Anticipatory exploration in the evaluation of technology acceptance

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Human Technology Interaction

Anticipatory exploration in the evaluation of technology acceptance

Master Thesis

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Abstract

Intelligent healthcare technologies can improve care efficiency, but their successful implementation depends on acceptance by clients, informal caregivers, and formal caregivers. However, despite positive results in acceptance studies, healthcare technology adoption remains low. This may be due to the traditional approach that overlooks ethical and social considerations, leading to potentially inaccurate acceptance levels. This study investigates the impact of anticipatory exploration on the technology acceptance of a Decision Support System (DSS) for dementia caregivers. A scenario is used to visualize both the positive and negative ethical implications of the DSS. Additionally, it is explored if anticipatory exploration enhances the response validity of the technology acceptance. The study employs a cross-over design, with eight caregivers receiving anticipatory exploration in the first trial and six caregivers receiving the scenario in the second trial.

The findings revealed that caregivers perceived the scenario as valuable since it contributed to a better understanding of the DSS. Additionally, results indicated reduced trust levels due to the exposure of the scenario. Remarkably though, is the observation that caregivers tend to overlook ethical concerns and encounter challenges in forming opinions on ethical aspects. Although in hindsight, they do acknowledge the importance of addressing ethical concerns during the evaluation process. Explorations for this occurrence are explored by employing the cognitive model of opinion forming, discussing potential biases in retrieving relevant information or forming judgments on ethical concerns.

This study highlights the importance of including anticipatory exploration when assessing technology acceptance to contribute to a more Responsible Innovation process. Furthermore, incorporating anticipatory exploration has the potential to obtain more truthful technology acceptance levels and increase response validity, ultimately ensuring that technology is less likely to be shelved after implementation. However, further research is needed to determine the appropriate strategy for incorporating anticipatory exploration into the evaluation process.

Keywords: Technology acceptance, response validity, anticipatory exploration, Responsible Innovation, ethical concerns, Decision Support System (DSS), Healthcare technologies,

Preface

The last project of my master's in Human Technology Interaction. How strange it will be to leave the Technical University of Eindhoven, which has been my home base for the past six years. Pursuing my studies here has been an absolute pleasure, and my passion for understanding and bridging the gap between technology and people has only grown stronger.

First, I want to thank Peter Ruijten-Dodoiu for his guidance during this project, as well as his mentorship over the past two years. I highly value our shared interest in exploring human behavior in the context of technology. I am grateful for both the valuable feedback on my master's thesis and for stimulating my personal growth. Furthermore, I am grateful for him introducing me to Vilans.

Vilans has given me a warm welcome. The HAAL team has been truly amazing, and I would like to express my gratitude to each and every one of the team members for making my internship an exceptionally rewarding experience. I have been fortunate to witness a truly remarkable working environment. I am especially grateful to Sima Ipakchian Askari for her exceptional support. Her insightful feedback, our fiery sparring sessions, and shared laughter during work have brought me so much joy, inspiration, and personal growth.

Furthermore, I would like to express my sincere appreciation to Dirk Lukkien for sparking my interest in Responsible Innovation. Within the first five minutes of being in the office, we delved into a conversation on the importance of Responsible Innovation. Additionally, of course, I would like to express my gratitude to Henk Herman, whose harmonious leadership skills and profound knowledge I deeply admire.

I would also like to thank the caregivers for their generosity in participating in my research. It has been my pleasure to engage in conversations about their visions for the use of technology in healthcare.

Lastly, I could not have undertaken this journey without the support from my immediate environment. A special shout-out goes to my fellow student, Ilana. We got to know each other at the start of our bachelor's in Psychology and Technology. It fills me with pride to stand together at the finish line six years later. I would also like to express my sincere appreciation to Tom, my family, and my friends for their unwavering support throughout this journey.

