. Another study by Muensterer et al. (2014) mentions that people had experience drawbacks with the Smart Glasses. The audio quality, internet connection, privacy protection, and battery endurance should be improved. However, the focus of this study is not on the hardware aspects of Smart Glasses. It is good to name the limitations and how best to deal with them.

Implementing Smart Glasses, a new technology, brings about some change within the organisations and the way they work. Mentis et al. (2016) looked at surgical telemedicine and mentioned that by implementing Smart Glasses within their job, a new technique is presented and that they should learn to cope with it. They also mentioned about the importance of communication between the person wearing the device and the remote person. The remote person is entirely reliant on the person wearing the Smart Glasses. Therefore it is interesting to get a good overview of how users of the Smart Glasses of 1Minuut are communicating when using the Smart Glasses. What to look out for when calling should be discussed in further research, the interviews.

Romare et al. (2018) researched what healthcare professionals thought about implementing and using Smart Glasses in the ICU. Their research showed that Smart Glasses can be helpful for patient monitoring but can never replace a human nurse. The nurses and other staff members see the Smart Glasses more as an addition to their routines than a device that can replace the current way of working. Before Smart Glasses can be implemented and be fully used, usage routines should be introduced, and training and support should be given before and during the implementation phase.

There are some disadvantages and things to consider when teleconsulting with Smart Glasses. In the study of Grata-Borkowska et al. (2021), it is said that there is a chance that the specialist cannot reliably verify the condition since the specialist does not see the client in person. In the study of Barbosa and Silva (2017), nurses mention that not perceiving nonverbal signs makes communication more difficult during telehealth. Therefore they said that this must be considered during the explanation or training. Those things are essential to consider when coming up with a proposal for how the Smart Glasses can support the care staff.

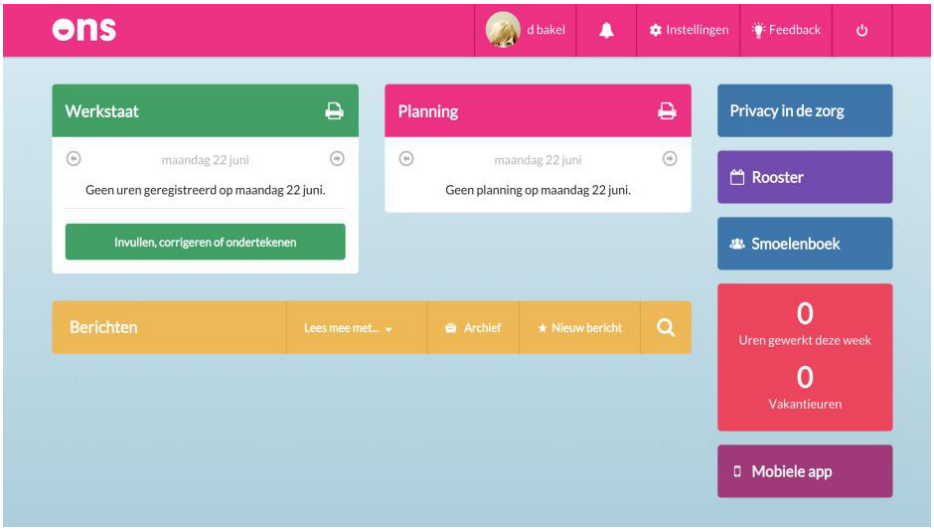


Figure 37: ONS, Nedap (ZZWD, 2022)

Working in the elderly (wound) care

Working in the elderly wound care sector consists of many things (Ontdek de Ouderenzorg, n.d.). As a caregiver, you are engaged in providing the appropriate care and monitoring the health and well-being of the elderly. It is also essential to understand the elderly. None of the clients is the same, so are the days. Within the elderly care, there are many different jobs, like physiotherapist, living room assistant and IG carer (caregiver individual healthcare) etc.

Many health organisations use different plans to provide the client with the best care and support, like the 'zorgleefplan', 'ondersteuningsplan' and 'begeleidingsplan' (Zorg voor Beter, n.d.). These plans show a methodical way of working; some of these are: information about the client and the situation must be gathered, problems and needs must be identified, and targets must be set. The plans guide the caregivers, so they know what to do, what the client wants and what is going on (Zorgleefplanwijzer, n.d.).

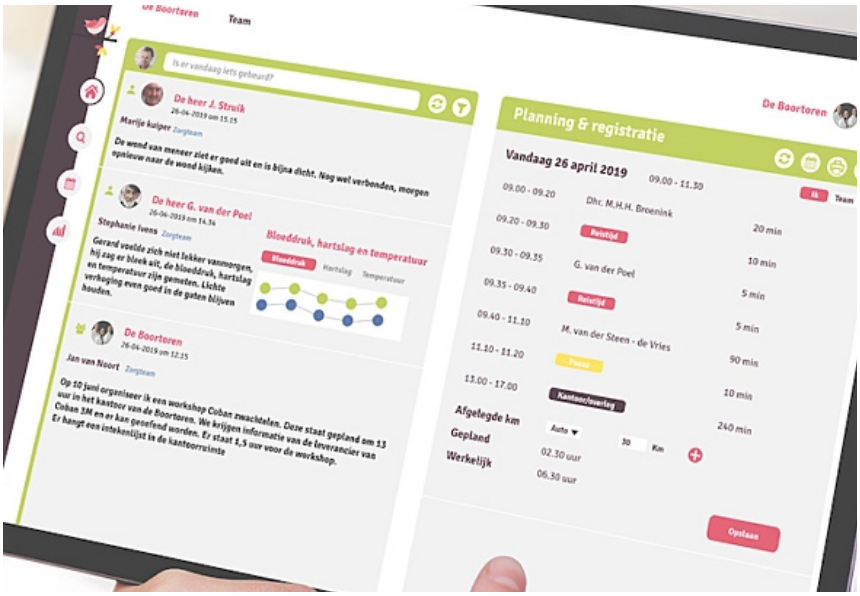


Figure 38: PUUR, (Ecare, 2022)

In the care sector, they have to do a lot of administrative tasks. Many organisations use different software to make this more accessible, such as the ECD (Elektronisch Clienten Dossier - Electronic Client File) from ONS, Nedap (Nedap, 2021) or PUUR (PUUR, 2021) (Figures 37 and 38). The ECD is a digital system that contains information about the client, the process of care provision and administration. Some of the sections of the ECD are client data and information, the client plan, reporting on the daily care, evaluation reports on the progress of the client, and an agenda or schedule (Adapcare, 2019).

Treating wounds

When treating wounds, three things are essential (Zorg Voor Beter, 2021). First, it is crucial to judge the wound. Second, to clean the wound. And finally, to establish the wound policy.

The TIME-model can be used to judge wounds (Zorg Voor Beter, 2021). This model consists of the following steps:

Step 1 – T – Tissue: Describe what the tissue looks like.
Step 2 – I – Infection: See if there is an infection inflammation.
Step 3 – M – Moisture: What is the moisture of the wound? Is it dry or wet?
Step 4 – E – Edge: How does the edge of the wound look like?

Another method to judge the wound, and helping nurses to report, is the ALTIS method (Start Wond Verzorging, n.d.).

- A: 'Aard' or nature: What is the nature of the wound? Is it, for example, a decubitus wound or a burn wound?
- L: Location: Where is the wound placed on the body, and where does it hurt?
- T: 'Tijdsduur' or duration: When is the wound present?
- I: Intensity: What is the category the wound fits in?
- S: 'Samenhang' or coherence: Write down a summary of what is going on. What has changed, what you did and if there were any accompanying symptoms?

Reporting

After seeing a client and performing any tasks, caregivers must report. Using a method makes reporting more consistent and to the point. Two will be shortly described. First is the SOAEP method (WoonZorgcentra Haaglanden, n.d.). With this abbreviation or reminder, the reporting will be split up into different parts which makes is more clear.

- S: Subjective: What does the client say? Write down the information they give.
- O: Objective: Write objectively what you observe and the situation.
- A: Analyse: What are the conclusions?
- E: Evaluation: What do you think is going on?
- P: Plan: What are you going to do? What are the next steps? How to proceed?

Another way of reporting is the SMART method (Landkroon, 2019). This abbreviation reminds nurses of what a good report should contain.

- S: Specific: When reporting, be specific. Name people (doctors, for example) by name, and do not use words like 'often' but instead name a number.
- M: Measurable: Make sure what you write down is measurable. Do not say that something took long; say the minutes it took.
- A: Acceptable: Does the client agree?
- R: Result: Think about whether what you write as a result is feasible.
- T: Time: Write when the things you write should be achieved, accomplished, or when evaluated.

During reporting, a couple of things are essential. Some are named by Luth (2020):

- Write in complete sentences
- Write objectively
- Write actively: 'It will be seen if that can be done' or 'It was said that this happened'. Those examples are not clear and lack information.
- Do not use abbreviations and jargon.

3.2 Methods

Different methods were used to gain more information about the users' experiences of the Smart Glasses & Genzõ software of 1Minuut, and how they experience working in the care sector. Interviews and two questionnaires were conducted, a Technology Acceptance Model (TAM) and User Experience Questionnaire (UEQ), to collect information to answer the sub-research questions. The gained data from the interviews were analysed by content analysis. Below, details of the selected participants and used methods are outlined.

3.2.1 Participant selection

Participants were recruited through the professional network of 1Minuut. Some have run only pilots with the Smart Glasses within their elderly care organisations, while others already use the Smart Glasses quite often. Compared to other customers of 1Minuut, the selected group of participants had some more experience using the Smart Glasses in the actual context. They were also quite enthusiastic about the Smart Glasses. The participants were more open to using this new technology than other users and had already seen or experienced some benefits the Smart Glasses can bring. Therefore I think this is an exciting selection of people who can give me more insides and information about the actual use and its benefits and drawbacks. When selecting participants, they were also checked to see whether they were users who watch or wear and control the Smart Glasses.

The consultants of 1Minuut had an overview of the different levels of Smart Glasses use and recommended approaching several health organisations. Those were mailed with information about the research and whether they would be interested in joining the study, participating in an interview and filling in forms. If willing to participate, an informed consent form needed to be signed (Appendix 2). The study was announced and approved (Nr. 1882) by the Human Ethics Committee of the TU Delft since the context of use involves the (vulnerable) elderly.

In total, seven participants were interviewed and filled in the questionnaires. Three of them use the Smart Glasses as an expert to watch along and give advice, and three of them were (student) nurses using the Smart Glasses to get advice or to be assessed. One participant was a student trying to implement the Smart Glasses within a health organisation and can be seen as a wearer since this participant used it a lot.

An overview of several demographics and other important information about the participants is given in Table 1. In this overview, a level of experience with the Smart Glasses is provided to understand the participant's experience with the product.

- A lot of use, (try) to use it weekly,
- Average use, once or twice a month
- A couple of times

Participants	Age	Gender	Current Function	Role Smart Glasses	Amount Of Experience Smart Glasses	Experience In Care
P123	±45	Female	Wound Consultant	Watch along (also wearer)	A lot of use	±25
P456	±30	Female	Nurse	Wearer	Average use	±10
P927	±45	Female	Wound nuse	Watch along	Average use	±25
P054	±20	Female	Student nurse	Wearer	A couple of times	±4
P148	±35	Male	Coach misunderstood behaviour	Watch along	Average use	±15
P841	±40	Female	Nurse	Wearer	A lot of use	±20
P333	±20	Male	Student implementation	Wearer	Average use	±3

Table 1: Demographics overview participants

3.2.2 Technology Acceptance Model (TAM)

For the study, we wanted to know what participants think of their recent experience with the Smart Glasses and how well they accept this new technology. The Technology Acceptance Model (TAM) makes this possible (UserSense, 2020 & Davis, 1985). This study looks only at the perceived usefulness and ease of use of the product, the cognitive response. Twelve questions are asked about those two perceived factors of the use of Smart Glasses. The first six are about perceived usefulness, which is the degree to which a person believes that using a particular system or product would improve their job performance. And six about the perceived ease of use, the degree to which a person believes that using a specific system or product requires no effort, and how easy it is to use. The perceived ease of use influences the perceived usefulness, as do other factors like situational involvement, earlier use or experience, and personal computer efficiency (King & He, 2006). The questions consisted of statements that participants had to fill in on a 7-point scale if they agreed or disagreed with the statement. See appendix 3 for an overview of the questions and the instructions participants got.

The forms were analysed by giving scores to the scaled answers. The highest score, 3, is given when agreeing strongly with the statement. A neutral response scores 0 and so until the lowest score is -3, strongly disagreeing. In Figure 39, you can see an example of what the form looked like and how the scaled answers are formed. In this way, the average scores per question could be calculated as the average on the perceived usefulness and ease of use. The higher the score, the more participants agreed with the statements and perceived the usefulness and ease of use better/well, as the level they accept the new technology.

Figure 39: Example question TAM

3.2.3 User Experience Questionnaire (UEQ)

Another questionnaire was distributed to learn more about the (overall) experience of Smart Glasses users. This is the User Experience Questionnaire (UEQ) (Hinderks et al., n.d.), which measures the user experience of an interactive product. Six aspects are used to develop a comprehensive impression of the user experience.

Six different aspects are being measured:

- Attractiveness: The overall impression of the product. Do users like or dislike the product?
- Perspicuity: Is it easy to get familiar with the product? Is it easy to learn how to use the product?
- Efficiency: Can users solve their tasks without unnecessary effort?
- Dependability: Does the user feel in control of the interaction?
- Stimulation: Is it exciting and motivating to use the product?
- Novelty: Is the product innovative and creative? Does the product catch the interest of users?

The questionnaire consists of 26 different questions presenting two words with opposite meanings per question. On a scale of seven, participants had to rate the product, which applies in their opinion the best. An example question is presented in Figure40. See appendix 4 for all the questions and the instructions. The questionnaire is analysed by giving scores to the scaled answers. The most positive term gets a score of +3, and the most negative term -3.

An average can be calculated for each question and each aspect. The higher the score, the more participants see the specific aspect as positive. When analysing the data of this questionnaire and its average, it is essential to look at outliers since people might have misunderstood the question. Using a benchmark data set from Hinderks, it is possible to compare the Smart Glasses with other products; this gives a more relative and comparable quality of the means of the evaluated product. This data set contains data from 21175 persons from 468 studies concerning different products (like business software or web pages).

Figure 40: Example question UEQ

3.2.4 Semi-Structured Interviews

Semi-structured interviews were conducted to gather data and better understand the participant's way of working in elderly care and their experiences with Smart Glasses. Therefore the interview was split up into two different subjects. A semi-structured approach (Adams, 2015) was chosen since this approach allows you to ask further questions when participants mention something of interest that requires additional follow up questions.

The first part of the interview consisted of questions about the current work process of nurses in elderly care and wound care if they experienced this.
Topics of the interview were:
- The number of clients they see.
- Daily routine.
- What tasks they perform before, during and after seeing a client.
- What goes well and can be improved within their job.
- Communication with colleagues and other doctors.

The second part consisted of questions to better understand participants' experience with the Smart Glasses. Topics discussed are:
- The start of using the Smart Glasses.
- The amount of use.
- The situation of use of the Smart Glasses.
- Dealbreakers of the Smart Glasses.
- Things that go well, are easy with the Smart Glasses.
- Controlling the Smart Glasses.
- The Genzõ software.
- Charging and storing.

The interview script and an overview of all the predetermined questions can be found in appendix 5.

The interviews were conducted online via Teams or Zoom, depending on the participant's preference. The online environment was chosen due to COVID; it was not allowed to meet physically due to the restrictions of that time. The meetings were recorded with the participant's consent to create anonymised, non-verbatim transcripts. The transcripts were analysed with content analysis. The interview took approximately 45 minutes. All participants were provided with informed written consent (Appendix 2).

3.2.5 Content Analysis

Content Analysis was chosen to analyse the qualitative data. This analysis quantifies the presence, meanings, and relationships of predetermined words, themes, or concepts of interest (Lazar et al., 2017). The method allows analysing the qualitative data from a qualitative and quantitative perspective.

The analysis consists of multiple steps, which can be presented as follows:
1. Select and get familiar with the data
2. Create a set of coding rules and code the data
3. Grouping the codes and finding and naming themes
4. Write the report

As part of the iterative analysis process, post-its and the program ATLAS.ti were used.

Once all codes are created, they can be grouped, and patterns, similarities, and differences can be found. By looking at the codes that occur more than others and those that relate more to the research focus (and questions), themes can be formed. Themes are the analysis results and consist of sub-themes and summarise the most interesting findings of that specific theme.

The process:
1. Select and get familiar with the data
The data consisted of non-verbatim transcripts of the conducted interviews and were inserted in ATLAS.ti. It is important to become familiar with the data before starting to code so that less is overlooked. Therefore, I transcribed the interviews myself and read the scripts twice.

2. Create a set of coding rules and code the data.
The coding was performed using apriori and emergent codes and must be done consistently. The apriori codes relate to the interview topics (see chapter 3.2.4). Emergent codes were created when several themes and interesting answers or notes related to the research questions emerged. The created codes can be considered negative, positive or neutral of the data.

3. Grouping the codes and finding themes
When all codes were created, they needed to be grouped. They first were grouped into apriori themes. Those will already be separated in the way of working in the elderly (wound) care and the experiences with Smart Glasses. Each code got labelled and placed in a specific grouped category in ATLAS.ti.

When the codes were categorised, see top of next page, I looked at which codes occurred more than others and related more to the research questions. For the selected codes, the most relevant findings were summed up (see appendix 5). And it was considered whether categories could be combined into themes or whether new themes would emerge. Within a theme, also sub-themes appear; some codes belong together or seem related. The analysis findings per theme, the results, are presented in a summary of the specific themed part.

4. Write the report
Once the themes and their sub-themes are created, the themes should be named appropriately, and a final summary will be written for the report.

Categories for the way of working in elderly (wound) care:
- Way of working
- Communication/contact colleagues/experts
- Preparations before seeing the client
- Reporting/documenting/task after seeing the client
- Wound care

Categories for the experiences with Smart Glasses
- Learning to use the Smart Glasses
- Charging/Battery/Accu & storing of the Smart Glasses
- Experience calling and using the Smart Glasses
- Situations of use of Smart Glasses
- (Experience) Software Smart Glasses
- (Experience) Hardware Smart Glasses
- Future view & functions of Smart Glasses

3.3 Results

This section will present the results of the two questionnaires and the content analysis.

3.3.1 Technology Acceptance Model (TAM)

All answers were transformed into the set scores. When looking at those scores, it is seen that the averages are quite high for all questions. This means that participants strongly agreed with the statements and perceived the usefulness and ease of use of the product well. The first six questions, related to the "perceived usefulness", scored an average of 1,7, see Figure 41. And the second six questions, related to the "perceived ease of use", scored an average of 2.3 (Figure 42).

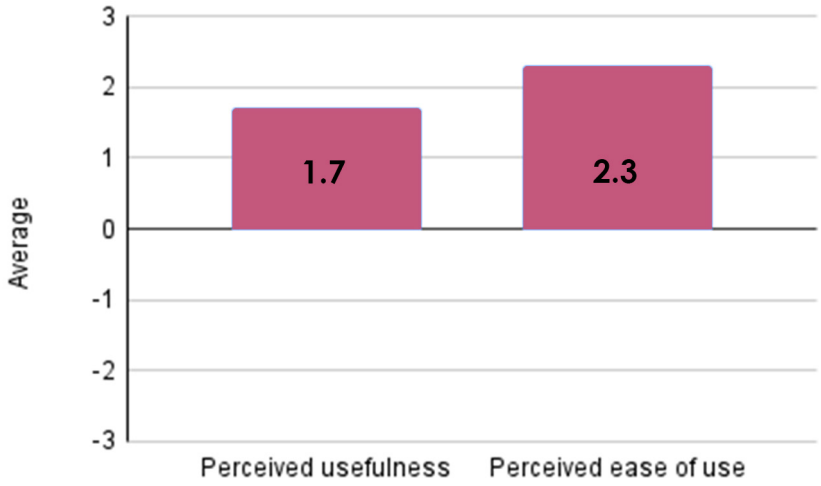


Figure 41: Averages perceived usefulness and perceived ease of use

Looking at the averages scores of the questions (Figures 42 and 43), it is noticed that participants agreed less with the following statement (question 5): "*Using the Smart Glasses makes it easier to do my job*". Although this question had a positive average, there can still be an improvement on whether the Smart Glasses make the job easier.

The averages of questions 1 and 2 were also a little lower. These questions are "*Using the Smart Glasses in my job enables me to accomplish tasks more quickly than other products in its class*" and "*Using the Smart Glasses improves my job performance*". To improve the perceived usefulness, it might be interesting to look at how users can accomplish tasks more quickly with the Smart Glasses. For example, by making it easier to use or adding more functions to the Smart Glasses and Genzõ. Then the job performance might perhaps also increase.

The perceived ease of use scored a very high average on all questions. Questions 8 and 10 scored a little lower than the other questions on the perceived ease of use. The statements are "*I found it easy to get the Smart Glasses to do what I want*" and "*I found the Smart Glasses to be flexible to interact with*". Although those averages are still high, and people agree with the statements, it might be interesting to improve on the easiness of the product and the way users interact with the Smart Glasses.

Overall, the participants perceived the usefulness and ease of use very well. No significant differences were seen between the two different users, participants who wear the Smart Glasses or watch along.

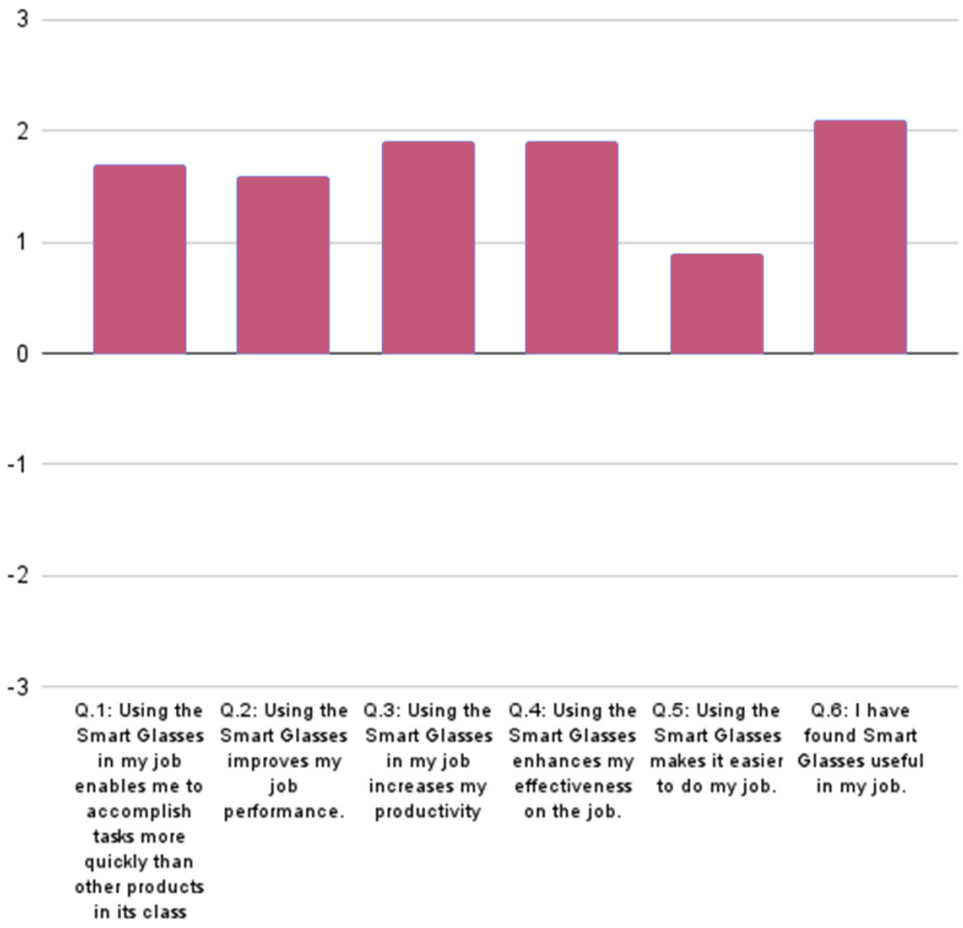


Figure 42: Averages perceived usefulness

Figure 43: Averages perceived ease of use

3.3.2 User Experience Questionnaire (UEQ)

All answers to the questionnaire were gathered in an excel file and were transformed into scores for the rating. In table 2, the means of each category are presented. All categories score in the green zone (Figure 44), which shows that the participants score the different categories of the experience of the Smart Glasses quite positive. The table shows that the attractiveness, dependability and novelty scores are a little lower than the other categories. These categories might provide areas for improvement. To improve the "attractiveness", it might be interesting to look more into how to increase the overall impression of the product. For the "dependability" to improve, it might be interesting to look at the feeling of control of the interaction. To improve the "novelty" of the product, it might be interesting to make Smart Glasses more attractive for the users to catch more interest. By, for example, adding more features to make the product more innovative and creative. No significant differences were seen between the two different users, participants who wear the Smart Glasses or watch along. The number of answers to questions that might be misunderstood was low; only four times it might have happened. Therefore it was not seen as problematic and to still use the answers.

UEQ category	Mean
Attractiveness	1,571
Perspicuity	1,857
Efficiency	1,714
Dependability	1,429
Stimulation	1,786
Novelty	1,571

Table 2: Averages UEQ

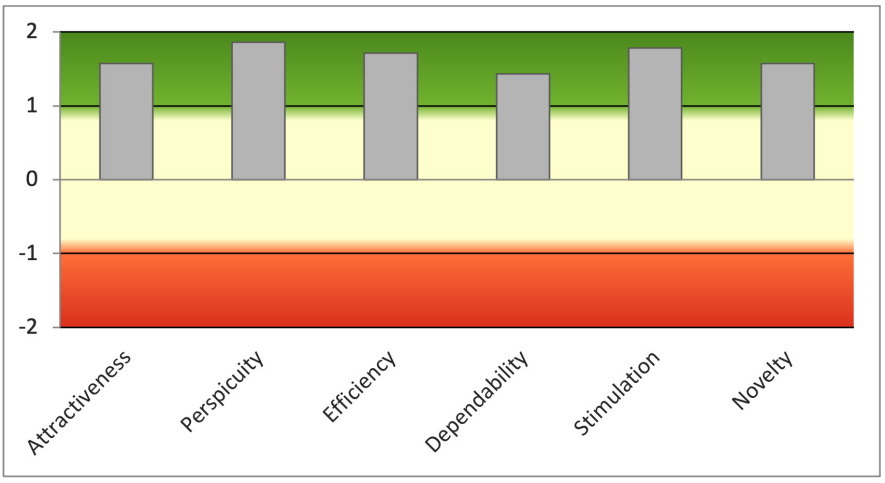


Figure 44: Averages UEQ in diagram

3.3.3 Content Analyse

The content analysis results are presented by themes that summarise the findings. The themes are divided into the two main topics of interest; the status quo of working in the elderly (wound) care & the Smart Glasses experience. A short description is given for each theme, and the containing sub-themes are named. An overview of all the codes per theme and sub-themes can be found in images tables 3 and 4.

The status quo of working in the elderly (wound) care included the themes:

1. The client visit
2. Wound care
3. Communication between caregivers
4. The way of working

The Smart Glasses experience included the themes:

5. Advantages Smart Glasses
6. Genzõ App Phone
7. Experience of using Smart Glasses
8. Learning to use the Smart Glasses
9. Not using the Smart Glasses
10. Hardware experience
11. Functions/features Smart Glasses
12. Logging in

Overview of the themes with sub-themes & codes of the part of the status quo of the elderly (wound) care.

Theme	Sub-theme	Code	Counted
1. The client visit	Preparations	Preparations new client	10
		Preparations known client	7
		Information Client	10
		Care plan	5
		Tools you take to the client	14
		Locations	13
		Time spend preparations	7
	Knowing what to do	Amount of clients	10
		Day routine	61
		Information client	10
		Travel to clients	8
		Care plan	5
		Knowing what to do by	14
	Performing tasks	Day routine	61
		Observing clients	5
		Time spend on clients	15
		Anamnesis	6
		Triage	5
	Reporting/ documenting	Moment of reporting	7
		Reporting/documenting	22
		Time spend reporting	11
	Tasks after the client visit	Action after seeing client	7
		Day routine	61
2. Wound care	Seeing wounds	See wounds real life	3
	When contacted	Called in when	5
3. Communication between caregivers	Ways of contacting	Communication between functions	41
		Work phone	7
	Moment of contacting	Communication between functions	41
4.Way of working	Day planning	Be flexible within job	12
		Busy schedule	9
		Way of working	9
	Differences between caregivers	Hieracrchy in care	9
		Improve knowledge of colleagues	9
		Performing tasks that others may not	8

Table 3: Overview themes, sub-themes and codes of the status quo of the elderly (wound) care

Themes relating to the status quo of working in the elderly (wound) care:

Theme 1: The client visit
This theme describes what caregivers must do before, during, and after the client visit. The sub-themes are *preparations*, *knowing what to do*, *performing tasks*, *reporting/ documenting*, and *tasks after the client visit*.

Before caregivers visit a client, in their own house or room at an elderly home, they read the care plan and the client's information file. It is checked whether there have been any important changes or updates, so caregivers know how to prepare, what to bring or do. The time spent on those preparations depends on whether the caregiver is familiar or not with the client. For new clients, more needs to be read and prepared. Some caregivers might work at a specific location and have a fixed amount of clients (intramural sector) each day whom they need to take care of. And others, especially some specialists, have to visit clients at different locations (extramural sector) and travel, which takes time.

Depending on the role of the caregiver and what the clients suffer from, other tasks are performed, such as observing, triaging, and guiding clients. The amount of time spent on a client depends on the task performed. What needs to be considered when tasks need to be performed is that not all caregivers may carry out specific tasks because they do not have the appropriate education. Therefore, it can sometimes take a little longer for a client to be seen by another specialist or doctor and must wait.

Sometimes tools need to be taken to the client, like bandages. In some situations, the materials are placed in the room of the clients; other times, caregivers need to bring them themselves. After the client visit, the caregiver should report about the visit. What is discussed, what changed, and other essential things of what was executed should be written down. Reporting should take place directly after the visit, which takes some time. This is mandatory in the intramural sector. Sometimes caregivers have to rush and write some notes down as part of a report and report at a later moment. Other actions that they might need to perform are, for example, contacting other disciplines or ordering materials.

"Each client discussed must be documented. A report has to be written. That's just part of the day. It also states what needs to be arranged. For example, the medication list must be sent to the doctor. Referral letters need to be sent. These are things that have to be added." – P456.

"We all have tablets with us. And that's where the information is. The care life plan, and then you can act from the care life plan." – P841

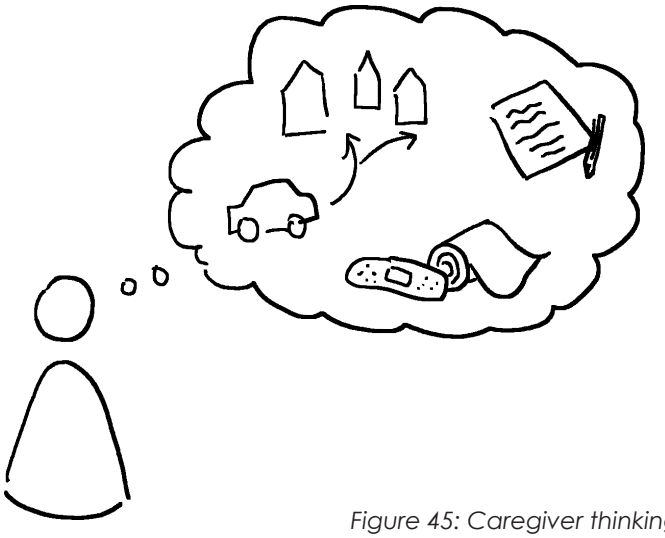


Figure 45: Caregiver thinking about different task

Theme 2: Wound care
This theme describes a couple of things that are relevant for wound care. Subthemes are *seeing wounds* and *when contacted*.

Wound specialists are called in when a wound is already open or just has been discovered. The wounds will be monitored until it is fully closed. They prefer to see the wound, especially when open, in real life. When a wound specialist visits a specific location, they will look at all wounds since they are already there. It will help them prepare when they have gotten a picture of the wound before the visit to form already an idea of the situation.

Each wound needs to be treated in its specific way, and anamnesis is necessary. Anamnesis is a conversation in which a healthcare professional asks the patient about relevant circumstances of the illness or condition. Smelling and feeling the wound is crucial during the anamnesis.

"We try to do weekly doctor's visits and see if we can use the Smart Glasses today or not. So they do not have to travel. The only problem there is that although you have a good case for the Smart Glasses, it might still happen that the doctor needs to visit another client at that specific location and then will have a look at all clients." -P456

"Because sometimes I get a mail, for example on Saturday afternoon and then, of course, I'm not there. And then I come on Tuesday, and then sometimes I can immediately start the wound treatment because of the photo. But only if they took a perfect picture." – P927

"How you take care of a wound. That is a policy. Every wound needs a different treatment. The wound nurse is a specialist; she knows everything about wounds. They know, for example, which materials to use for a particular wound, which we as nurses do not know." – P054

Theme 3: Communication between caregivers
This theme shows the way different caregivers communicate with each other. Sub-themes are *ways of contacting* and *moments of contact*.

Contacting other disciplines is mainly done via email and call. When there is a rush or an emergency, calling is almost always chosen. Depending on whom the caregiver needs to contact, different ways are possible. Sometimes a colleague can quickly be addressed on the floor or via the work phone. But when there is no need to take immediate action, the client's situation will be discussed during the standard visiting hours of the specialist. Another option is to send a mail when there is no rush. It is then also possible to add a picture of a wound, for example. Despite the communication going well, it sometimes takes quite a long time before something is decided and new actions can be carried out.

"Often when you have to consult with a physio for a new client, if we have, for example, a client with an amputation and there are prostheses involved and wounds, then the physio has to be consulted, the ergo has to do something, and the dietician has to do something, then it can sometimes take quite a long time, or there has to be consultation with the doctor." – P123

"If it's an emergency, we call the doctor right away. We usually save it for the doctor's visit, "behavioural medical visit" they call it, if it's not an emergency. That is on Mondays, and then it will be discussed once a week." – P841

Theme 4: The way of working
This theme describes findings of ways of working in (elderly) care. Sub-themes are *day planning* and *differences between caregivers*.

Caregivers have a busy day, and therefore, almost everything is planned during their day. However, they can be flexible when their planning needs to change, such as in an emergency situation. As described in the previous theme, specialists must sometimes come to the clients to look at their wounds. It is in their blood, a standard way of working, to come by and visit clients.

Due to their education level, not all caregivers might perform the same tasks. Therefore, they should contact each other and make proper arrangements to ensure that the client receives care from a qualified person. Although some specialists think that nurses' knowledge about certain things can be improved, such as recognising specific behaviour or wounds earlier.

"I was told that they had to come to the location often. But I think that's where the problem lies now: they're used to it. It's a bit in their blood to come to locations, the elderly homes. To talk to the client, to see the client. And all that stuff." – P333

"Every wound is different. You can have two burns, but they are both different. I think you really need someone to tell you more about that." – P054

"And in the meantime, you try to make the employee a bit richer. How can you solve this yourself without having to call me all the time. Because in the end, I'm not always there. I would be nice if employees get skills so that they can do more things themselves." – P148

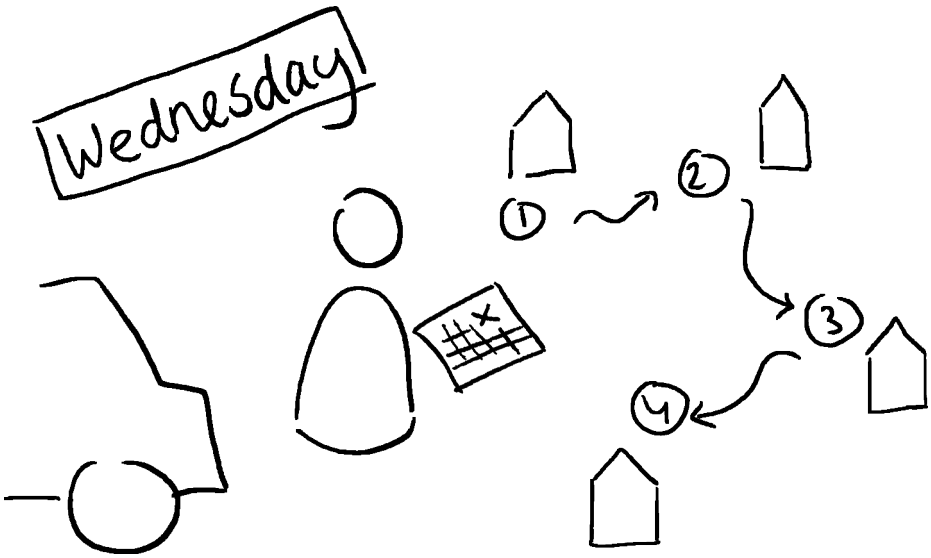


Figure 46: Caregiver planned route for the Wednesday

Overview of the themes with sub-themes & codes of the part of the experiences with Smart Glasses

Theme	Sub-theme	Code	Counted
5. Advantages Smart Glasses	Saving travel time	Advantages use smart glasses	30
		Smart Glasses time saving	7
	Client response	Advantages use smart glasses	30
		Client response	23
	Direct & fast contact with	Advantages use smart glasses	30
		Smart Glasses time saving	7
6. Genzõ app phone	Easy to control	Genzõ app phone	13
		User friendly	2
	Function of the app	Medical helping calculating tool	5
		Genzõ app phone	13
7. Experience of use Smart Glasses	Calling/having contact before the actual call	Calling before the call	6
	Planned calls	Availability with the Smart Glasses	5
		Busy schedule	9
		Planned call	11
		Spontaneous calling Smart Glasses	5
		Knowing who is calling	3
		Knowing who to call	1
	Communication	Communication during calling smart glasses	8
	Controlling the Smart Glasses	Control is easy of Smart Glasses	6
		Control is not easy of Smart Glasses	6
		If you know it is easy	4
		Users are not digital	5
		Elderly more difficuly controlling the Smart Glasses	4
		Technical person less difficulty with technology	4
		QR code scanning	6
	Finding people to call	Finding people to call	16
	Connecting problems	Connection problems	9
		Use mifi box	4
	Charging directly after use	Charging the Smart Glasses	11
	Situation of use	Situation of use Smart Glasses	55
		Time use Smart Glasses	7
	Storing	Storing the Smart Glasses	11
	Watching along	Tablet	13
		Watch along	17
		Drawing along during call	4
		Zooming in	3

Table 4.1: Overview themes, sub-themes and codes of the experiences with Smart Glasses

8. Learning to use the Smart Glasses	Explanation	Explanation Smart Glasses use	11
		Learning others to use the Smart Glasses	7
		Learning to know how to use the Smart Glasses	11
		Training Smart Glasses	10
	Learning takes practice	Try out Smart Glasses during training	4
		Trying makes easier	2
9. Not using the Smart Glasses	Battery empty	Accu running empty	5
		Forgetting to charge	4
	Use is not in the system	Doctor/specialist will visit soon	4
		Implementing in system	3
		Not seeing the advantages or added value	3
		Amount of use Smart Glasses	16
	Not able to use Smart Glasses (situation)	Behaviout is not planned	2
		Cannot use the smart glasses	7
		Not using the Smart Glasses	19
		Amount of use glasses	6
10. Hardware experience	Vuzix	Vuzix	7
		Buttons	7
	Google Glasses	Google Glasses	11
		Own Glasses under Smart Glasses	2
		Swipe and touch	6
	Position screen	Watching Smart Glasses screen	5
		Adjust Smart Glasses	3
		Position Smart Glasses	6
	Quality	Light of Smart Glasses	10
		Quality Smart Glasses	7
	Glasses are big/ heavy/large	Glasses are big	5
11. Function/feature Smart Glasses	Voice control	Voice control	14
		Not using voice control	6
	Video recording	Recoring videos	14
12. Loggin in	Accounts	Logging in	13
		Group accounts	6
		Own accounts	9
	Device Genzõ is running on	Own phone	2
		Own work phone	2
		Work phone	7

Table 4.2: Overview themes, sub-themes and codes of the experiences with Smart Glasses

Themes of the experience of the use of Smart Glasses

Theme 5: Advantages of Smart Glasses
The following theme outlines the advantages of Smart Glasses & Genzõ users and people who are helped with the Smart Glasses. The sub-themes that belong to this theme are *saving travel time*, *the client response* and *direct and faster contact with doctors or specialists*.