Contents

Chapter 1

Introduction

1.1 Background

The rapid increase in the aging population and persistent reports of a growing workload in the healthcare sector have highlighted the pressing need for innovative solutions (Gielen, 2022). The largest industry in the Netherlands, healthcare, faces significant personnel shortages that are expected to worsen in the coming years (Ministerie van Volksgezondheid, Welzijn en Sport, 2022). In response, researchers, designers, and tech companies are actively exploring the development and implementation of intelligent healthcare technologies due to their potential to enhance care efficiency. The healthcare technologies can be divided into various categories, including among others; monitoring-, routine structure-, and rehabilitation technology (https://www.vilans.nl/kennisbank-digitale-zorg). For instance, a medicine dispenser is an example of routine structure technology, saving 22 minutes of care per client per day (Vermeend & Zwerver, 2023). Whereas an interactive watch introduced by a healthcare facility in the Netherlands can be classified as monitoring technology and resulted in a 38% decrease in clients' need for physical care from district nurses within months (de Goede, 2019). Additionally, smart incontinence equipment with monitoring technology reduces the need for 1,900 full-time jobs annually in the Netherlands alone (Nap et al., 2021). Moreover, the rise of AI has led to an increased demand for a relatively new healthcare technology category, a Decision Support Systems (DSS), which assist caregivers in making informed decisions and therefore foster patient safety and cost reduction (Mahadevaiah et al., 2020). Although intelligent healthcare technologies hold promises for improving care efficiency, successful implementation depends on technology acceptance by clients, informal caregivers, and formal caregivers (Alaiad & Zhou, 2014).

Emerging technologies, such as a DSS, cannot deliver improved organizational effectiveness if they are not accepted and used by potential users (Avis et al., 1996). Although a large body of literature shows positive results of technology acceptance of healthcare technologies, such as the therapeutic robot Paro (McGlynn et al., 2017) and the humanoid social robot Mathilda (Khosla et al., 2017), in reality, the uptake of healthcare technologies is relatively low (Shibl et al., 2013,). This raises the question, of what causes the low success rate of technology implementation. A survey conducted by the Dutch healthcare firm CZ provided a possible explanation for the low success rate of care technologies. Results of the survey identified a lack of support from clients, informal caregivers, and formal caregivers (van Gaalen, 2023). There seems to be a disparity between the obtained technology acceptance by research and the actual willingness to use the technology in practice. This disparity might be attributed to the current

approach to obtaining technology acceptance since it neglects on ethical and societal impact (He et al., 2022).

Technology has developed rapidly and became deeply embedded in our lives making ethics and social impact increasingly relevant factors for technology acceptance (Kumar et al., 2023; Verbeek & Tijink, 2020; Wu et al., 2014). Despite research showing promising results of technology implementation in the healthcare sector, the implementation can also result in various societal challenges. For example, when looking at smartwatches and fitness trackers. While these popular devices can provide insights into health metrics and contribute to one's well-being, there is a risk of individuals becoming obsessively focused on tracking their health status (Attig & Franke, 2020). Similarly, care robots are intended to assist individuals with healthcare needs. For instance, PARO, a therapeutic robot, is used to provide companionship and emotional support to elderly individuals in care settings. However, concerns have been raised regarding the potential dehumanization of care (Zardiashvili & Fosch-Villaronga, 2020). Furthermore, when it comes to AI in healthcare, while AI decision support systems can provide valuable assistance to healthcare professionals in making diagnoses, treatment recommendations, and care management decisions, their use is not without challenges. Over-reliance on AI decision support systems can diminish the critical thinking skills and clinical judgment of healthcare professionals. Relying heavily on algorithms without considering the broader clinical context or patient-specific factors can lead to a decrease in human expertise and an increased potential for errors or missed opportunities in diagnosis or treatment (Magrabi et al., 2019; Sutton et al., 2020). Additionally, AI algorithms often operate as "black boxes," making it difficult to understand the reasoning behind their recommendations or decisions. This lack of transparency raises concerns about the accountability of AI systems in healthcare (Zihni et al., 2020). Moreover, AI decision support systems require access to significant amounts of sensitive patient data to function effectively. The collection, storage, and transmission of this data raise concerns about privacy and security (Magrabi et al., 2019; Sutton et al., 2020).

Despite consistent studies highlighting the significance of ethics and social norms in healthcare technologies they are still not considered in the current methodology of technology acceptance evaluation. He et al. (2022) criticized the existing technology acceptance models for socially assistive robots (SARs) for their failure to incorporate ethical and social norms. Moreover, it is emphasized that further research is necessary to explore alternative assessment tools in addition to questionnaires, to enhance the accuracy of the evaluated user acceptance levels.