Travel time is reduced when specialists can watch along at a distance. They can save time and see in this way more patients per day. The client who is taken care of by someone wearing Smart Glasses also experiences advantages. Fewer people (who might not be familiar with the client) need to come by, and the client does not have to go to the hospital when watching along with the Smart Glasses is possible. Another advantage is that an expert can watch along with the Smart Glasses wearer and can stay in contact easily. Actions can be performed more efficiently, and treatments can start earlier.

"But also an advantage is that no other strange people come to our site. Really those stimuli." – P841

"We now have someone lying terminally, so I call in with the Smart Glasses. Then she [the expert] can see an observation herself. And then you can make the diagnosis together." – P841

"That I can assess people faster, there are so many applications on some days. I really can't do them all in one day; if I must drive back and forth so much, I lose so much time. With the Smart Glasses, I could assess them all. Mainly time saved." – P123

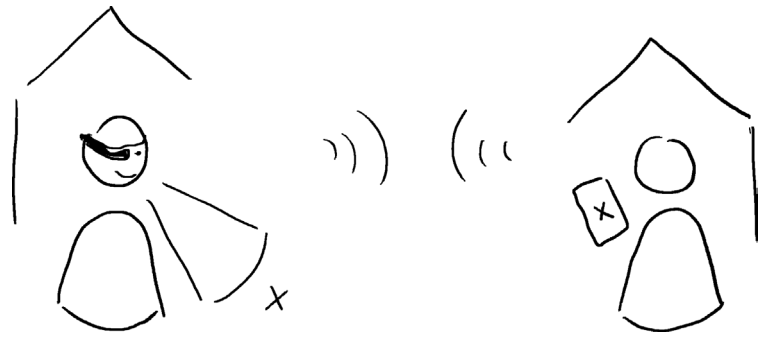


Figure 47: Call with the Smart Glasses.

Theme 6: Genzõ App Phone
This theme describes the (use) experiences of the Genzõ app on the users' phones (or tablets). The sub-themes consist of *easy to control* and *functions of the app*.

The app is used mainly for calling and watching along; other functions like the helping tool or the chats on the app were not used by the interviewed participants most of the time. Since there are few options, participants perceived the app as easy to control and user-friendly.

"It is easy to use. You can't do much wrong with it. It is clear. You know where to go." – P456

"I heard of a helping tool, medical calculating, through a colleague of 1minute. But I haven't looked into it yet. I don't really need it here." – P054

Theme 7: Experience of using Smart Glasses
Different findings related to the experiences of using Smart Glasses belong to this theme. From how people are making a call to the different situations of use. Subthemes are *calling/having contact before the actual call*, *planned calls, communication during calls, controlling the Smart Glasses, finding people to call, connecting problems, charging directly after use, situations of use, storing* and *watching along*.

Smart Glasses users always make an appointment with the person who watches along or vice versa to make sure they are available for calling in their busy schedules. Therefore they always know who to call and who is calling. Often they search for contact before the actual call to make sure the appointment will go ahead. Communication during Smart Glasses use is essential since the wearer is the eyes and ears of the person who watches along. It is important to communicate whether everything is visible and well understood. Watching along is easier on a tablet. Participants mentioned they are not using the drawing function much. Moreover, a good internet connection is necessary to have a smooth conversation. Not all participants have experienced this well at first, but some changes to the internet or adding an amplifier fixed the poor signal. The participants believe that the Smart Glasses are easy to control. You have to try it, experience it yourself. Then you know how it works; it is easy. However, many older adults are working in care. They are more likely to be less technical experienced and therefore find it challenging to get started and control the Smart Glasses. It is regularly experienced that it takes too much time to find the right person to call because there are too many accounts in the system. The Smart Glasses were used by the participants in different situations, like watching the behaviour of the elderly, wound care, student guidance, ergo therapist and hospital/doctor visits/contact. In those situations, advice was given, and someone could watch along. After using the Smart Glasses, it is essential to charge them and store them safely where people can easily take them.

"Operating the Smart Glasses is good. You just have to feel which button is which and what you can do with the buttons. But once you get used to it, you know what has to be done." – P456

"I also always ask the colleague who is watching: am I clear, am I understood? Do you see everything clear? Because you are their eyes. I always ask this. You don't know what they see. But that is just a standard sentence that you start with, I think." – P841

"Usually, I call them first, just on the phone number I want to use with the Smart Glasses. Or I send them a WhatsApp message saying that I need them for a moment. And then I always get a response." – P841

"At some point, we planned the calls. Because you notice that it's not in people's system to use the Smart Glasses. So I made an appointment." - P148

Figure 48: Consultant of 1Minuut gives training on how to use Smart Glasses and Genzõ

Theme 8: Learning to use the Smart Glasses
This theme describes how participants have learned using the Smart Glasses and what was important when learning to control them. Subthemes are *explanations*, and *learning takes practice*.

Smart Glasses are a completely new device, and therefore people need some time and practice to learn how to control and use the Smart Glasses and the Genzõ app. Especially elderly users, who are less technical skilled, find it difficult to control the Smart Glasses and need more explanation. 1Minuut offers training to explain the use of the Smart Glasses and the Genzõ app. Since not everyone can be trained by 1Minuut, designated ambassadors of the health care facilities have to pass on their experience and have to teach others how to use the Smart Glasses. Some people have not gotten this explanation and learned to control the Smart Glasses independently. To feel more comfortable with using the Smart Glasses, is it crucial to try them out.

"Now, a colleague and I have been looking at the Smart Glasses, and we've been talking to people. I think you should do that more extensively so that people feel a bit more comfortable with the Smart Glasses. Because otherwise, they won't use them. It's a little strange because it's not difficult, but still, people find it difficult. It is a different way of working." – P148

"You know, fortunately, we still had him physically [training physically in times of COVID-19]. And I liked having the training physically. Because physically, it is also explained, and you can try it right away. Yes, you can just play with that." – P841

"[Scanning the QR code] That is going well. It is just a matter of testing out how to hold it, and then it goes well." – P054

"Then someone came from 1Minute and gave us training. The training was mainly for nurses and GPs. They all came together to practice with the Smart Glasses and get more information. How it works and how you make contact with each other to use these Smart Glasses." -P456

Theme 9: Not using the Smart Glasses
The next theme describes why users do or can not use the Smart Glasses. The following sub-theme are *battery empty, use is not in the system* and *not able to use Smart Glasses (situation)*.

Smart Glasses do not have a long-lasting battery. When people forget to charge them after use, the following user is in trouble and cannot use the Smart Glasses. Another reason why Smart Glasses are not used that much is that it is not in the system of some healthcare workers. Nurses are used to waiting for a doctor or specialist to visit. As are specialists, they are used to seeing clients at their homes. When, for example, a wound specialist visits a specific location, they will look at all wounds since they are already there, and the Smart Glasses will not be used. In addition, Smart Glasses wearers also do not (immediately) see/ experience the advantages and are therefore not tacking/grabbing the Smart Glasses. It is another way of working that should be implemented well in their system. In some situations, it is even not possible to use Smart Glasses. For example, when a client must be treated physically, behaviour is not shown at that specific moment, or the person watching along is not getting a clear overview of the situation. Although the participants think the Smart Glasses are easy to control, many users find it still quite difficult, which keeps them from using the Smart Glasses.

"And I said, the moment you're done with the Smart Glasses, always put them on the charger by default. To avoid the battery will run empty." -P333

"I think it is the care itself. I think that they are so reluctant to use it, that they find it so threshold, and find it difficult, and that it just doesn't benefit them enough to use it." -P333

"We try to do weekly doctor's visits and see if we can use the Smart Glasses today or not. So they do not have to travel. The only problem there is that although you have a good case for the Smart Glasses, it might still happen that the doctor needs to visit another client at that specific location and then will have a look at all clients." -P456

"Other colleagues find it difficult to control and use the Smart Glasses, or something like that. Or they don't see the added value of it." -P054

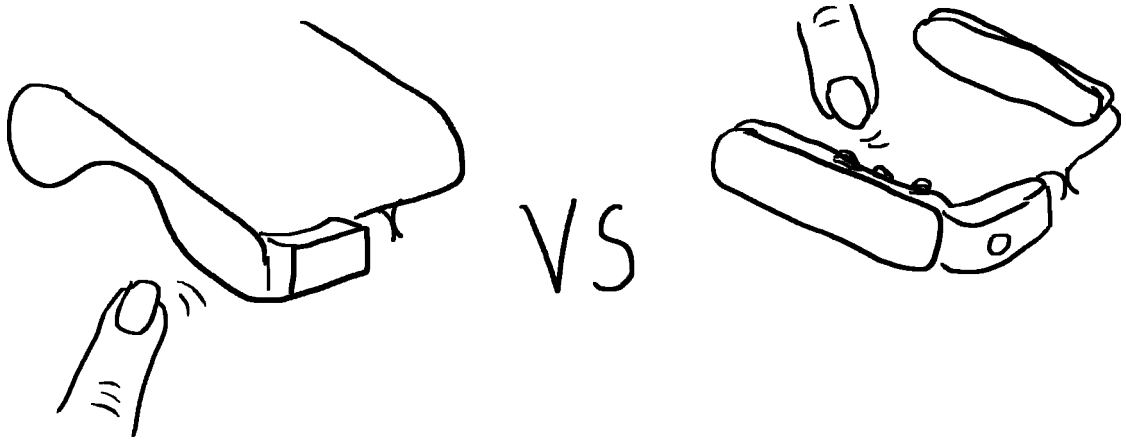


Figure 49: The Google Glasses vs the Vuzix

Theme 10: Hardware experience
This theme describes how different features of the hardware are experienced by the interviewees. Sub-themes within this theme are: *Vuzix, Google Glasses, positioning screen, quality,* and *glasses are big/large/heavy.*

Smart Glasses are new devices, and although they can do much the same as phones, the way of using them is way different. Participants mentioned that the Smart Glasses are still big and heavy. The Vuzix is experienced easy to use since the buttons are easy to control. The Google Glasses is experienced as less user-friendly since controlling, swiping and touching/tapping is more complicated. People wearing glasses underneath Smart Glasses experience fewer difficulties when using the Vuzix than when using the Google Glasses. The quality of the sound and screen are experienced very well. However, the light of the Smart Glasses is a bit different. Therefore, people might estimate/judge images differently, leading to not using the Smart Glasses and misunderstandings. The screen and camera position of the Smart Glasses are of importance during use. Some people find it challenging to position this screen and camera well. The Vuzix is easier to position since these Smart Glasses have more freedom of movement.

"The Vuzix, on the other hand, they [the nurses] find it a lot easier to use. Because the Vuzix has buttons." -P333

"I find it quite big. Quite a thing you have on your nose. That could be improved in the design." -P123

"We continued with the Vuzix. Because the Google you cannot adjust and the Vuzix you can, that's nice." -P841

"It is cold light, so blue light. So you sometimes get a distorted view of skin colour." -P927

Theme 11: Other functions/features of Smart Glasses
This theme describes some other features/functions of the Smart Glasses interviewees mentioned shortly. Subthemes are voice control and video recording.

Although users are not that familiar with voice control and do not use it, they see some advantages, like finding a person to call faster. Video recording was a wished feature which is here now and can be used, for example, for observations. Although it is relatively new, not all users are aware of it.

"We didn't have an explanation of that [voice control], so I didn't know that was possible. I didn't know that." -P054

"Yes, I think I would use it more [voice control]. It's much easier to find everything. It saves in scrolling." -P123

"We haven't used the recording function yet. But it would certainly be a good option/ feature." -P148

"Oh, that's nice. because the psychologist sometimes asked about video recording." -P927 [did not know video recording and sharing was already possible]

Figure 50: Use of voice control

Theme 12: Logging in
The last theme describes how participants have experienced logging in. Sub-themes are accounts and devices Genzõ is running on.

When health organisations decide to use shared work phones or tablets and personal accounts, people must always log in and out. This takes much time, and many people forget this, especially when there are many accounts. Therefore organisations often choose group accounts. A disadvantage of this is that you do not see who is calling, although an appointment is usually made when calling as seen before. Some interviewees also have their own accounts on a personal (work) phone and do not need to search for their accounts when logging in.

"The whole logging in process was a barrier, so we decided on a group account." -P333

"For privacy reasons, we use personal accounts. This means you have to log out if you use the tablet with several people. But I have it on my work phone, and nobody can access it." -P841

3.6 Direction to continue with

In the end, the goal is to come up with a design proposal that supports and helps nurses in the (wound) care for the elderly. A proposal, based on the results and insights gained from this study, that supports the following main research question.

"How can the elderly care staff be supported with smart glasses in the elderly wound care?"

Although it has been noticed that Smart Glasses are around and have been introduced in some health organisations, they are still not widely used. This study shows, among others, that some people do not see the benefits, and it is not in their system to use. Also has been perceived that there are not many advantages for the wearer directly.

Therefore I decided to continue with the following focus: showing the advantages/ benefits of the Smart Glasses wearer or letting them experience the advantages (more) to stimulate the use. I chose to add an extra feature on the Smart Glasses for the wearer within this focus. New features might provide a reason for the nurse to use the Smart Glasses. When this new feature supports the nurses in making their work easier, they might get more out of use and experience more advantages of the Smart Glasses.

4 DEVELOP & DELIVER

Now that a direction is chosen; "to show advantages/benefits of the Smart Glasses wearer by adding an extra feature on the Smart Glasses", we dive into the second diamond. It is chosen to go through a short 5-step design sprint to develop and deliver a solution for the selected direction. First, diverging occurs by deciding what to focus on and exploring this direction deeper. Next, ideas and solutions will be created and other things to consider. When all ideas are generated, the converging starts. The best ideas are selected, and three concepts will be made. One of the concepts will be chosen, will be elaborated on, and in the end, evaluated with several caregivers. Finally, a short discussion will happen, and recommendations will be made about the proposed design solution.

4.1 Design sprint method

In order to create a design proposal to let Smart Glasses wearers experience the advantages/benefits of the Smart Glasses by adding an extra feature on the Smart Glasses, it is chosen to perform a short five-step/day design sprint which is based on the design sprint of Jake Knapp from Google Ventures (Google Ventures, n.d.). This method is selected because it is an effective and fast process with which you can quickly develop new products and solve complex problems.

These are the steps of the sprint:

Step 1	Deciding what to focus on
Step 2	Brainstorming
Step 3	Comparing all solutions & choosing the best solution & creating concepts
Step 4	Choose a concept & develop final concept
Step 5	Discussing with customers or other users

The first two steps of the sprint belong to the diverging phase and the last three to the converging phase.

Step 1: Deciding what to focus on
Before generating ideas and creating concepts, it is essential to know what to focus on. Therefore the chosen direction must be determined more to decide what kind of feature to add. This will be done by looking back at the most exited and related results. When the focus is decided, a better understanding will be formed by asking questions through the WWWWWH method (Digital Society School, n.d.), asking Who-What-Where-When-Why-How questions.

Step 2: Brainstorming
When it is clear what the problem is or the goal of the design sprint, we can start brainstorming. Ideas for different parts of the goal will be generated. Methods used during the idea-generating are creating a mind-map, asking How-To's questions, collage making and idea sketching. Next to those methods to come up with ideas, more information was found on the content of the chosen direction.

Method ideation 1: Mind-mapping
Creating a mind map makes the topic more explored by writing related things and ideas down around a chosen word. Two mind-maps will be created, one by myself and one together with two company employees.

Method ideation 2: How To's
A couple of How-To's questions will be asked about the focus, and as many solutions have to be created. In this way, the focus is split up into smaller questions to create solutions. The questions that were asked were:

- How to make reporting easier?
- How to not forget to report?
- How to report more correctly?
- How to report faster?
- How to perform tasks easier after the client visit?

Method ideation 3: Collage making
A collage will be created for inspiration to gain more ideas about what the screen should look like on the Smart Glasses. This collage will be made by searching the internet for other interfaces of Smart Glasses.

Method ideation 4: Idea sketching
The last method used in this phase is idea sketching of what the screen's interface can look like. By using empty frames of the screen of the Smart Glasses, ideas for the interface can be created in a fast way.

Step 3: Comparing all solutions & choosing the best solution & creating concepts
When all ideas are generated, it is time to select the most promising ones. This is done by voting with dots for the most exciting ideas. The researcher and the two employees who have joined the brainstorming session will perform the voting. The selected ideas must be realistic and feasible and combined into three different concepts. Three concept cards have to be made to make it easy to compare the different concepts. The cards contain a picture of the situation of when to report, what the screens of the Smart Glasses should look like, and a few bullet points explaining the concept.

Step 4: Choose a concept & develop final concept
The fourth step in the design sprint is first to choose a concept. By presenting and discussing the three different concept cards with a wound expert and two employees of 1Minuut, feedback and opinions will be gathered. Then, a final concept can be formed. This concept will contain a description and several interfaces. During the interface design, some more information will be provided on the amount and size of the text.

Step 5: Discussing with customers or other users
Finally, the created final concept will be put in a document and discussed with four participants. Two of them participated in the interviews and questionnaires. The two other participants were project leaders of care technology within an elderly care organisation and are trying to implement the Smart Glasses within their organisation. The final concept will be explained and discussed in a short online meeting of 15 minutes. After presenting the concept, the participants could share their opinions and discuss its advantages, disadvantages, and improvements.

4.2 Results

The decisions made per step will be highlighted and presented. More focus will be on the three formed concepts, the feedback on those, the final concept and its final feedback.

Step 1: Deciding what to focus on.
First, an overview is given of the most exciting results from the research related to the focus:

- Need to prepare and read client information files
- Read for changes and updates
- Perform different tasks, but have the appropriate education for it
- After seeing the client, they need to report/document what changes, what they did and discussed
- Reporting should take place directly after the visit. People might forget this due to time pressure
- Everything is planned during the day
- What can be improved is that people recognise things earlier, like wounds or specific behaviour
- Advantages of Smart Glasses wearer: can discuss directly with an expert, can perform the task/treatment earlier
- Do not use the Smart Glasses since it is not in their system
- After using Smart Glasses, it is essential to charge them correctly
- Smart Glasses wearers do not (immediately) see/experience the advantages.

The starting point of this design sprint is the chosen direction and question that followed: 'How to let Smart Glasses wearer experience more advantages?'. The goal is to show and/or let experience the Smart Glasses wearers the advantages by adding something to the Smart Glasses. The two most noticeable parts that nurses spend time on are preparing for and reporting after seeing a client. It is chosen to continue with the reporting tool since this was mentioned more by the participants who joined the research. The WWWWWH-method gave a clear overview to understand reporting even better; see appendix 6.1 for the results. Reporting is essential, and Smart Glasses might have the potential to make this task more accessible and less time-consuming. Nowadays, reporting is not always performed correctly or on time. Therefore, within the set focus, it is decided to continue with the following direction:

'How to support reporting (for wounds) with the Smart Glasses?'

Step 2: Brainstorming

All different kinds of ideas were created with different methods. In appendix 6.2, you can find all those ideas. Figures 51, 52 and 53 show some of the ideas obtained from the brainstorming session, collage making and idea sketching. Some new questions that arose in this phase were:

- When should you report with the Smart Glasses? When the caregiver, the wearer, is still with the client or afterwards?
- What can and cannot be said by a nurse in the presence of a client?

Therefore, these different options will be included in the concepts to be discussed with the caregivers/reviewers.

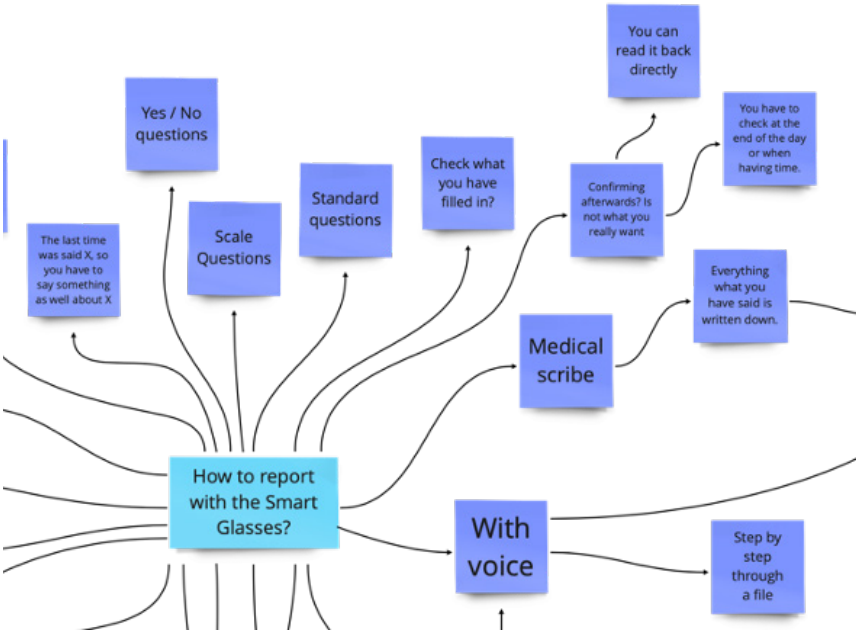


Figure 51: Part of the mindmap with ideas

Figure 52: Example Smart Glasses interface (Engineering, 2020)

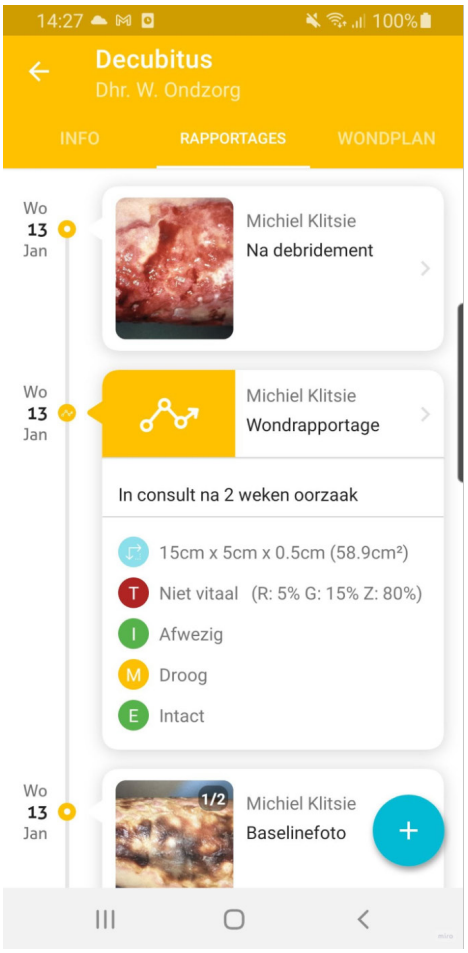


Figure 53: Example wound application (Apkpure, 2022)

Step 3: Comparing all solutions & choosing the best solution & creating concepts.
Three different concepts were created by voting for the most exciting ideas that fit within a realistic view of reporting with the Smart Glasses by using voice as the input. This is desired since it is the best way to control the Smart Glasses and still have your hands free. See appendix 6.3 for the results of the voting session.

Concept 1:
The first concept focuses on making reporting as easy as possible by letting you think for yourself as little as possible. This will show only closed questions like yes/no and rating questions to the Smart Glasses wearer. In this way, the nurse does not have to speak very long personal things aloud in front of the client. The reporting will occur in the client's room, directly after the nurse has treated or visited the client.

When the nurse puts on the Smart Glasses to report, the correct client must first be chosen to write a report about. Followed is an option to select a specific situation or treatment to report on, like treating a wound. The Smart Glasses wearer will be guided through the specific reporting. When finished answering the questions, a summary will be presented. This summary will be automatically uploaded to the client's ECD (electronic client file).

Optional might be to automate some of the steps. For example, the Smart Glasses can be linked to your diary, and in this way, the Smart Glasses can present to you which client you are going to, what to report on, and some other information about the client's state and the 'zorgplan', the care plan. Another option, which is perhaps a little too futuristic, is to let the Smart Glasses listen and record during the nurse's conversation with the client. In this way, the Smart Glasses will already gather information and fill in this in the report. When the nurse wants to report, he/she only has to add or change information to the report.

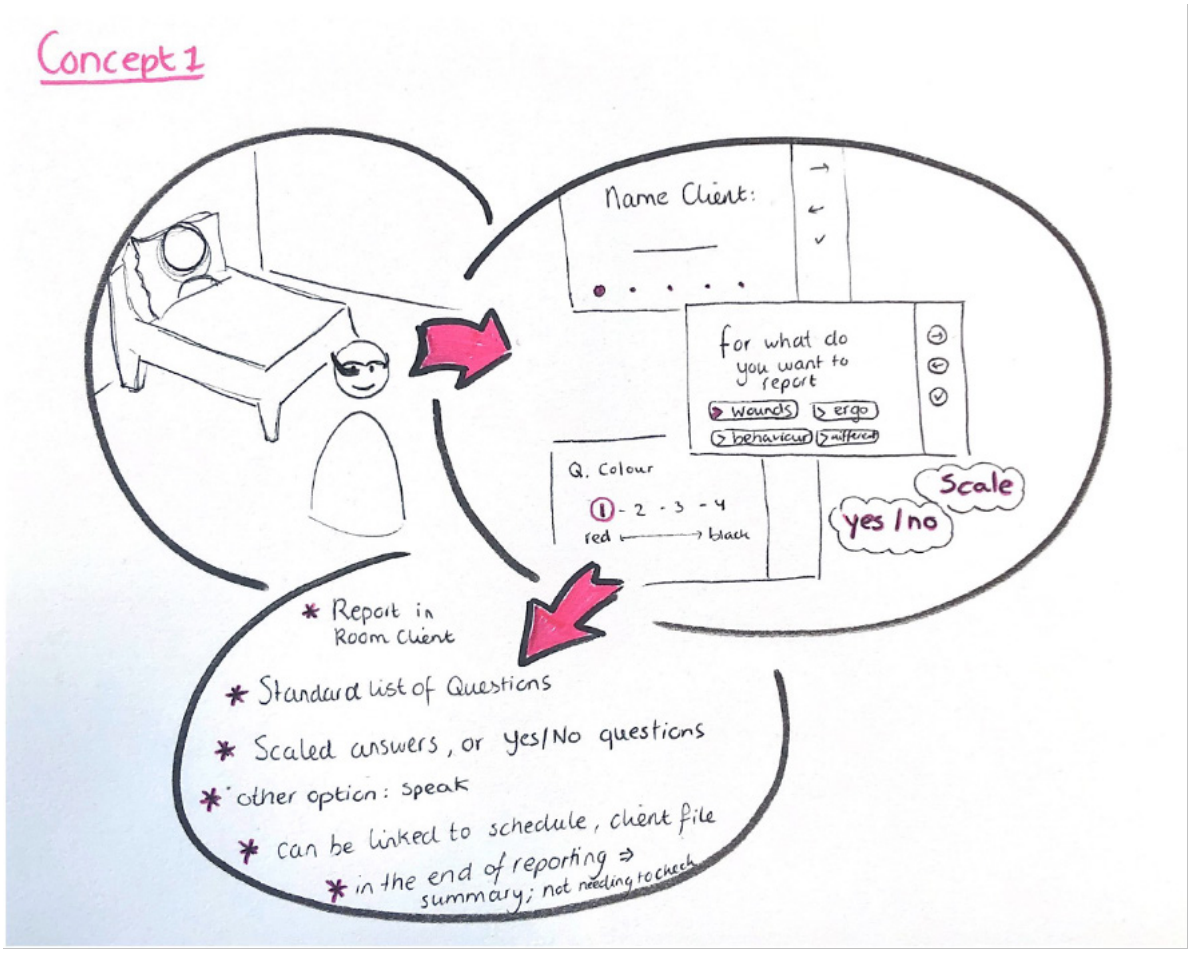


Figure 54: Concept card 1

Concept 2:
The second concept contains the option to report after seeing the client, not in their private room but at another location. After selecting the correct client to report on, it is possible to speak the report aloud by pressing the recording button. The Smart Glasses wearer will not be guided through the reporting, but they can say aloud what they usually would report. During speaking, the nurse can watch directly what is spoken. After the reporting is done, it needs to be checked and adjusted if necessary before uploading it to the ECD. This might happen at a computer at the end of the day.

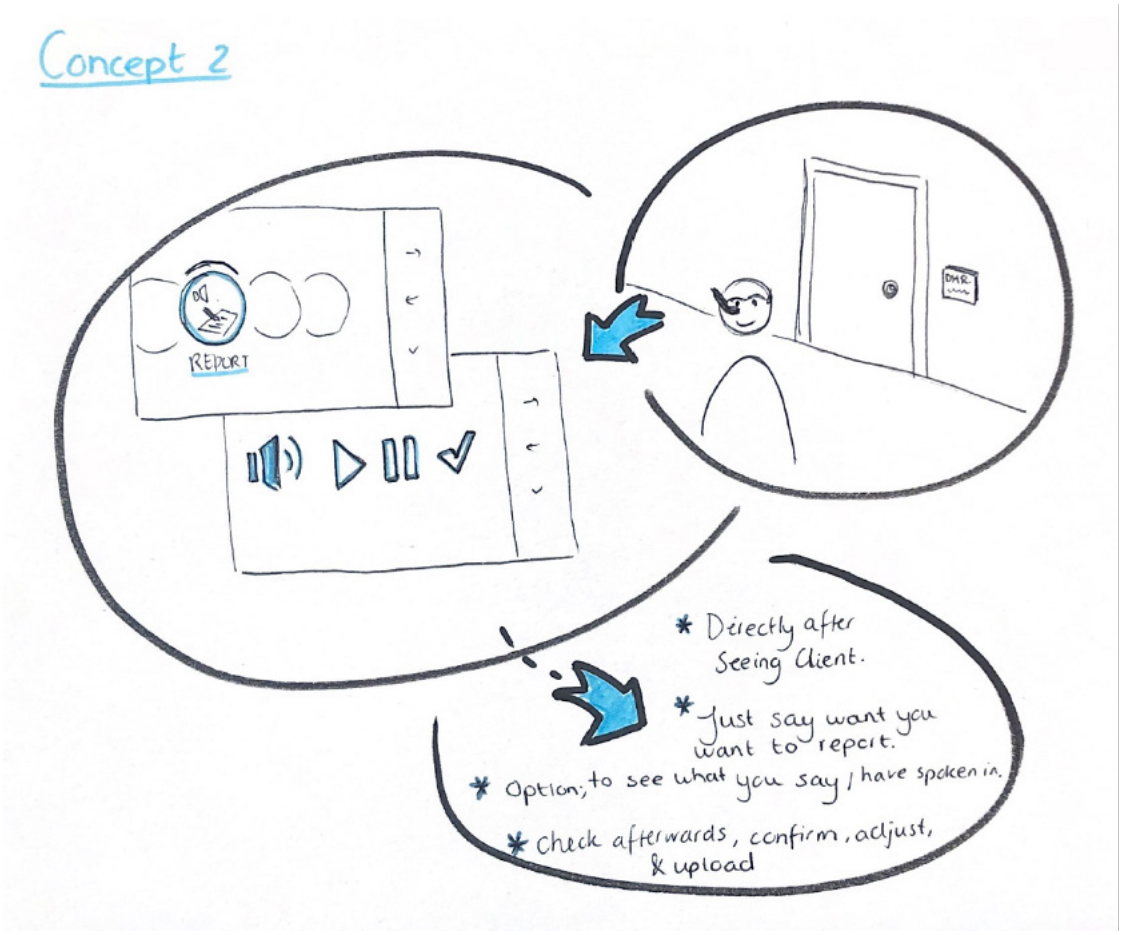


Figure 55: Concept card 2

Concept 3:
In the last concept, Smart Glasses wearers will be guided through the report, as in concept 1. This concept will not present closed questions or options to choose from but will focus on the different reporting steps. The Smart Glasses wearer will see, for example, the different stages of the TIME method. Per stage, the wearer must report by speaking out loud. Reporting will occur in the client's room after the visit/treatment. In this concept, the client is present during the reporting. Before reporting, the wearer must select the correct client and what situation to report on. A summary is presented to the Smart Glasses wearer when all questions are answered. Eventually, some things might be added to the report. Finally, this summary will be directly uploaded to the ECD.

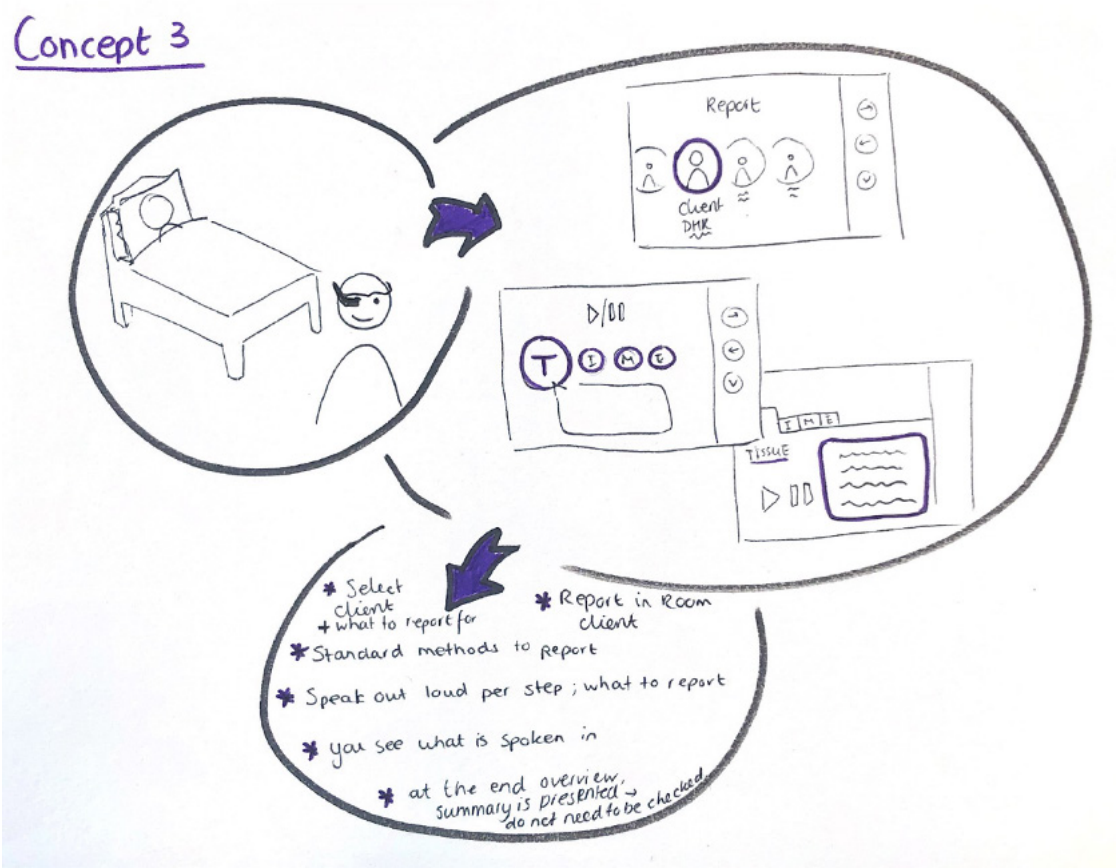


Figure 56: Concept card 3

Step 4: Choose a concept & develop final concept

To get to one final concept, the three concepts were discussed with three employees of 1Minuut, a wound expert, a consultant, and a developer/tester. The wound consultant also participated in the interviews and questionnaires, participant P123. The difference between the concepts gave interesting discussing points. When and where do you want to report? Can you say everything out loud or not? What do you need to report, and how not lose its goal of making it easier and faster. Below, these discussion points and other feedback are clarified.

Having standard questions and guidance makes reporting more objective and consistent. Using questions that need to be answered on a scale of 1 to 3 or yes/no can make it even more objective and faster. However, there must always be an option to add something that might not be covered within the default settings. Having only an opportunity to report by voice with no guidance is an option, but the other concepts with guidance throughout the reporting are better perceived.

What to report depends on the situation, what happened, what is the state of the client, and what action or task did you perform? It is different every time. Therefore it is necessary to select before starting reporting with the Smart Glasses the situation for which you come to report or visit the client. Otherwise, you get a very long list of questions that might not all need to be discussed. There should also be a clear option on whom you report.

Reporting with the Smart Glasses should save time. It would be best to connect the report to the ECD directly. Here all things are written down and can be found on the client. When you need to check, confirm and adjust the reported document with the Smart Glasses at another time of day, it will lose its goal. Reporting should be happening as quickly as possible after the visit, even in the client's rooms. But it may happen that it is not appropriate to say some things in the client's presence. Closed questions can cover som e topics or information, but there should always be an option to report later with the Smart Glasses. According to the wound specialist, reporting (with voice) in the client's room is 90-95% of the time possible and appropriate.

At the end of the reporting, it is desired to get an overview or summary of what you will hand in. When documenting with voice, you want to see that what you have said is written down correctly. The reviewers think this is important, especially in the early phase, to get more trust in this new method.

Concept 1 mentions two features that might be possible for all three concepts. The first one is that the Smart Glasses listen to the conversation between the caregiver (the Smart Glasses wearer), the client and the specialist (who watches along). In this way, some information about the health and condition of the client can already be reported automatically. It remains to be seen whether technology is good enough for this and what information is to be extracted from the conversation. Especially the wound care specialist wondered what information would be extracted since, in a normal situation, you also talk to the client and have a friendly conversation with them. According to the reviewers, the second feature to connect the Smart Glasses to the agenda and ECD of the client might also be an option. It might save some time, though they were wondering how this all should look and what you will see on the screen of the Smart Glasses.

In conclusion, the three reviewers all most liked a combination of concepts 1 and 3. Most points described above will be included in the final concept.

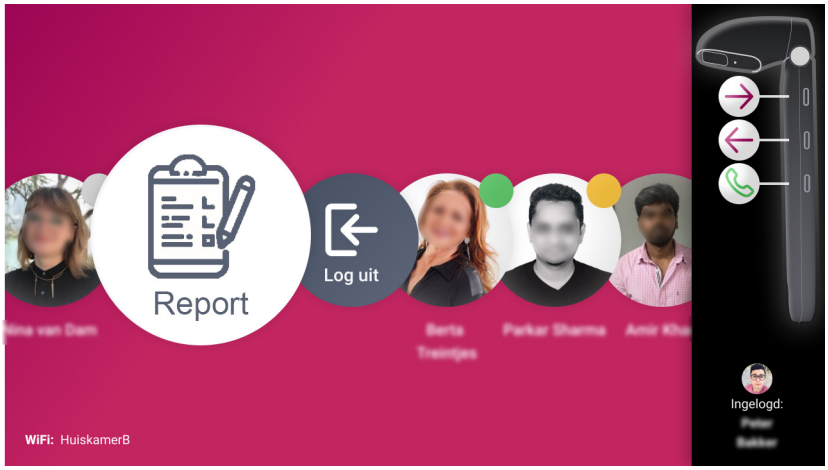


Figure 57: Start screen interface

Select the option to report

Figure 58: Insert name client

Say out loud about who you will report.

Figure 59: Confirm name client

Confirm if this is th correct person

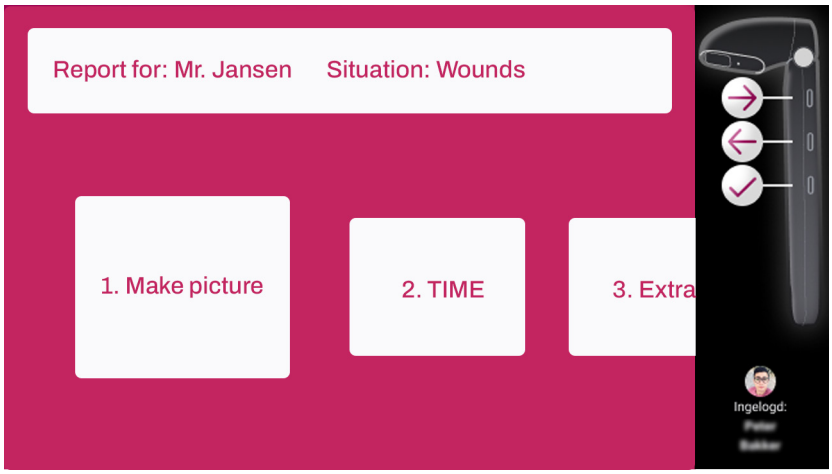
Figure 60: Screen to select what to report on

Select t you will

The final concept:
Reporting in the client's room is the standard after the performed task, but an exception to report at another moment can be made. After the Smart Glasses wearer has selected the correct client to report on, the right situation to report on must be chosen. Presented might be for what case was reported lately and what problem is reported on the most for this client. Then the Smart Glasses wearer will then be taken to a new screen where they will be guided through the specific report. Most questions will be closed, which can be answered with yes/no or by mentioning/saying out loud an answer already shown by default. For example, what colour is the wound: 1-Red, 2-Yellow or 3-Black. You can mention the colour or the number. In this way, as few long texts as possible are spoken aloud.