1.2 'Traditional' methodology for obtaining technology acceptance

Although the importance of ethics is known, ethics is often not considered in the methodology for obtaining technology acceptance, rather it focuses on functional aspects. The general methodology for evaluating technology acceptance is by first introducing the technology by explaining its purpose and functionalities. Afterward, participants are asked to interact and perform tasks with the technology, including for example having a conversation or playing bingo or cardgames with a socially assistive robot (Khosla et al., 2017; Louie et al., 2014) or trying out the functions of a Decision Support System (Al-Rahmi et al., 2019). Lastly, participants are asked

to complete an acceptability questionnaire based on the technology acceptance models, such as the most prominent models TAM (Davis, 1989) or UTAUT (Venkatesh et al., 2003). However, the TAM and UTAUT do not consider the societal factors that influence technology adoption (He et al., 2022; Sobhanmanesh et al., 2023). Therefore, over time, new models were developed or tailored toward a more specific user group or category of technology since technology got more diverse and implemented in various aspects of our daily live (e.g. Chen & Chan, 2014; de Graaf et al., 2019; Heerink et al., 2010). An example is the Almere model of technology acceptance which is tailored to test the acceptance of assistive social agents by elderly users (Heerink et al., 2010). It addresses new components such as 'trust' and 'anxiety' to account for the social aspects of interaction. Some of the proposed questions for this model are cited below:

The robot would make life more interesting (attitude towards technology)
I would follow the advice the robot gives me (trust)
If I should use the robot, I would be afraid to make mistakes with it (anxiety)
I think the robot is useful to me (perceived usefulness)

However, participants may not have a comprehensive understanding of the technology due to the lack of information on ethics and societal impact throughout the evaluation process. The traditional approach to obtaining technology acceptance primarily focuses on practical aspects during the introduction and task performance. As a result, there are concerns about the accuracy and truthfulness of responses to the technology acceptance questionnaire, also known as response validity (Ryan et al., 2012) Insufficient attention is given to exploring the potential implications and ethical concerns associated with its use. Certain questionnaire components, such as trust, are even closely tied to ethical considerations. Trust dynamics between humans and technology are complex and involve cognitive assessments of risk and benefits, including privacy, reliability, and security (Kumar et al., 2023). Without understanding the broader context of the technology, it becomes challenging to respond to these statements accurately. The narrow focus of the traditional methodology disregards the broader operational context and potential societal impact of the technology. This raises the question of whether participants can provide truthful responses to the technology acceptance questionnaire without being well-informed about the broader holistic perspective of the technology.

1.3 Responsible Innovation and anticipatory exploration

An approach that strives to integrate ethics and consider the societal impact during the innovation process is Responsible Innovation (RI). To elaborate, the term Responsible Innovation refers to the approach of innovation that emphasizes, ethical, social, and environmental considerations throughout the entire innovation process (Stilgoe et al., 2013). Responsible innovation is gaining momentum, partly since modern technology raises more ethical questions among the public, such as: *What happens to the personal data in the system? What do robots do to people's autonomy and privacy? Who is responsible if something goes wrong?* (Verbeek & Tijink, 2020). Despite the growing interest in RI, there remains a lack of both collective meaning and understanding of the implementation of RI (Lubberink et al., 2017). To implement RI into practice, Owen et al. (2013) proposes four process-oriented principles that should guide technology research and development: (1) *anticipation* on the potential

positive and negative implications; (2) *inclusion* of users and other stakeholders; (3) *reflexivity* of actors upon their own practices, assumptions, values and interests; and (4) *responsiveness* to insights that emerge during the innovation process.

According to the principles of RI, it is crucial to identify and create awareness on the various positive and negative implications regarding ethical concerns, known as anticipatory exploration (Fraaije & Flipse, 2020; Stilgoe et al., 2013). This ensures that the development and deployment of new technologies are aligned with societal needs and values of the user (Koops, 2015). Since technology got more intertwined with society, and its capabilities increase, having the power to produce both benefits and harm, it is essential to include ethical considerations when innovating a new technology (Burr et al., 2020). A concept that highlights the challenge of controlling technology's societal impact is the Collingridge dilemma (Tigard, 2022) In the early stages of the development and implementation of a technology, it is relatively easy to make changes and exert control over its design and use. However, at this stage, the full implications and potential risks of the technology are not yet well understood or apparent. On the other hand, once the full impact and consequences of a technology become more evident and measurable, it is often too late to make significant changes or control its use effectively. By this time, the technology has become deeply embedded in society, and its effects are widespread. This dilemma emphasizes the importance of implementing anticipatory exploration in the early phases of the development of technology as it still allows for flexibility and the potential to make necessary adjustments. By investigating the important ethical values of users and identifying which negative societal implications should be avoided at all costs, the negative impact on society can be limited in the long run.