There is always an option to add something by voice if the answer you want to select is not there or add something not mentioned. When saying something to the Smart Glasses to report, you should see what you have said displayed on the screen. At the end of the reporting, a summary should be presented, and it should be directly updated/sent to the ECD.

A first interface is created (Figures 57 to 65) to present what this concept might look like on the Smart Glasses. During designing, I looked at the existing screen interfaces of the Smart Glasses to ensure that what I designed fits on the screen. To make sure everything is readable and that not too much information is presented to the wearer.



You will be guided through the different stages of the report.

Set options will be visisble, as an option to add something.

Figure 61: Guided options for reporting wounds

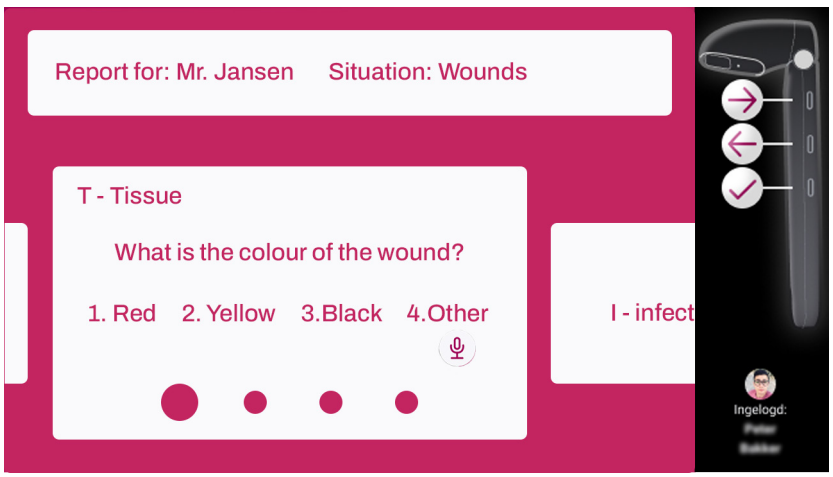


Figure 62: Follow the wound reporting protocol

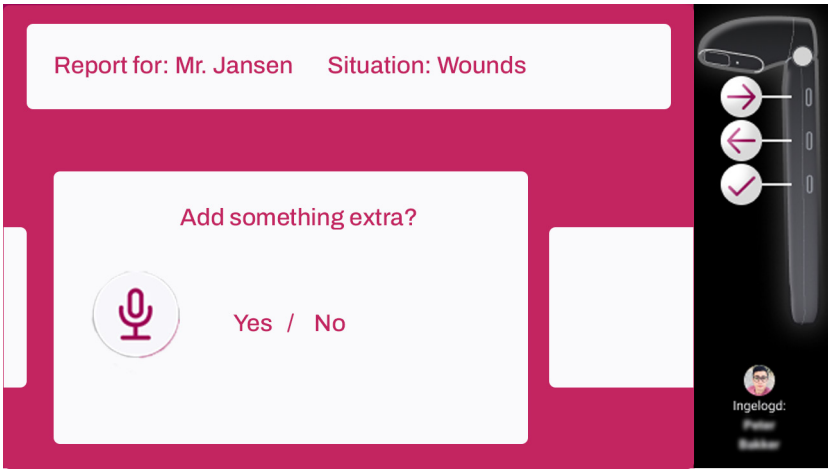


Figure 63: Option to add extra information

If almost ready, it is possible to add something to the report that was not mentioned

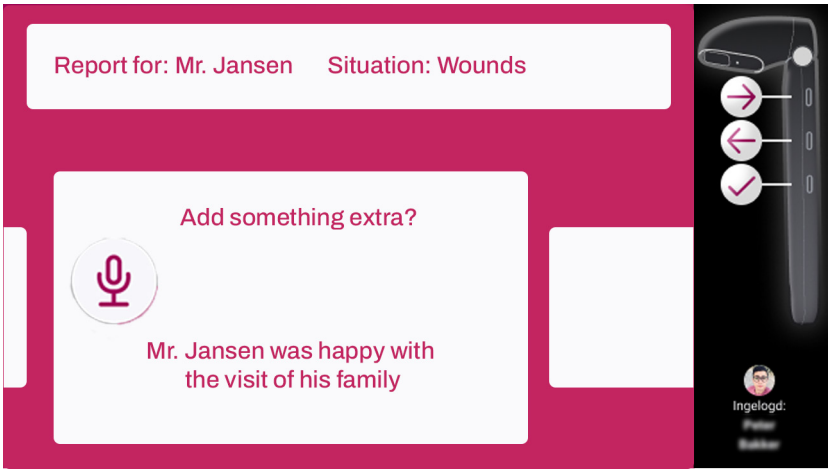


Figure 64: Presented what is spoken

After reporting, a summary is presented to the nurse. The summary can be adjusted and confirmed.

Figure 65: Summary of the report

Step 5: Discussing with customers or other users
A document was made with short explanations and images of the final concept and was shared and discussed with four participants to receive the following feedback:

At the moment, the participants mention that not all nurses report correctly about the wounds. Some might forget or do not follow the different steps of the TIME since they do not understand or have forgotten its steps. Others only describe sometimes what they see. Therefore, the participants think this concept can help contribute to the consistent reporting and let the different nurses be on the same page. One of the participants mentioned: 'Thinking for yourself is more difficult than just answering closed questions with options.'.

The participants all thought that showing the wound plan might also be an exciting option. Showing pictures of the wound to the wearer gives the wearer a clear idea of its process; it is easier to compare an image than the reported text.

Both nurses thought that reporting with voice would make reporting easier and faster. Especially when the report is automatically uploaded to the ECD or the official program to report with. Another option that could go automatically is that the report/information can be shared with externals, such as the wound specialist.

When selecting the client to report on, one must be aware that multiple clients might have the same last name. Therefore the project leaders recommended using client numbers or room numbers. Furthermore, the project leaders thought that reporting with voice is quite different. Having closed questions or options makes it easier to adopt, they think.

4.3 Conclusion

This concept shows the potential to make reporting easier, more consistent and faster for the nurses. Fewer mistakes might be made when guided through a specific way of reporting, and several options will be shown. However, an essential requirement for success is linking the new feature to the existing report software. It is not desired to check and confirm it at a later stage, so it must be uploaded automatically to the other systems.

Nurses benefit from this way of reporting since it will go faster and easier. In addition, the reports will also become more consistent, which will ultimately benefit the client since they might be treated better.

When a picture of the wound is shown to the wearer and the 'Zorgplan', the nurse wearing the Smart Glasses gets information on the wound more easily, which helps them decide better what to do.

Having as well an option to add an answer next to the pre-set answers during reporting, much can be covered. It is wished to report directly (in the client's room) after the nurse has treated/seen the client. Although there always must be an option to report at a later stage when, for example, it is not appropriate.

5 WRAPPING UP - DISCUSS

5.1 Conclusion

This project explored how the Smart Glasses (mainly of 1Minuut) are currently experienced in the actual context and how Smart Glasses could support elderly care staff in elderly wound care. Based on this research, a design proposal is developed focussing on how caregivers in the elderly wound care can be supported with the Smart Glasses. The main research question set at the beginning of this project was:

"How can the elderly care staff be supported with Smart Glasses in the elderly wound care?"

To answer this question, four sub-research questions were created to better understand the elderly wound care and the current use of Smart Glasses of 1Minuut and in general.

- *"What is the current way of working in the elderly (wound) care?"*
- *"What can be improved in (wound) care for the elderly?"*
- *"What are nurses' current experiences with Smart Glasses?"*
- *"What are the possibilities with Smart Glasses in the elderl care?"*

Different methods were used to obtain more information for answering the main and sub-research questions. First, the context is explored of Smart Glasses; a better understanding is created of how the Smart Glasses and Genzõ of 1Minuut are working, how they are used, and by whom. Then literature research was performed to obtain more information on the experiences of other Smart Glasses users and researchers. Furthermore, two questionnaires and interviews were conducted by seven participants (clients of 1Minuut) who had all experiences with using Smart Glasses in the actual context. A content analysis method was used to analyse the interviews. Those analyses gave an overview of the current state of the use of Smart Glasses, what is going well and what might be improved. Next to focusing on the Smart Glasses, this project concentrated partly on what is happening in the elderly (wound) care sector. The proposed design contributes to the improvement of the elderly wound care and will ease the work of the elderly care staff.

To answer the main research question, this chapter first answers the sub-questions.

About the elderly wound care:

"What is the current way of working in the elderly (wound) care?"
Working in elderly (wound) care includes various aspects. In this sector, many specialists and nurses work together to provide the best care for the elderly. Caregivers almost always know what they have to do, have a relatively fixed schedule and are sometimes very set in their way of working. They work with standard visiting hours for specialists to come by in the elderly homes throughout the week. So many activities are planned, although it takes priority if there is an emergency.

By using electronic client files, nurses and doctors can prepare before seeing the client. They will become aware of the state of the elderly clients and what kind of treatment and care they should receive. After seeing a client, it is essential to report the visit, such as what happened, whether the state of the client had changed and what to look out for. It is mandatory to do this immediately after seeing clients in the intermural sector (providing care in a healthcare institution, such as a nursing home). Some caregivers, especially specialists, need to travel between nursing homes to see their clients because, for example, a wound specialist is not stationed at each location. Caregivers have a busy and fixed schedule throughout the day. Due to this bus ness, they might rush and forget to or incorrectly prepare or report.

Next to that, there are many different systems that health organisations are working with, such as the Nedap Ons or PUUR. These systems are often not connected, which means that much time is spent on completing a client visit. Tasks that need to be carried out after the visit include the nurse contacting another discipline or ordering bandages.

In addition, the caregivers know how to contact and communicate with each other. This communication goes well through different ways like emailing and calling. Furthermore, not all caregivers might perform the same actions/tasks due to their education level and need to reach out to others. Or for example, some nurses might not perform some treatments and do not know how to treat a wound.

For wounds:
Anamnesis is very important for a wound. When a wound is detected by a nurse, a specialist should see it, and a wound plan will be created. The wound plan describes how the wound should be treated. Pictures help generating an overview of the process of the wound. Two methods used to report wounds are the TIME and ATLIS method. Here different aspects of the wound are highlighted. When seeing and judging a wound, it is essential also to smell, see the colours and feel the wound.

“What can be improved in (wound) care for the elderly?”
From the research, aspects/areas are followed in which the care for elderly can be improved. First, the time management can be improved. Often there is a lot of time between tasks, like time between the first communication about a detected wound and the actual treatment. Although the communication between the different caregivers is quite good, it sometimes takes long before real action is taken. When e-mails are sent late in the day, it is possible that they will not be answered immediately. Especially when the weekend is in between, it might take longer before action is taken.

Moreover, the preparing and reporting part can be improved. Caregivers do not always read well enough about what they need to look out for or check when seeing a client. As for what they need to report. Due to their busy schedules, the experienced time pressure, and the many tasks they needed to perform, nurses might prepare and report in an incorrect way or even forget to prepare and report. The ease and guidance of preparation and reporting can be improved. There is also room for improvement in the systems the organisations work with. They are all different and not connected, making some of the tasks that caregivers have to perform in those systems repeatitive and time-consuming.

Furthermore, the basic knowledge of nurses needs to be improved. They are the first to notice a difference in the client's health and need to inform others. The earlier a wound or disease is diagnosed, the earlier the client can be treated. However, it must be taken into account that they cannot possess all this different knowledge given their education and the many tasks they already have to perform.

Another improvement can be in the planning of when a specialist will see a client. If there is no need to take immediate action, the client's situation will be discussed during the standard visiting hours of the specialist. This sometimes take quite long, and the client's state may change. By improving the planning, such events can be prevented.

About Smart Glasses:

"What are nurses' current experiences with Smart Glasses?"
Based on the literature, the questionnaires and content analysis results, many people, and especially nurses, are generally interested in the Smart Glasses and their possibilities. Smart Glasses can offer great potential and benefits, and some users already experience those. Advantages of using Smart Glasses are showing information to the wearer, like checklists, or making video calls to ask specialist for quick help. For example, specialists can watch from a distance with the Smart Glasses to a situation and do not have to travel anymore. They can save time and see more clients a day. Clients (the elderly) also experience great benefits when they get a consult with Smart Glasses. They do not need to travel to the hospital, and fewer (unfamiliar) people will visit them.

Although Smart Glasses are being explored in many different sectors and for other use contexts and multiple possibilities and advantages are out there with the Smart Glasses, they are not yet fully used. There are multiple reasons for this, and the most critical ones are named. One of the reasons is the lack of opportunities and features for Smart Glasses. In addition, the wearers of the Smart Glasses, the nurses, have not yes experienced the possibilities of the Smart Glasses. Therefore it is essential that the reason for use, and the way it is implemented, are apparent to all the users and people involved with the Smart Glasses. Another reason is that the hardware is still in development. The Smart Glasses are experienced as big and heavy, and the battery life is not that long. However, the quality of the Smart Glasses is generally experienced as good, such as the sound and the screen/ video.

What also needs to be considered is that it is an entirely new product, especially for some elderly users. If they are not that technically inclined, it is experienced more challenging to control, learn and get familiar with the Smart Glasses. The participants from the interviews thought the Smart Glasses were easy to control. However, they mentioned that learning to use the Smart Glasses might take some time.

When users, especially wearers, do not see the advantages, find it more difficult and do not save time, they are more likely not to use the Smart Glasses because their old way of working is still sufficient and even faster.

“What are the possibilities with Smart Glasses in the elderl care?”
The literature shows that Smart Glasses are already used for different tasks in various sectors. Although Smart Glasses do offer great potential, there are still some parts that need to be developed or improved. As can be seen from the content analyses, some nurses do not yet see the opportunities of the Smart Glasses. Therefore some possibilities might lay in adding features for the wearer. When other used programs can be connected to the Smart Glasses and efficiently be presented and used by the wearer, they might get more out of their useIt might be possible to provide the wearer with checklists or information about, for example, specific wounds and how to treat them. Other possibilities might be helping the wearer in making choices in an easier way and assisting them with doing tasks. Making use of the screen of the Smart Glasses more often and presenting more information to the wearer is one of the main possibilities which can be improved. A function which is already implemented in the Smart Glasses is voice control, but is often not used. Although voice control is still in development, it might offer great potential for making performing tasks even more effortless.

Main research question:

“How can the elderly care staff be supported with Smart Glasses in the elderly wound care?”

The proposed design, the reporting tool, supports the elderly care staff in the elderly wound care. It helps them in performing their reporting tasks in an easier and faster way. And above all, the quality of reporting will improve since it will become more consistent with the pre-set questions.

However, this feature is not the only way to support elderly care staff with the Smart Glasses. One group of the elderly care staff, who watches along, already experiences some support and benefit from the current Smart Glasses use and the software Genzõ. Wound specialists can monitor and see the wounds and give advice remotely. Currently the nurses, the Smart Glasses wearers, do benefit less. As seen in the results; it costs them more time than it brings in. A way the nurses are supported now is only by getting help of an expert. In this way nurses can make decisions easier and act faster.

More Smart Glasses features need to be developed, which contribute to the work of the nurses/caregiver. These features need to support the nurses by making performing tasks more straightforward, accessible, or quicker. Like presenting client information, their agenda or tasks to complete. In this way, other used care software programmes could be linked to the Smart Glasses and be shown on the screen of the Smart Glasses to the wearer.

5.2 Discussion

The research's starting point was how Smart Glasses could contribute to elderly wound care. The double diamond approach was well chosen since it allowed me to diverge and converge within this new (for me) and large context. However, during this project, the main focus was on the first diamond and less on the second in which a solution is developed and delivered. This was because much time was spent exploring the context, gaining as much information as possible about the current use of the Smart Glasses and Genzõ software of 1Minuut. Quite broad interviews were conducted to understand better why the glasses are not yet widely used. To take these points along to the design phase. As time was limited, less time was left for the second diamond. Thus it was chosen to go through a short design sprint of 5-steps to still come up with an improvement/solution for how Smart Glasses can support the elderly care staff in the elderly wound care. And above all, to do something with the results of the research.

5.2.1 Results and relevance of the research

For this research, multiple research methods were used to gain more information on the current experiences and future possibilities of Smart Glasses in the elderly wound care sector and better understand the way of working in this sector. The methods used are literature research, two questionnaires, a semi-structured interview and content analysis. The most exciting results of the study will be discussed.

The questionnaires
The answers to the first questionnaire, the TAM (Technology Acceptance Model), showed that the participants accepted this new technology quite well. Since many participants often strongly agreed with the different statements, they perceived the usefulness and ease of use quite well. The answers to the second questionnaire, the UEQ, showed that the participants experienced the six different aspects of the user experience: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty, quite well.

These results are not entirely in line with the expectation that people are not yet using the Smart Glasses much. Expected was that there would be much room for improvement in how the new technology can contribute to their work and how the user experiences could be enhanced. Therefore, it was expected that the participants would rate those aspects lower.

Although, these results present that participants, who have some or much experience of using the Smart Glasses in the actual context, are satisfied with the use, and they think the Smart Glasses are helpful and easy to use. A possible explanation for these results might be that the participants really believe in the Smart Glasses and are already benefiting from their use. This does not mean that there are no improvements. But it does mean that the current product is working for these participants.

The content analysis
The content analysis results consisted of many findings divided under 12 different themes, 4 of them relating to the way of working in the elderly wound care sector and 8 of them of the current use of the Smart Glasses. The overall result of the analysis was that Smart Glasses do show great potential to support caregivers in the elderly (wound) care, but that the current product is not yet fully used for several reasons. First, some exciting results of the benefits and advantages of Smart Glasses will be discussed, followed by discussing some of the exciting results of why the Smart Glasses are not being used much and what to do about it.

The research shows that specialists who can watch along with the Smart Glasses and the elderly already benefit much from the Smart Glasses use. The Smart Glasses wearer, on the other hand, experiences fewer advantages. The only advantage is that they might provide care to the client faster by receiving help and feedback from another caregiver more quickly. These results are in line with the expectation that the use of the Smart Glasses will bring many benefits to all three different parties. Earlier research also presents the many opportunities and benefits Smart Glasses might have, as seen in Bashshur et al. (2014); using Smart Glasses for teleconsulting reduces hospitalisation and hospital visits and can prevent illness. In the study of Syberfeldt et al. (2017), Smart Glasses are used in factories to help the wearer make choices and assist them. However, this research (about the elderly wound care) presents a relatively new relevance that the elderly, seen with the Smart Glasses, also experience benefits. Other studies often do not use 'real situations' with a client/patient and they are therefore not asked about their experience.

Although these are good advantages, the results show that the Smart Glasses are not always used to their full extent. This has multiple reasons, but one striking result is that mainly the Smart Glasses wearers do not always see or experience the benefits of the Smart Glasses use. They do not know what is in it for them. In addition, some people still find the Smart Glasses challenging to use, too technical, they think the Smart Glasses are too heavy, and they do not have the time or want to learn to change/work differently. Some nurses find it more time-consuming to use Smart Glasses than to perform tasks in their usual way. Those findings all contribute to the fact that Smart Glasses are not being used. If wearers spend more time using them than they benefit from the use, it is logical that this group uses the Smart Glasses less. The only benefit Smart Glasses wearers have when using the Smart Glasses of 1Minuut is to get help and expertise from a specialist who otherwise was not able to help. Other studies show more benefits for the wearer when they benefit from the use itself. Another striking result is that nurses always made an appointment to call; otherwise, the call was not happening. A clear implementation plan should be set up so everyone involved with the Smart Glasses knows what is happening. These results did not entirely fulfil my expectation. I expected to see much more use of the Smart Glasses, especially with the selected participants and their organisations. Another expectation that was not fulfilled was that there would be more benefits for the wearer.