Stilgoe et al. (2013) have established a framework for responsible innovation, providing an overview of techniques and approaches to address its various dimensions. Anticipation, one of these dimensions, can be supported among others, by the use of scenarios in the innovation process. Scenarios serve as valuable tools for systematically and comprehensively analyzing the future landscape by identifying potential risks and benefits. Several studies have successfully employed scenarios to contextualize realistic examples of healthcare innovations, facilitating better-informed decision-making (Antes et al., 2021; Lukkien et al., 2023). Therefore, the use of scenarios as anticipatory exploration has the potential to create awareness on the ethical and social implications of the technology.

1.4 RI challenges in prominent approaches

While certain approaches like Human-Centered Design (HCD) and co-design seem to align with Responsible Innovation (RI) principles, there has been increasing criticism regarding their limited societal impact and lack of consideration for ethical aspects. Van Velsen et al. (2022) discuss several limitations in current HCD practices for eHealth innovation, noting the tendency to overlook ethical and societal aspects. HCD practices primarily focus on individual users, their context, needs, and expectations for specific tasks and goals, resulting in a prioritization of the individual level while neglecting the broader societal level. In addition, the study conducted by Lukkien et al. (2023) stands out as one of the few studies emphasizing the importance of incorporating anticipatory exploration into the innovation process. This empirical study

examines how the co-design process of an AI-based decision support system (DSS) for dementia caregivers can be enhanced through anticipatory exploration. The findings demonstrate that anticipatory exploration not only provides valuable insights into users' ethical concerns beyond the co-design process but also leads to more detailed answers and practical suggestions for meeting requirements. By integrating anticipatory exploration into the innovation process, a more holistic perspective can be achieved, allowing for a more comprehensive understanding of users' ethical and societal needs in innovation.

1.5 Response validity

Although studies on Responsible Innovation (RI) emphasize the importance of addressing ethical and societal implications in the innovation process, its implementation is still lacking in the current methodology for evaluating technology acceptance. Moreover, the validity of the responses to the statements of the technology acceptance questionnaire can be called into question when participants are not provided with a holistic perspective of the technology.

The interdisciplinary field of Cognitive Aspects of Survey Methodology (CASM) focuses on investigating response validity by exploring how respondents process their thoughts, perceptions, and experiences when answering survey questions (Ryan et al., 2012). The four-stage cognitive model by Tourangeau (2003) is the most frequently cited framework for describing the cognitive process of opinion forming to survey questions (Hubley & Zumbo, 2017). It states that in order to construct a validated response, respondents need to (1) comprehend the question, (2) retrieve relevant information, (3) form a judgment and (4) translate this judgment into the format of the question (Figure 1).

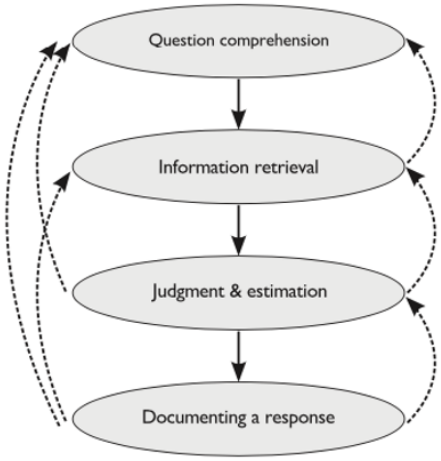


Figure 1. A four-step model of cognitive processing in answering questions (Tourangeau, 2003)

A previous study conducted by Sekhon et al. (2022) has identified challenges in answering questions within an acceptability questionnaire for health interventions. The study revealed that questions related to ethics, self-efficacy, and those that were prospectively formulated were perceived as less comprehensible and answerable compared to questions related to the burden, perceived effectiveness or opportunity costs (Sekhon et al., 2022). However, the study does not provide an explanation for these difficulties, nor does it explore potential methods to improve the comprehensibility and answerability of the questions.

The inclusion of anticipatory exploration in technology acceptance evaluation has the potential to enhance response validity. According to the four-stage cognitive model of opinion formation, the absence of anticipatory exploration can introduce biases in the retrieval and judgment stages. Without addressing the relevant ethical aspects crucial for opinion formation, there may be insufficient information available for retrieval. Given the rapid increase in complexity and societal impact of modern technology, it becomes crucial to keep people well-informed about the relevant issues surrounding it. Neglecting such information complicates the judgment process as respondents may need to make inferences when faced with missing or incomplete information (Ryan et al., 2012). Furthermore, forming an opinion on ethical issues is inherently challenging due to the frequent intertwining of technology with conflicting values and ethical dilemmas (Verbeek & Tijink, 2020). Ethical dilemmas often involve making trade-offs, where choosing one aspect may come at the expense of another. For instance, when it comes to monitoring healthcare technologies, there is a well-known trade-off between gathering accurate information for ensuring safety and protecting clients' privacy (Verbeek & Tijink, 2020). Therefore, it becomes crucial to educate people effectively about these trade-offs in order to foster well-considered opinions.

1.5 Case study: HAAL project

The study is conducted within the project of HeAlthy Aging eco-system for peopLe with dementia (HAAL) project.[1] The international HAAL consortium[2] develops a Decision Support System (DSS) dashboard that integrates various types of data about persons with dementia such as; physical activity, eating and sleeping patterns, cognitive functioning, mood, social contact and medication intake. These data can be collected through various healthcare technologies. By structuring and visualizing the data in the dashboard, the formal caregiver will have a clear overview of the health status of the person with dementie. Additionally, over time, the DSS should also recommend the formal caregivers on potential care strategies. The aim of the project is to reduce the workload of formal dementia caregivers and increase the quality of care.

The evaluation of technology acceptance of DSSs follows the traditional methodology, neglecting the exploration of the implications of the DSS. However, numerous studies have highlighted the importance of ethical-related aspects for DSS such as; trust, privacy, accountability, transparency and safety (Kumar et al., 2023; Rosada & Hernandez, 2020; Saheb et al., 2021). A brief review of the literature revealed that the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) are the most prominent used models for assessing the acceptance of DSSs (Aljarboa & Miah, 2020; Al-Rahmi et al., 2019; Choudhury, 2022; Rosada & Hernandez, 2020; Shibl et al., 2013). Other studies modify the technology acceptance models by adding new factors such as trust and perceived security (Rosada & Hernandez, 2020), perceived risk (Choudhury, 2022), or by combining them with other theories such as the Task Technology Fit (TTF) (Aljarboa & Miah, 2020). However, no

[1] AAL Europe, 2021, Project number: AAL-2020-7-229-CP; https://www.haal-aal.com/

[2] The HAAL consortium consists of care organizations, research institutes and commercial firms from the Netherlands, Italy and Taiwan.

exploration of the implications regarding ethical concerns of the DSS is integrated in order to provide the user with a holistic perspective of the DSS.

1.6 Research aim

This case study aims to explore the impact of anticipatory exploration on the evaluation of technology acceptance. It is expected that including anticipatory exploration, by utilizing a scenario, will enhance caregivers' awareness of the potential positive and negative implications regarding ethical concerns. As a result, users will adopt a more holistic perspective on the technology, ultimately influencing technology acceptance. No assumptions are made regarding the direction of the effect of technology acceptance. The scenario could lead to a negative influence on technology acceptance as it brings to light previously unforeseen negative consequences. Conversely, it could also lead to a positive influence on technology acceptance, especially if users at first foresaw a lot of problems, but the scenario clarifies some of the taboos or uncertainties (Etemad-Sajadi et al., 2022).
The research question and hypotheses are as follows:

Research question 1:
What is the influence of anticipatory exploration on technology acceptance when evaluating a decision support system?

H1a: The addition of anticipatory exploration influences technology acceptance.

H1b: The addition of anticipatory exploration leads to adjusting opinions regarding technology acceptance.

Hypothesis 1a will be tested by comparing the technology acceptance scores between users who have been exposed to anticipatory exploration and those who have not. Furthermore, qualitative analyses will be conducted to gain additional insights into the reasoning behind the determined technology acceptance levels. Regarding hypothesis 1b, the study will investigate whether anticipatory exploration induces changes in individuals' technology acceptance. Therefore, the evaluation of technology acceptance will be carried out twice: once without anticipatory exploration and once with it.