One explanation for the results may be that it is indeed a very different way of working, to which some nurses are not yet accustomed. Carers find it difficult to change and are very attached to their standard working methods. In addition, some care providers are less technically skilled and find it challenging to use Smart Glasses. Another explanation could be that not enough time is set aside for it yet, and that not enough thought has been given to how this new technology will be implemented in their sector and way of working. As a result, the Smart Glasses are not yet widely used. This is in line with the study by Romare et al. (2018). The study mentions that usage routines, training and support must be given before Smart Glasses can be fully implemented and used.

The study gives insides into the current use of Smart Glasses in elderly (wound) care, what users come up against, what can be improved, and the advantages. Those results are an addition to the existing literature on the use of Smart Glasses since almost no previous studies have researched the actual use of Smart Glasses in elderly (wound) care.

The proposed design, the reporting tool
The reporting feature on the Smart Glasses, which can be controlled by voice, shows great potential. The nurses wearing the Smart Glasses will be guided through the report, closed questions are asked, and common answers are displayed each time. Reporting can happen directly in the client's room and will be uploaded directly to the client's file. This reporting tool makes reporting faster, easier and more consistent. The reporting tool shows the potential to make tasks easier for the nurses and support them with their work. It will only benefit the nurses when they do not have to perform the same tasks twice. Therefore future features on the Smart Glasses must be fully integrated with the currently used software programs nurses use.

5.2.2 Limitation of the research

One limitation of the research was that the set focus of the study was quite broad, as many users might have different experiences with Smart Glasses. This resulted in many different insights with fewer specific results. The interviews had a broad scope since many insights had to be collected on as many themes as possible about the Smart Glasses' current user experiences. If more focus or specific direction was set initially in the interviews (and the project focus), deeper insights might have been obtained about fewer subjects. Since the interview transcript acted as the data for the content analysis, many different codes were created, and the results were also broad.

Another limitation of the study was that due to COVID-19, it was impossible to observe nurses using the Smart Glasses in the elderly (wound) care sector. When observing users, more insight can be gained into how they use the product, what goes well and what does not.

In addition, a limitation of the project was time. If there were more time, more time would be left to focus on the further developments of the findings/insight. The proposed concept could then be elaborated and developed into a testable concept. Then the final proposal can also be tested with real users of Smart Glasses, and more reliable conclusions can be drawn.

The number and type of participants were other limitations of the study. Mainly due to COVID-19, many caregivers in elderly care were very busy and had no time to participate in the research. Therefore, the number of participants was low. Fewer participants are significantly less desirable for quantitative research since the more participants; the more reliable the results will be. The participants were selected based on their user experiences with Smart Glasses in elderly care. And therefore, it is only possible to say something about their experiences. When chosen for a wider group of users, including, for example, first users and people who are using the Smart Glasses in different sectors, a more comprehensive overview of the current state can be formed.

The participants of the research all worked within different elderly care organisations and had used the Smart Glasses for different situations. Some for watching along with wounds, to observe the behaviour of the elderly, or to have a teacher judge the performance. Therefore, they might have had separate agreements on the Smart Glasses usage and different implementation plans. This also means that they could encounter various challenges.

5.2.3 Future recommendations

As seen in the results, Smart Glasses wearers do not always benefit from Smart Glasses use. Therefore it is interesting to look more into what features must be added to the Smart Glasses and what these must look like. These features must support nurses in their work. Otherwise, they will not use the Smart Glasses. Therefore it is recommended to involve them in the design process of developing new features.

It must be considered that only in-depth research has been conducted mainly on the Smart Glasses and Genzõ software of 1Minuut. Therefore, it might be interesting for a follow-up study to involve other Smart Glasses and software and compare them to obtain more points of improvement for Smart Glasses in general and the specific software and use of the Smart Glasses 1Minuut.

The evaluation of the reporting tool on the Smart Glasses showed that it is essential for the nurses to upload the report directly to the client's file. Therefore, the used different programs by the nurses must be integrated perfectly within the Smart Glasses. It is recommended to cooperate more between the developers of software of Smart Glasses and the developers/owners of healthcare software programmes.

Another future recommendation is to elaborate more on the proposed reporting tool. The different steps of reporting should be better elaborated on. What pre-set answers need to be available. And in addition, thought should be given to how to confirm your answer, how the user will navigate through the reporting menu and how the tool will look on the Smart Glasses.

5.3 Personal reflection

When I came across the assignment from the company 1Minuut, it immediately drew my attention. I had already come across Smart Glasses in another project a few years ago. Then I found out that Smart Glasses have much potential but are not so easy to use. I was immediately curious about how 1Minuut used the Smart Glasses. My interest as a designer has always drawn me to medical projects that contribute something valuable. The idea that I could contribute to healthcare improvement was a great motivation.

When I started the project, I was under the impression that the Smart Glasses of 1Minuut would be used a lot more. Unfortunately, this turned out to be less accurate. I was inquisitive as to why and saw that there were still many improvements.

Looking back on the process I went through, it was sometimes difficult not to go too broad and lose my focus. I quickly find many things interesting and sometimes find it challenging to make choices. At an early stage during exploratory activities, I was already tempted to have a broader look at how Smart Glasses are implemented, how people come into contact with Smart Glasses, etc. Eventually, I returned to my focus on how Smart Glasses are used in the present context and what it all entails. Looking back on my project, I should have set more boundaries. I would then be less tempted to go too broad and perhaps have more time to elaborate on my proposed design and test it. But in the end, I did get a lot of exciting insights into the use of Smart Glasses, and I am pretty proud of that.

Looking back at the learning goals I had set for myself at the beginning of the study; they have all been achieved. I enjoyed being part of the company and making a difference. I was involved in many current projects, which gave me many experiences in how things work in a health-tech company. I also wanted to know how things work in the health-tech world. Although I expected it, it still surprised me that changing something in this sector or implementing innovations is all going very slow. During the project, I put my skills into practice, and I have seen that I can come up with usable and reliable results. I found it exciting to delve into the content analysis, as this was a completely new method for me. Still, I dare say that I am more confident now about my design, and I dare to share my results with more confidence. I worked on this project independently, which was quite an achievement for me because I prefer to work in groups. I have proven to myself that I can work on my own and that I am capable of running such a big design project on my own.

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7 APPENDIX

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1. Project brief

Personal Project Brief - IDE Master Graduation

TU Delft

A design proposal for featuring Smart Glasses in the elderly wound care — project title

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

start date 25 - 10 - 2021 — 31 - 03 - 2022 end date

INTRODUCTION **

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

The company 1Minuut focuses on the development of innovative technical solutions with which (healthcare) knowledge and expertise is easily, safely and everywhere available to the care provider. The company wants to increase labour productivity and thus realize a more sustainable employability of care providers. With the same care capacity, more (and heavier/complex) care can be provided. As a result, care providers will remain involved in care provision for longer, in good health and with a lot of pleasure. The provision of care will be improved, which will also benefit the clients/patients in the end. Since among others, there is more time and attention for them.

At the moment, the company is focusing on care for the elderly. Not only in elderly homes, but also in other places in the healthcare sector, we see a shortage of nurses. This results in less time for practical care. 1Minuut believes that with the help of Smart Glasses and innovative software, the work of caregivers can be made easier and more efficient. Smart Glasses are wearable augmented reality devices, which can add information to what the wearer sees. Some glasses capture and process the surroundings of the wearer and add virtual elements. The glasses the company is working with are the Vuzix and Google Glass. Those glasses have a small computer screen/display, which can present data in front of a person's eye. The introduction of those Smart Glasses in the healthcare sector for elderly might ultimately lead to more time and attention for the client, the delivery of quality care, and of course to job satisfaction. Next to the glasses the company also work closely with an external software company, which delivers the software for the glasses.

The Smart Glass is already being used in a couple of care homes. Here the glass is used by caregivers to (video)call to another person at a different location to get feedback, tips and extra expertise on the situation. Experts can watch live with the glass wearer and can give advice and help. To get started the caregivers and other users first need to download an app called Genzo at their telephones. After logging in within their specific organization they get access to among others contact information of colleagues and are able to call each other. When using the glass, it first needs to be connected to the app. This is done by scanning a QR code on the app with the camera of the Smart Glass.

Unfortunately a lot of first users run into difficulties when trying out the glass, they do not know what the possibilities are and do not know how to use/control the glasses. Also connecting the glass to the phone can be difficult, it is not user-friendly and is not going very smoothly. In addition it is difficult to implement new technology in the healthcare context. People are stuck to protocols and have not much time to learn & implement new things. Besides, not many people have had a good first experience with the glass and are less eager to try it out again. Therefor not all benefits can be shown and experienced and people do not yet know what all can be possible with the glasses.

The developments around Smart Glasses are out there but we as users and designers do not yet experience all these interesting results. It takes time for companies to have a working product and therefore is difficult to integrate glasses in the real context. Nevertheless the company do see the value and possibilities of Smart Glasses and think way more can be achieved with them. A lot of ideas for new features and modules are on the table, ready to be developed, the only question is how exactly. Moreover the company thinks controlling the Smart Glass by voice is very interesting, since it is desirable that the hands of the healthcare providers are free during use of the Smart Glass.

Stakeholders in this context are in the elderly homes; nurses who wear the glasses, experts who look along with the glass wearer, patients/clients and managers/administrators. Others are the glass-makers Vuzix & Google, an external software company and 1Minuut itself.

space available for images / figures on next page

introduction (continued): space for images

image / figure 1: An employee with a Smart Glass (Vuzix)

image / figure 2: Smart Glass in action, on the app you can see through the eyes of the nurse.

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.

There are too few people working in the healthcare sector and with the increasing number of elderly, the pressure on care will only get higher and higher. Working in care is hard working, people need to make numerous decisions each day when interacting with patients. There is a risk of human error in this context and those can sometimes cause catastrophic results. Making information, knowledge and expertise more easily and safely accessible might really help some of the problems described above. Smart Glasses can be the solution and provide those things. The glasses can be helpful for nurses, and serve as an interesting tool/aid. But they can also increase labour productivity and can help document organizational knowledge.

But what and how exactly should the Smart Glass provide information, knowledge and expertise? At present, the Smart Glasses are already being used cautiously in the healthcare sector. Calling and viewing/watching are already possible, but there are many more options and functions that can be added. What should those function look like on the glass and how should those be controlled? What does the users of the glass really want and what is actually possible? How to get the most out of the glass and in what kind of context will it be used? These are big questions that cannot be answered properly within 100 days. Therefore, during the project I will focus on a specific case in the elderly care, namely treating a wound.

ASSIGNMENT **

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

I will explore what the wound care of the elderly consists of and how this can be supported with a Smart Glass. Next to that I will investigate what the current and possible interactions are with the glass. I will come up with a design proposal of how Smart Glasses can be used in the wound care for elderly. I plan to carry out a formative usability evaluation of the proposed design proposal.

I will first explore what the wound care of elderly consists of. What are the protocols and the workflow? Where can help be given, and/or how can things be simplified/improved? How can a Smart Glass contribute to and support this process?

By getting to know the glasses, find out how people are using them at the moment and what kind of problems they run into, I get a better view on where and what the problems are. But also on what need to be improved and what is possible.

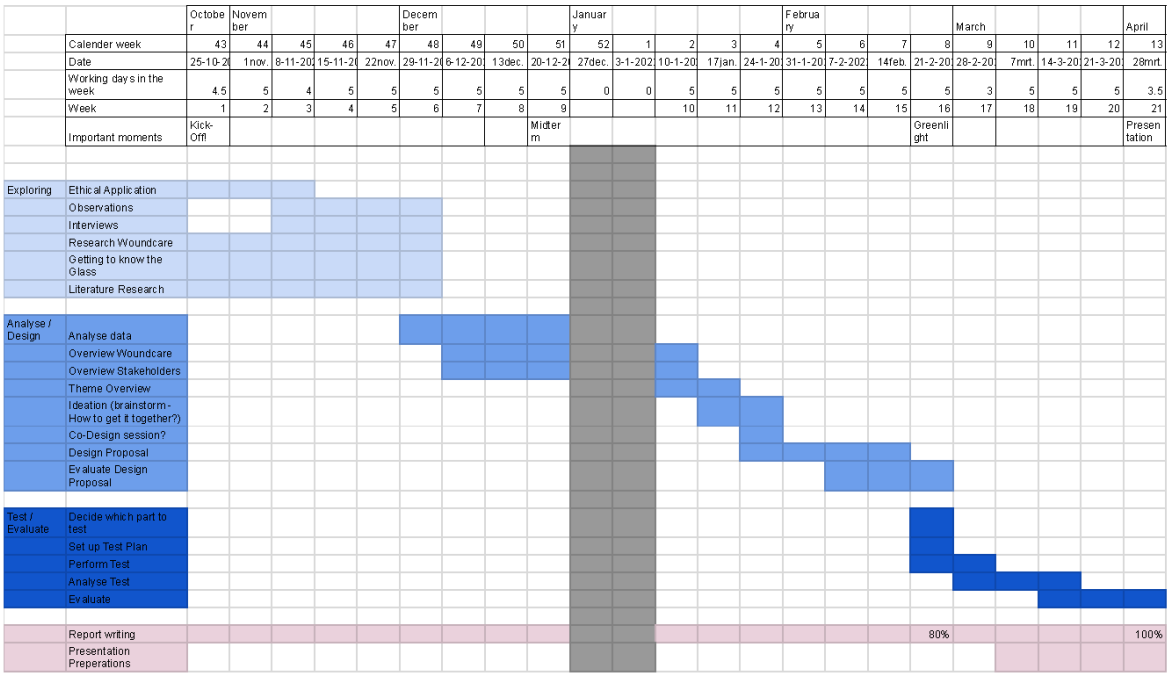
With this overview different themes can be formed, like what are the requirements, the context of use and control possibilities. Ideas and solutions will be created for those different themes and a design proposal can be created. This design proposal will consist out of solutions for different themes, like for example how to control the glass with voice and what are the voice commands? And what should be shown on the screen when treating the wound.

I would like to validate/test in the end a part of the design proposal and get feedback whether my proposed solutions might work or work not. I do am aware that I will not have time to test a whole working app/feature on the Glass and therefore should choose what to test depending on my findings.

PLANNING AND APPROACH **

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

start date 25 - 10 - 2021 31 - 3 - 2022 end date



In the exploring phase I will explore what the current use is of the glasses by observing and interviewing nurses who are using the glass and other stakeholders. Since the focus will be on a wound case I should research the current state of the wound care and its protocols. Next to that I will have to get to know the glasses and do research about the potentials Smart Glasses might have nowadays. I have to find literature about among others the interaction with glasses, integrate them in the healthcare/processes and what the current state is of voice control/gesture.

In the second phase I have to analyse all my data and create clear overviews of what the wound care consist of and what all stakeholders find important and want. Then a big overview of what we need for the specific case can be created and by ideation and brainstorming, answers/solutions can be created for the problems/questions. Since I want to involve the health care providers a co-design session will be performed in which they can think along with the process. In the end of the phase a design proposal will be created which will be evaluated with the different stakeholders.

In the end I plan to test a part of the design proposal. Depending on the complexity of the design proposal, a small user test can be set up and performed. After analysing the test an updated proposal of how to integrate the Smart Glass in a wound case will be delivered.

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.

During my D:Dreamteam year at Project March (2018-2019), I got to know the Google Glass. I thought they were very cool but soon I ran into some problems. For example, the software was not ready to be integrated easily and the glasses were not very user friendly yet. It is difficult to integrate a new product in a new context. I see this project really as a challenge, and the company 1Minuut is middle in this challenge, which I would love to contribute to.

I always find it very interesting how people are interacting with products, what do they get out of it and how can you optimize them? What do you have to show to your user to make it more intuitive, what kind of information do you show and how to control it? Those questions I always find interesting and will also be addressed in this project.

Besides that, I find healthcare a super interesting field. I want to go for the Medisign specialisation and this project is perfectly suited for the combination of technology and healthcare. I can make good use of the knowledge I have gained from the courses I have taken, such as E-health and Rules & Regulations for medical devices. I am also looking forward to testing part of my design and showing my skills in practice.

Another thing I like very much is that I will have easy access to the target group. I want to involve the users as much as possible in the design process and choices that are made. There is a lot of room for that in this project. I really have to involve them and get to know what they want!

Some goals I have and things I want to focus on.
- Design & present with more confidence & more independently
- Learn more about health-tech
- Get some company experience
- Use my skills for real and get some real usable results

FINAL COMMENTS

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

2. Consent form

Consent Formulier voor de studie 'A design proposal for featuring Smart Glasses in the elderly wound care' Ofwel 'Een ontwerpvoorstel voor het gebruik van Smart Glasses in de ouderen wondzorg'.

Interview

1. **Doel van het onderzoek**

Op dit moment werken er te weinig mensen in de zorg sector en met het stijgende aantal ouderen, zal de druk op de zorg alleen maar hoger en hoger gaan worden. Werken in de zorg is hard werken, zorgverleners moeten ontzettend veel belangrijke beslissingen nemen wanneer ze met patiënten bezig zijn. In deze context is er een verhoogde kans op menselijke fouten. Wanneer informatie, kennis en expertise makkelijker en veilig beschikbaar gemaakt kunnen worden, zal een aantal van deze boven omschreven problemen kunnen helpen.

Slimme brillen of ook wel Smart Glasses, kunnen de oplossing voor dit probleem zijn. De brillen kunnen een hulpmiddel zijn voor verpleegsters, en dienen als een tool die ze bij zich dragen. Met de brillen zou eventueel ook de arbeidsproductiviteit kunnen verhogen en helpen bij het documenteren en delen van organisatorische kennis.

Voor mijn afstudeeropdracht wil ik onderzoeken hoe Smart Glasses (nog beter) kunnen worden geïntegreerd in de wondzorg voor ouderen. Hierbij word ik door 1Minuut begeleid. We willen weten wat voor functies de bril moet hebben, hoe moet informatie worden getoond en hoe moet de bril worden aangestuurd zijn vragen waar wij ons mee bezig houden. Wij willen graag weten hoe u op dit moment de Smart Glasses gebruikt en wat u ervan vindt. Graag willen we weten wat u denkt dat verbeterd kan worden en wat de bril (in de wondzorg) bij kan dragen in de toekomst. Welke features mist u nu en zou u dit graag willen zien? Verder willen we graag uw mening horen over hoe de bril het beste informatie kan tonen en hoe dit moet worden aangestuurd op een zo gemakkelijke, intuïtieve manier.

Tijdens dit gedeelte van de studie zal een interview worden afgenomen om beter inzicht te krijgen over hoe u onder anderen de bril gebruikt en wat hier u van vindt. Vragen mag u op elk moment stellen en ook contact achteraf opnemen is altijd mogelijk.

2. **Voordelen en risico's van deelnemen**

Gedurende het interview kunt u zich op elk moment terugtrekken zonder dat er vragen gesteld zullen worden. Tijdens deze activiteit kunt u altijd vragen stellen. Als u uw gedachte veranderd en wilt terugtrekken uit de studie, gedurende of na de activiteit, is dat mogelijk door te mailen naar Karlijn de Jong (K.J.dejong-1@student.tudelft.nl) voor 09-02-2022.

3. Data verzameling

Interview

Het interview zal ongeveer 45 minuten duren. Het interview zal worden opgenomen d.m.v. audio, foto's zullen gemaakt worden en aantekeningen worden opgeschreven. Delen van de opname zullen worden uitgetypt/getranscribeerd. Alle persoonlijke data zal worden verwijderd uit de aantekeningen. En alle data die u kan identificeren zal uit de transcriptie worden gehaald.

4. Contact gegevens

Als u vragen hebt of zich wilt terugtrekken uit het onderzoek, mail dan naar de onderzoeker voor 09-02-2022.