Additionally, this study will investigate the influence of anticipatory exploration on the response validity. It is hypothesized that presenting users with a comprehensive overview of ethical implications will positively affect the response validity of caregivers when completing the technology acceptance questionnaire. This expectation stems from the belief that anticipatory exploration will enhance the retrieval and judgment stage of the cognitive model of opinion formation, ultimately resulting in a positive influence on response validity.

Research question 2:
What is the influence of anticipatory exploration on the response validity of technology acceptance when evaluating a decision support system?

H2a: The addition of anticipatory exploration leads to a more easily perceived evaluation of technology acceptance.

H2b: The addition of anticipatory exploration leads to more in-depth argumentations in formulating opinions on technology acceptance.

To test hypothesis 2a, a questionnaire enclosing both open and closed-ended questions is designed to evaluate the various stages of the cognitive model of opinion formation. The responses from users who have been exposed to anticipatory exploration are compared with those who have not. In addition, qualitative analyses will be conducted to gain further insights. Furthermore, for addressing hypothesis 2b, the open-ended questions will be analyzed based on the topics addressed and the level of detail provided in the responses.

Chapter 2

Method.

The aim of the study is to gain more insights into the relation between anticipatory exploration and technology acceptance when evaluating a DSS in healthcare. To account for anticipatory exploration, a scenario was employed, illustrating both the positive and negative implications of the HAAL dashboard. In order to examine potential order effects, participants underwent two trials, with one of the trials involving exposure to the scenario. Results were assessed by a technology acceptance questionnaire and a self-constructed questionnaire based on the four stages of the cognitive model of opinion forming.

2.1 Participants

Participants were either recruited via healthcare institution Livio (located in Enschede and partner in the HAAL project) (https://www.livio.nl), and via personal network. The selection criteria to participate in the experiment was to have experience as a formal caregiver of people with dementia. No distinction was made between being a formal caregiver working in either homecare (extramural) or a healthcare facility (intramural). Although the HAAL project in the Netherlands is mainly focused on extramural care, the HAAL dashboard can also be implemented in healthcare facilities, as is done in Taiwan. Therefore, to broaden the target group the decision was made to include formal caregivers of people with dementia in both extramural and intramural care. In total, 16 participants took part in the experiment. The total years of experience as a formal caregiver ranged between 1 and 22 years, with an average of 8 years and a standard deviation of 5.35. 12 Caregivers reported working in extramural care, while 4 caregivers reported working in intramural care. Furthermore, 8 participants reported working as a 'district nurse', 4 participants reported working as a 'healthcare assistant' and 4 participants reported 'others'. Also, 5 of the participants participated in the interview of approximately 15 minutes.

2.2 Design

The design of the study was a cross-over design with the scenario as manipulating factor (see Figure 2). A cross-over design randomizes the order of the scenario and makes it possible to check the manipulation within and between subjects. The independent variable is the scenario, whereas the dependent variables are the technology acceptance and the four stages of the cognitive process for forming an opinion; comprehension, retrieval, judgment and response. A cross-over design normally contains a washout phase to eliminate the effects of the previous trial and allow a return to baseline before the start of the next trial. However, due to the restricted time of the study, no washout phase was implemented between the two trials.

Furthermore, the tasks are counterbalanced in the design, in order to rule out a potential order effect of the assigned tasks.

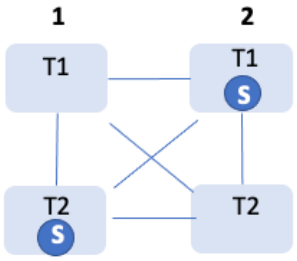


Figure 2. The cross-over design of the study.

Table 1. Further explanation of the design

Group 1	Group 2
Introduction video	Introduction video
Task 1 (or 2)	Task 1 (or 2)
x	Scenario video
Evaluation trial 1	Evaluation trial 1
Task 2 (or 1)	Task 2 (or 1)
Scenario video	x
Evaluation trial 2	Evaluation trial 2
Interview (some of the caregivers)	Interview (some of the caregivers)

2.3 Measurements

Questionnaire construction: Technology acceptance DSS

For this study, it was decided to follow up on the Almere model of acceptance, a technology acceptance model for socially assistive robots (SARs) (Heerink et al., 2010), instead of the often chosen TAM or UTAUT model. The Almere model includes factors that are important for technology acceptance of DSS, including attitude and trust (Rosada & Hernandez, 2020), and anxiety (Nezamdoust et al., 2022). Furthermore, perceived risk is added to the model due to its relevancy for DSS (Choudhury, 2022).

Questionnaire construction: Response validity

In the literature no validated questionnaire was found to assess the level of perceived difficulty of a questionnaire. Therefore, a new questionnaire was developed based on the four-stage cognitive model of (Tourangeau, 2003). Each stage contains three closed-ended questions and one open-ended question. The constructed questionnaire was evaluated by colleagues and fellow students. Also, a formal caregiver conducted a pilot test to evaluate the clarity of the constructed questions.

Semi-structured interview

To gain more in-depth insights in the perspectives of technology acceptance semi-structured interviews were conducted.

2.4 Materials and procedure

The study was conducted in an online setting. Participants received a personalized email, containing a link to the experiment and the name of the client that was assigned to them. They were given until the 7th of May 2023 to complete the online study. At the beginning of the experiment, participants were provided with an overall introduction to the HAAL project and the informed consent form. The experiment started with a list of social demographics questions. Afterward, the experiment followed the order as depicted in Table 1, depending on the the assigned group.

Using videos as a visualization medium can strengthen a message by providing a more engaging and impactful way to convey information (Esposito, 2009). Therefore, the video creation software Doodly (Doodly | Video Creation Software, 2023) was used to visualize the content of the introduction and scenario.

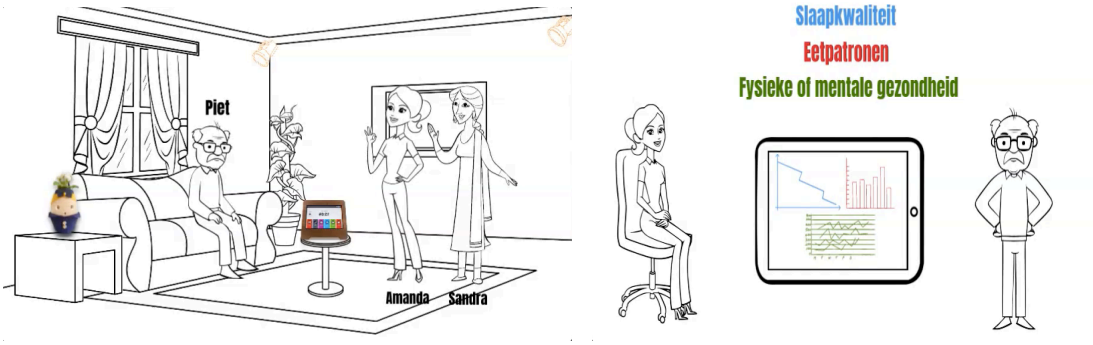


Figure 3. Scenes from the video constructed by using the software Doodly

Introduction video

All participants started off with an introduction video on the HAAL dashboard with similar information that would be provided in the 'traditional' methodology of evaluating technology acceptance. The content of the introduction video was carefully selected from the information on the HAAL project. Depending on the assigned group, participants either continued with the scenario video or the first task (see Table 1). The complete text used for the introduction video can be found in Appendix A3.

Scenario video

The scenario is used to represent anticipatory exploration, creating awareness of the potential negative and positive ethical implications of the HAAL dashboard. The scenario is constructed based on the findings of the study of Lukkien et al. (2023) and the six principles for responsible AI innovation, adopted from guidelines from the World Health Organization: autonomy, well-being & safety, transparency & explainability, responsibility & accountability, inclusiveness & equity, and responsiveness (WHO, 2021). The scenario highlights two main themes related to the implementation of the dashboard: 1) Quality of care 2) Efficient working (*HAAL*, 2021). The potential positive and negative impacts, along with their associated values, of the HAAL dashboard are discussed within these two main themes. Table 2 presents an overview of the various values and their relationship to the HAAL dashboard as presented in the scenario. The

complete text used for the scenario video can be found in Appendix A3. The ethical aspects were not explicitly mentioned in the scenario, since this would influence the thoughts of the caregivers too directly. The purpose of the scenario was to only stimulate thoughts on ethical considerations that are important to the caregivers. To make sure the scenario was not steering towards either a positive or negative attitude, an equal amount of arguments and words was used for both positive and negative implications. To validate the content of the scenario it was checked several times by project members of the HAAL project. Additionally, a pilot test was conducted with a formal caregiver to evaluate the effectiveness of the scenario (see 2.5 Pilot testing).