Karlijn de Jong
University of Technology Delft
K.J.dejong-1@student.tudelft.nl

Consent Formulier voor *'A design proposal for featuring Smart Glasses in the elderly wound care'* Ofwel *'Een ontwerpvoorstel voor het gebruik van Smart Glasses in de ouderen wondzorg'.*

Gelieve de juiste vakjes aan te kruisen	Ja	Nee
Deelnemen aan de studie		
Ik heb de studie informatie van [19/11/2021] gelezen en begrepen, of is mij voorgelezen. Ik heb vragen kunnen stellen over het onderzoek en mijn vragen zijn tot mijn tevredenheid beantwoord.	☐	☐
Ik geef vrijwillig mijn toestemming om aan dit onderzoek deel te nemen en begrijp dat ik kan weigeren vragen te beantwoorden en dat ik mij op elk ogenblik uit het onderzoek kan terugtrekken, zonder dat ik daarvoor een reden moet opgeven.	☐	☐
Interview Ik begrijp dat deelname aan het onderzoek inhoudt dat ik deelneem aan een semi-gestructureerd interview (ca. 45 min.). Deze activiteit zal worden opgenomen, gedeeltelijk getranscribeerd en er kunnen foto's worden genomen. Alle gegevens zullen voor de analyse worden geanonimiseerd. De opnames zullen na een jaar worden vernietigd.	☐	☐
Gebruik van informatie in de studie		
Ik begrijp dat de door mij verstrekte informatie zal worden gebruikt voor verslagen, publicaties en websites.	☐	☐
Ik begrijp dat persoonlijke informatie die over mij is verzameld en die mij kan identificeren, zoals mijn naam of waar ik woon, niet buiten het onderzoeksteam zal worden gedeeld.	☐	☐
Ik stem ermee in dat de foto's en aantekeningen die ik in het kader van het onderzoek lever, in onderzoeksresultaten worden getoond of geciteerd, zolang ik niet identificeerbaar blijf.	☐	☐
Toekomstig gebruik en hergebruik van de informatie door anderen		
Ik geef toestemming om de transcripten die ik aanlever te archiveren in een open data depository zodat ze gebruikt kunnen worden voor toekomstig onderzoek en leren. De gegevens zullen worden geanonimiseerd, waarbij alle identificeerbare informatie uit de dataset zal worden verwijderd.	☐	☐
Ik geef toestemming om de foto's die ik aanlever in een open data depot op te slaan zodat ze gebruikt kunnen worden voor toekomstig onderzoek en leerprocessen. De gegevens zullen worden geanonimiseerd, waarbij alle identificeerbare informatie uit de dataset zal worden verwijderd.	☐	☐

Handtekeningen

_____	_____	_____
Naam van de deelnemer	Handtekening	Datum

Ik heb het informatieblad nauwkeurig aan de potentiële deelnemer voorgelezen en mij er, naar mijn beste vermogen, van vergewist dat de deelnemer begrijpt waarmee hij/zij vrijwillig instemt.

_____	_____	_____
Onderzoeker Karlijn de Jong	Handtekening	Datum

Contact gegevens voor meer informatie:

Karlijn de Jong

+31 6 40 99 61 48

K.J.dejong-1@student.tudelft.nl

3. TAM
3.1 Intructions + 3.2 Questions

Technology Acceptance Model (TAM)

Date:
Time:
Participant:

The Technology Acceptance Model (TAM) is designed to give you an opportunity to rate the Smart Glasses' usefulness and ease-of-use.

To as great an extent as possible, think about all the tasks that you do with the Smart Glasses while you answer these questions.

Please read each statement and indicate how strongly you agree or disagree with the statement. Please read the statements carefully, but don't spend a lot of time on each item – your first impression is fine.

	Extremely agree	Quite agree	Slightly agree	Neither	Slightly disagree	Quite disagree	Extremely disagree
1.Using the Smart Glasses in my job enables me to accomplish tasks more quickly than other products in its class							
2.Using the Smart Glasses improves my job performances							
3.Using the Smart Glasses in my job increases my productivity							
4.Using the Smart Glasses enhances my effectiveness on the job.							
5.Using the Smart Glasses							

makes is easier to do my job.							
6.I have found Smart Glasses useful in my job.							
7.Learning to operate the Smart Glasses was easy for me.							
8.I found it easy to get the Smart Glasses to do what I want it to do.							
9.My interaction with the Smart Glasses has been clear and understandable							
10.I found the Smart Glasses to be flexible to interact with							
11.It was easy for me to become skillful at using the Smart Glasses							
12.I found the Smart Glasses easy to use							

4. UEQ

4.1 Intructions + 4.2 Questions

Please make your evaluation now.

For the assessment of the product, please fill out the following questionnaire. The questionnaire consists of pairs of contrasting attributes that may apply to the product. The circles between the attributes represent gradations between the opposites. You can express your agreement with the attributes by ticking the circle that most closely reflects your impression.

Example:

attractive	○	⊗	○	○	○	○	○	unattractive

This response would mean that you rate the application as more attractive than unattractive.

Please decide spontaneously. Don't think too long about your decision to make sure that you convey your original impression.

Sometimes you may not be completely sure about your agreement with a particular attribute or you may find that the attribute does not apply completely to the particular product. Nevertheless, please tick a circle in every line.

It is your personal opinion that counts. Please remember: there is no wrong or right answer!

Please assess the product now by ticking one circle per line.

	1	2	3	4	5	6	7		
annoying	○	○	○	○	○	○	○	enjoyable	1
not understandable	○	○	○	○	○	○	○	understandable	2
creative	○	○	○	○	○	○	○	dull	3
easy to learn	○	○	○	○	○	○	○	difficult to learn	4
valuable	○	○	○	○	○	○	○	inferior	5
boring	○	○	○	○	○	○	○	exciting	6
not interesting	○	○	○	○	○	○	○	interesting	7
unpredictable	○	○	○	○	○	○	○	predictable	8
fast	○	○	○	○	○	○	○	slow	9
inventive	○	○	○	○	○	○	○	conventional	10
obstructive	○	○	○	○	○	○	○	supportive	11
good	○	○	○	○	○	○	○	bad	12
complicated	○	○	○	○	○	○	○	easy	13
unlikable	○	○	○	○	○	○	○	pleasing	14
usual	○	○	○	○	○	○	○	leading edge	15
unpleasant	○	○	○	○	○	○	○	pleasant	16
secure	○	○	○	○	○	○	○	not secure	17
motivating	○	○	○	○	○	○	○	demotivating	18
meets expectations	○	○	○	○	○	○	○	does not meet expectations	19
inefficient	○	○	○	○	○	○	○	efficient	20
clear	○	○	○	○	○	○	○	confusing	21
impractical	○	○	○	○	○	○	○	practical	22
organized	○	○	○	○	○	○	○	cluttered	23
attractive	○	○	○	○	○	○	○	unattractive	24
friendly	○	○	○	○	○	○	○	unfriendly	25
conservative	○	○	○	○	○	○	○	innovative	26

5. Interview script

Interview Protocol

Date:
Time:
Nr:
Researcher name:

- Introduce consent form
- Interview will be in Dutch. Answers will be translated.

Before we start with the interview and questions about the glasses I would like you to introduce yourself and ask you some questions about the current state of working.

Age :
Education:
Functions this moment:
Experience in healthcare:

Questions about the Status Quo:

1. Can you describe your day routine briefly?

2. How many patients do you see on a day?
    a. Do you also need to travel to patients? How much time does this take? (in min)

3. How much time do you spend on a patient in average (in min)?

4. What works well for you and what not so far?

5. Is everything planned throughout the day or are you flexible? Can you give an example?

6. How much time are you busy with preparations before and documentation after seeing a patient? (in min) and what do these preparations and documentation contain?
    a. Do you spend time on other activities?

7. If you need help or want a second opinion, how do you get it?

8. What do you bring with you when seeing a patient?

Questions about the Glasses:

9. When did you start using the glasses? How was it introduced?

10. Are you using the glasses? If so, for what use cases do you use them?

11. How often do you use the glasses?

12. How long do you use the glasses?

13. What do you think is useful with the glasses?

14. What do you think is a nuisance or a dealbreaker?

15. What is your experience with controlling the glasses?

16. Can you tell me more about your experience with charging and storing the glasses?

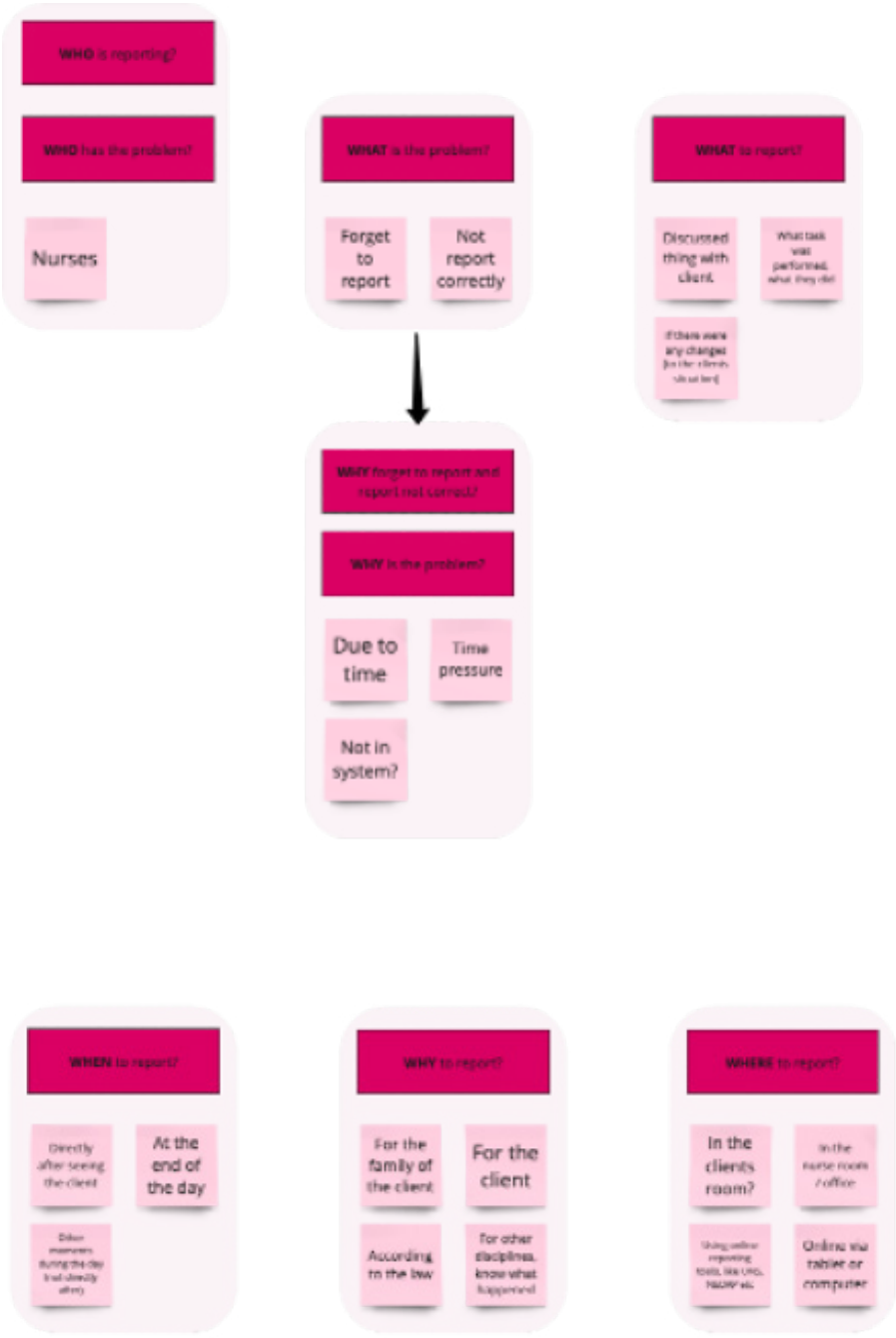
17. Can you tell me more about your experience with the Genzo application?
    a. What do you think of the connecting part?
        i. The WiFi.
        ii. The glasses with the app? The QR code?
    b. Do you make use of the other tools in the app?
    c. How do you find the person you want to call? How do you experience this?

18. What feature(s) would you like to have on the glasses?

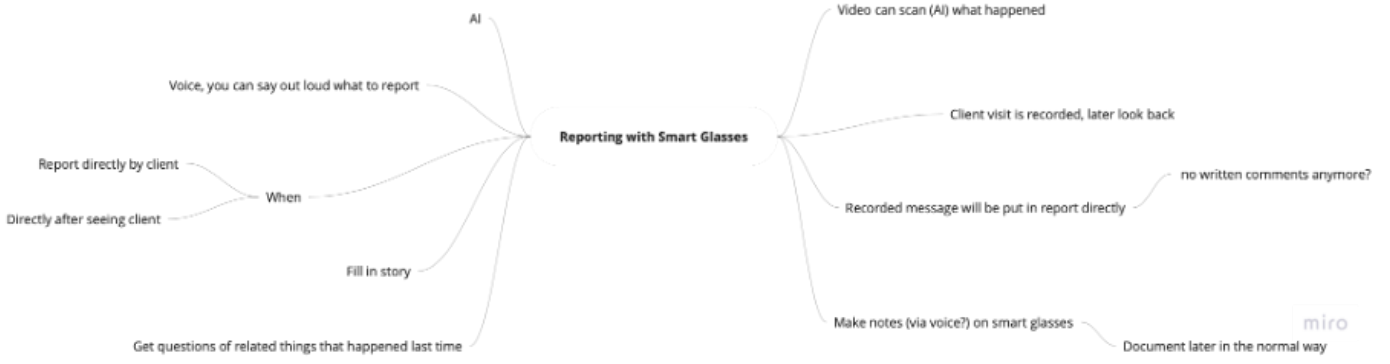
19. Is there anything you would like to add?

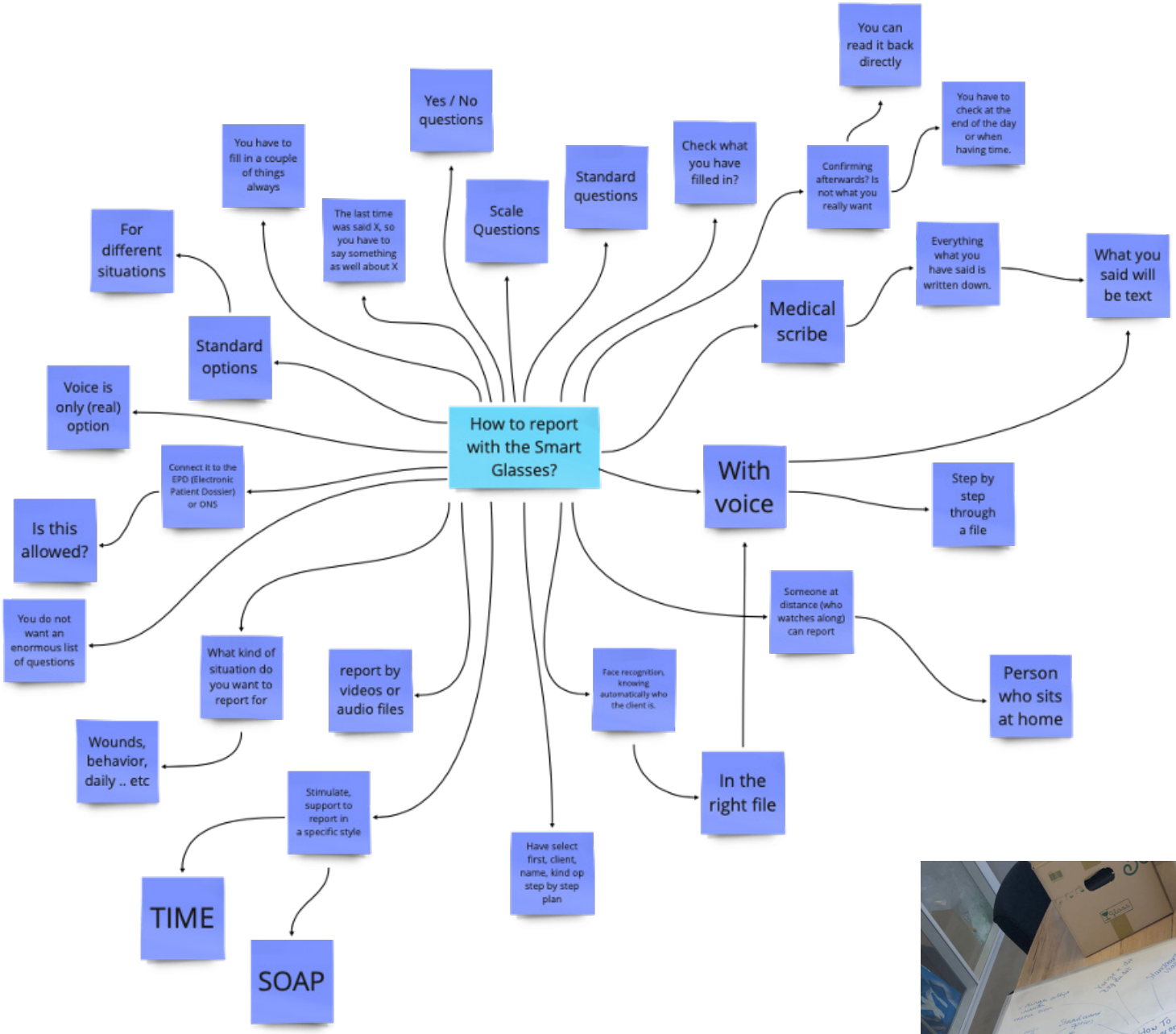
6. Design Sprint

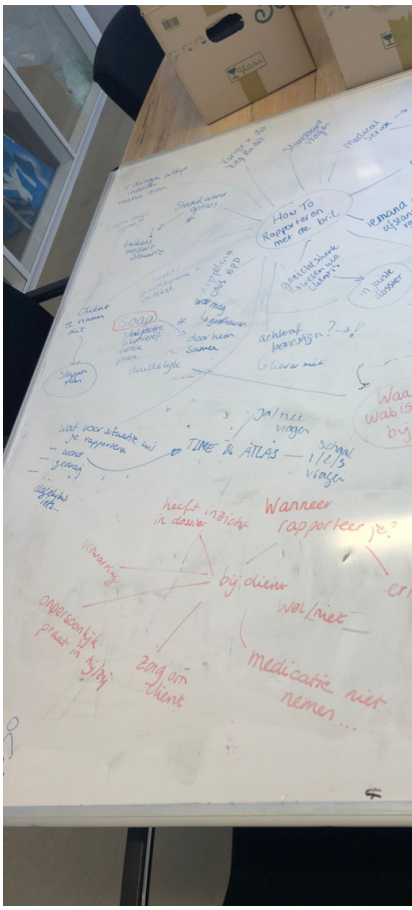
6.1 WWWWWH results

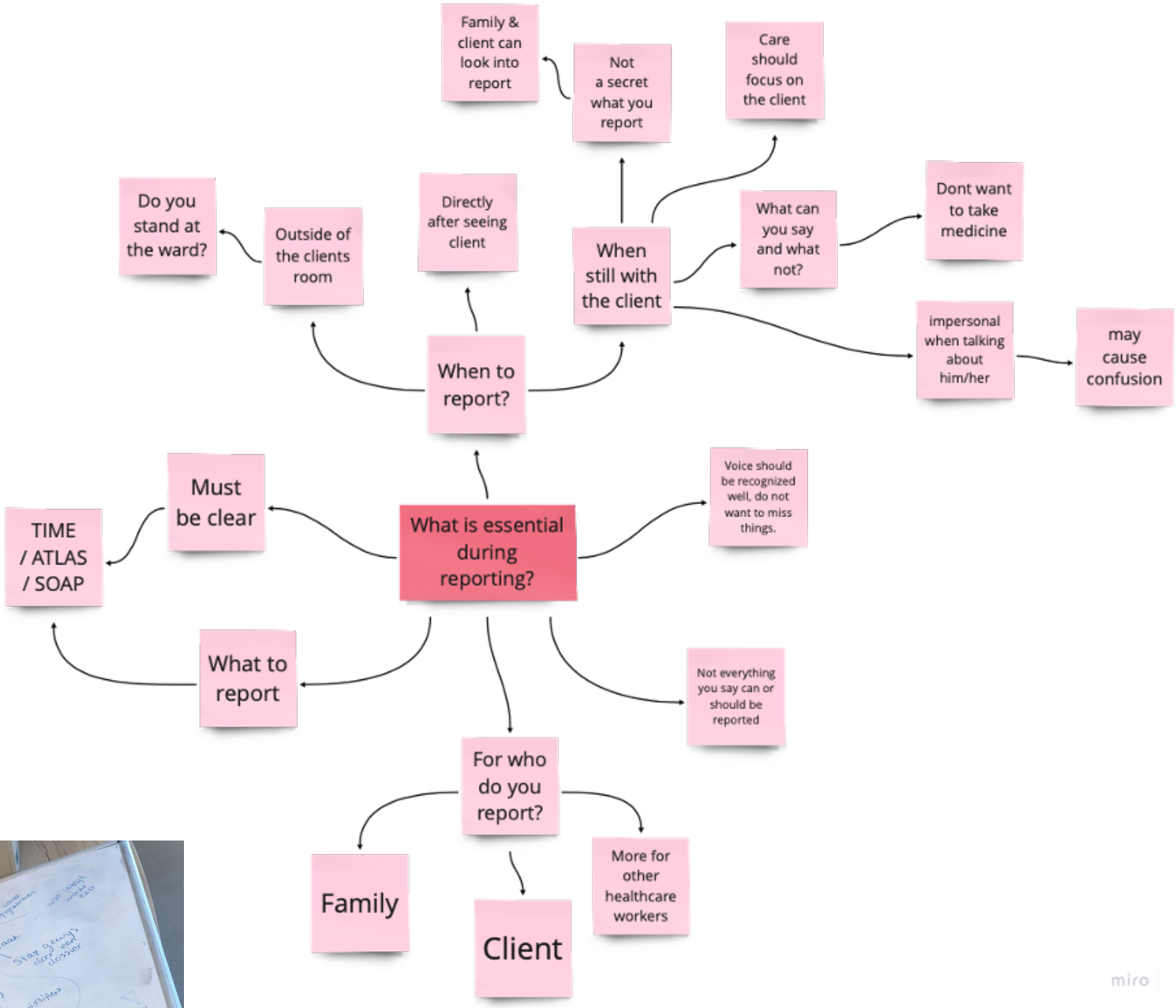


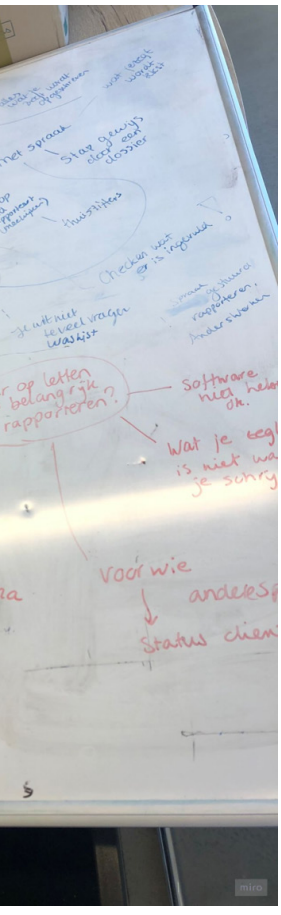
6.2 Brainstorm results




How to report with the Smart Glasses?
Yes / No questions
You have to fill in a couple of things always
Scale Questions
Standard questions
Check what you have filled in?
You can read it back directly
You have to check at the end of the day or when having time.
Confirming afterwards? Is not what you really want
The last time was said X, so you have to say something as well about X
For different situations
Standard options
Voice is only (real) option
Medical scribe
Everything what you have said is written down.
What you said will be text
With voice
Step by step through a file
Connect it to the EPD (Electronic Patient Dossier) or ONS
Is this allowed?
You do not want an enormous list of questions
What kind of situation do you want to report for
report by videos or audio files
Face recognition, knowing automatically who the client is.
Someone at distance (who watches along) can report
Person who sits at home
Wounds, behavior, daily .. etc
In the right file
Stimulate, support to report in a specific style
Have select first, client, name, kind op step by step plan
TIME
SOAP




Family & client can look into report
Not a secret what you report
Care should focus on the client
Do you stand at the ward?
Outside of the clients room
Directly after seeing client
When still with the client
What can you say and what not?
Dont want to take medicine
When to report?
impersonal when talking about him/her
may cause confusion
Must be clear
TIME / ATLAS / SOAP
What is essential during reporting?
Voice should be recognized well, do not want to miss things.
What to report
Not everything you say can or should be reported
For who do you report?
Family
Client
More for other healthcare workers
miro



How to make reporting easier?

- Automatically
- What is said is recorded and automatically reported
- Easy short questions
- Clear questions
- Dots of info, what to say something about
- Easy and 1 platform, everything together
- Things are recognised with the glasses
- Things are copied from last time
- Client recognition, - this is state
- See for what you come - agenda - see a wound or for medication
- Fill in less
- Tick boxes for which things make sense
- When speaking, automatically notes are being made
- Yes / No questions
- No time pressure

How to not to forget to report?

- Alarm
- Out of room alarm
- posters
- notifications
- Cannot shut down the Smart Glasses after reporting
- fixed time schedules for reporting
- writing along during visit
- notes on glasses
- Notes during visit
- Reminders phone
- Special moment during the day
- Someone else reports
- Place at the ward where you have to report, close to client
- Buzzing
- Can not drink coffee
- You get a reward
- You get points

How to report more correctly?

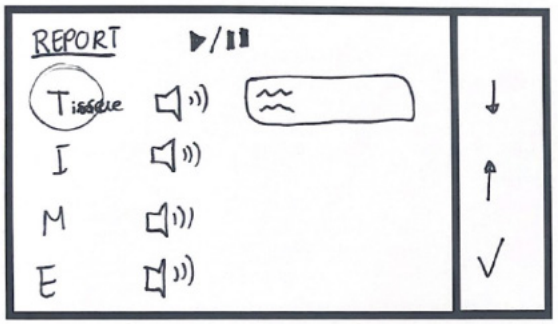
- Fill in questions
- You have to write complete sentences, otherwise, you cannot submit.
- Puntsgewijs, balletpoints
- Clear language
- Abbreviations are not allowed
- Have to follow strict steps
- Yes / No questions
- Someone has to check it
- You have to dubble check it
- Duration of filling has to be x amount of time.
- Have to answer all questions

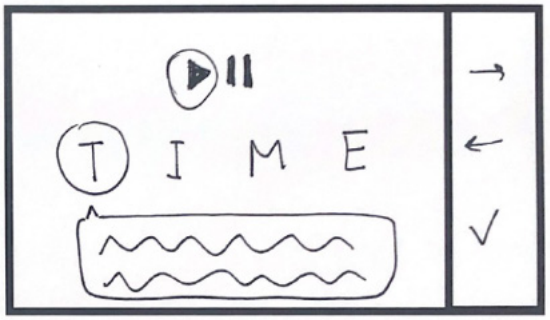
How to report faster?

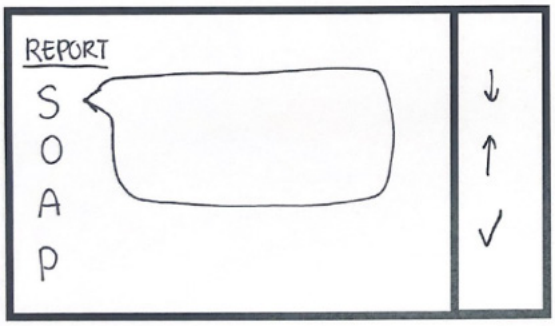
- Not writing long sentence
- YEs / no questions
- Not reporting
- Reporting is done automatically
- Voice recognition, report in audio files
- Do not have to check
- Voice recognition, report is made automatically
- Speak really fast
- Write only words, not full sentences

How to perform tasks easier after visit

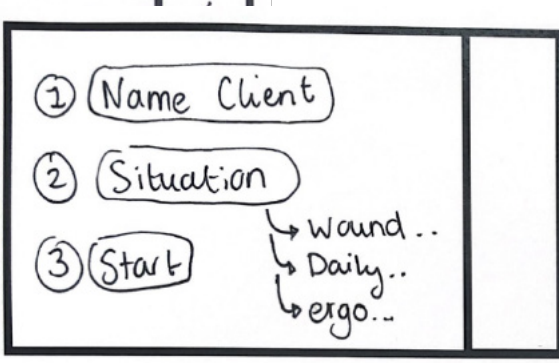
- Showing already what to to by what is discussed
- Showing what to do options
- Make notes list during visit with Smart Glasses
- Some things are done automatically, ordering medicines or mattresses , for example.
- Reminds you of thigns to do
- Notifications
- Is you have to call people, thos will pop up into your screen
- In agenda time is made for this (automatically?)

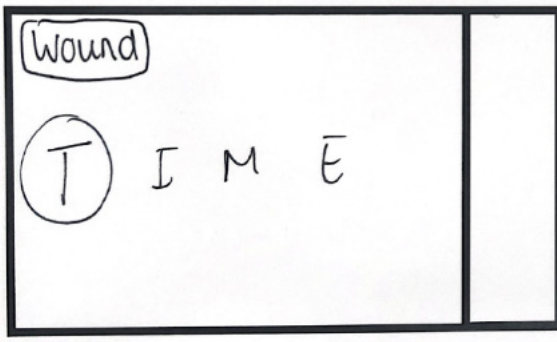

REPORT
Tissue
I
M
E

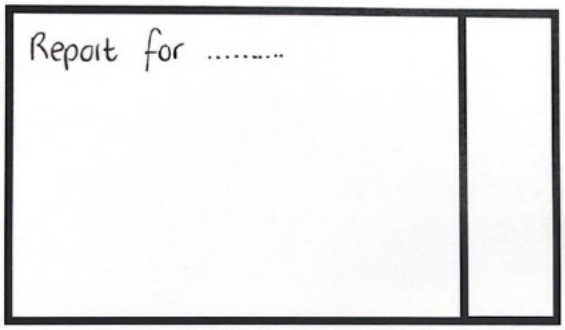

T I M E

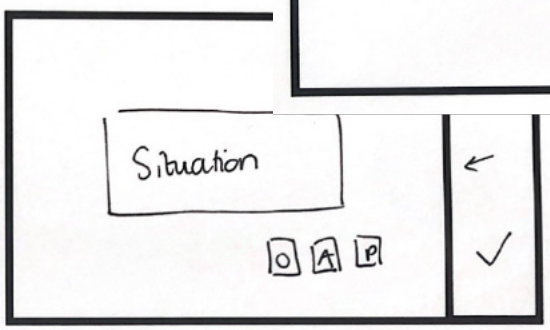

REPORT
S
O
A
P

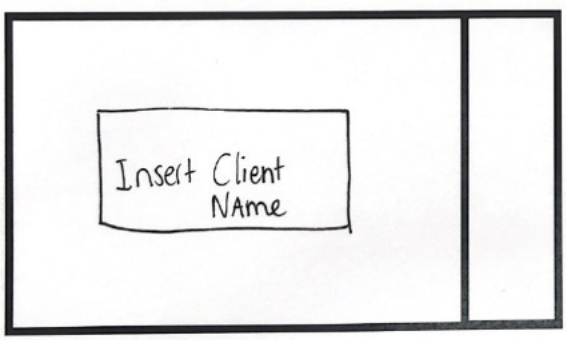
Reporting - DHR de vries
T I M E

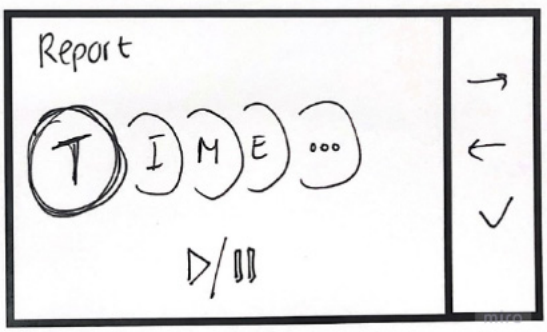

1 Name Client
2 Situation
3 Start
Wound..
Daily..
ergo..

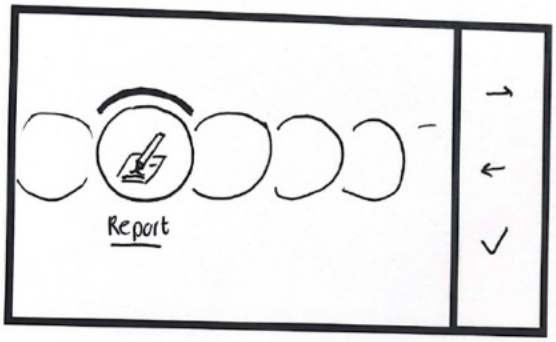

Wound
T I M E


Repoit for .....

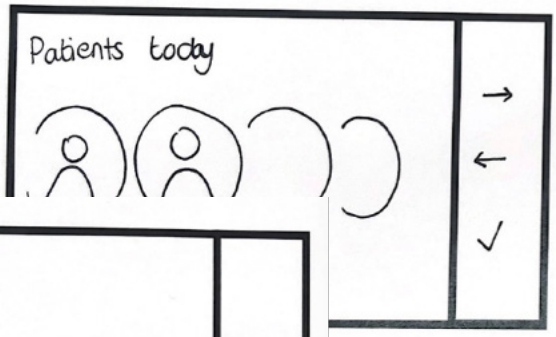

Situation
O A P

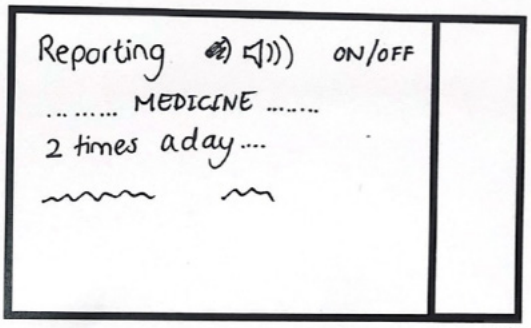

Insert Client
NAme

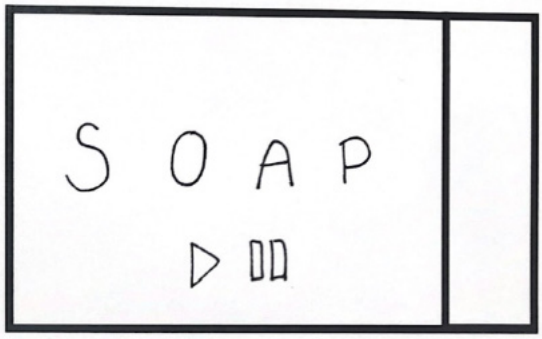

Report
T I M E ...

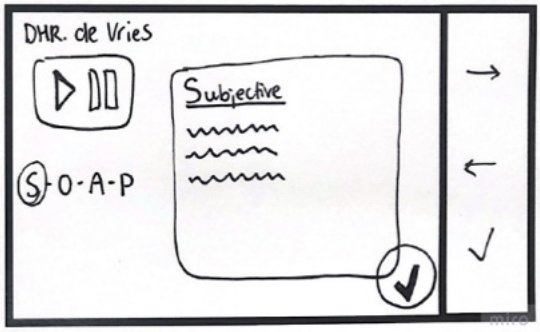

Report

NAME: DHR de vries
Report
information
MORE INFO

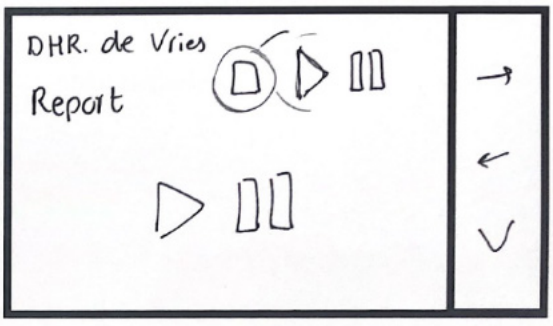

Patients today

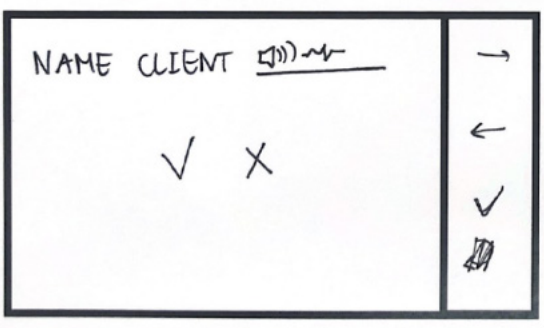

Reporting
ON/OFF
MEDICINE
2 times aday....

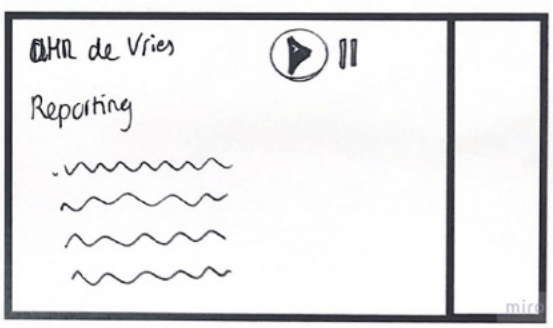
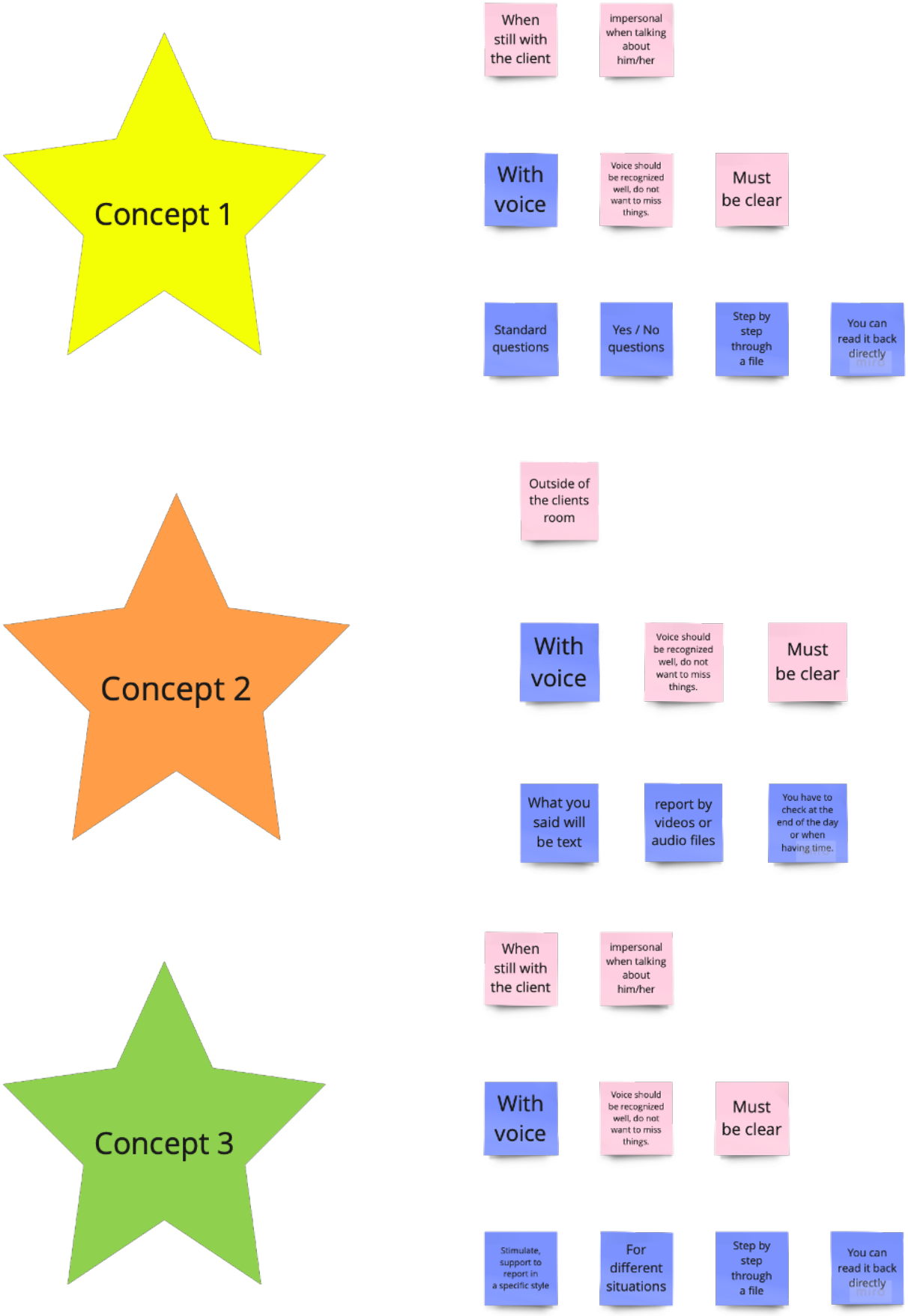

S O A P


DHR. de Vries
Subjective
S-O-A-P

CLIENT VISIT


DHR. de Vries
Report


NAME CLIENT


DHR de Vries
Reporting

6.3 Voting session