Table 2. overview of ethical aspects addressed in the scenario and interviews.

Autonomy	Even with the use of the HAAL dashboard, do you still feel that you have the autonomy to make your own decisions?
Well-being & safety	Does the use of the HAAL dashboard contributes to the quality of care and quality of life of the client?
Transparency & explainability	Is it clear for the user of the HAAL dashboard why certain decisions or actions are recommended?
Responsibility & accountability	Who is responsible or accountable if the advice of the HAAL dashboard was taken on, but turned out to be incorrect?
Inclusiveness & equity	The HAAL dashboard prioritizes clients based on urgency of care. Does this have consequences for the inclusiveness and equity of clients?
Privacy	The use of the HAAL dashboard makes it possible to monitor the client 24/7 in order the ensure safety. Does this outweigh the intrusion of the privacy of the client?

Tasks

Two tasks were incorporated into the HAAL dashboard to facilitate the assessment of technology acceptance. These chosen tasks aim to emphasize the main features of the dashboard, including identifying the problematic health domain of a client and identifying and responding to alarms. The full description of the tasks and screenshots of the HAAL dashboard can be found in appendix 1B.

After having completed the two trials, participants were asked if they were willing to participate in an interview of about 15 minutes via phone call. Additionally, they were asked to send an email to the researcher with bank account details so that the compensation of ten euros could be transferred. Finally, participants who did not participate in an interview received an email with the debriefing of the experiment.

Semi-structured Interview

Appointments for the interviews were scheduled via email. All interviews were conducted over the phone and were recorded. Formal caregivers were asked to elaborate on their perceived benefits and drawbacks of the HAAL dashboard, as well as on their thoughts on the distinction between the introduction video and the scenario video. The intention was to allow participants

to express themselves freely and provide them with the opportunity to raise any ethical considerations that they consider to be important. However, only in cases where such aspects were not initially discussed, the conversation was redirected to prompt participants to consider ethical implications as seen in table 2. The interviews lasted about 15 to 20 minutes.

2.5 Pilot testing

A pilot test was carried out with a formal dementia caregiver to check the validity of the study set-up. The questionnaires were evaluated as well as the introduction and scenario text. The tasks were not implemented in the dashboard yet and were therefore left out of the pilot test. The purpose of the scenario pilot test was twofold: firstly, to evaluate the authenticity of the scenario. This was crucial to ensure that the scenario accurately portrayed a typical day in the life of a formal dementia caregiver. Secondly, the pilot test was conducted to get a glimpse of the initial impact of the scenario. Specifically, it was sought to determine whether the inclusion of the scenario leads to more conscious thinking regarding ethical implications. Furthermore, the clarity of the questions was evaluated. The scenario was perceived as representative by the formal caregiver. However, as for the impact of the scenario, the formal caregiver mainly focused on practical aspects of the dashboard, such as its user-friendliness and compatibility with the existing systems, rather than ethical considerations. Only after some prompting did the caregiver begin to consider more ethical implications, including the importance of maintaining human dignity. The decision was made to adjust the introduction text of the experiment and include two extra questions asking for the potential advantages and risks associated with the implementation of the HAAL dashboard. These adjustments aimed to encourage caregivers to engage in a deeper reflection of their perspectives on the technology's implementation and go beyond practical guidance.

2.6 Data analysis

Qualitative analysis

For the qualitative data analysis, a conventional content analysis was performed on the open-ended questions and the five transcribed interviews using MAXQDA. Conventional content analysis is a specific type of content analysis that involves the subjective interpretation of textual data through a systematic coding and theme identification process (Hsieh & Shannon, 2005). This method was chosen as the most suitable approach for this study due to the limited availability of existing theory or research literature in the research field. Unlike using predefined categories, conventional content analysis allows the categories to emerge organically from the data itself. Moreover, it is particularly well-suited for data primarily collected through interviews and open-ended questions (Hsieh & Shannon, 2005). The data was analyzed using MAXQDA 2020 software for qualitative research. An overview of theme-coded interviews and open-ended question summaries can be found in Appendix 2A and 2B.

Data transformation

In order to test the hypotheses, new variables were derived from the questionnaire data. The technology acceptance score, attitude towards technology, comprehension, retrieval, judgment, and response were represented by calculating the averages of various items. Additionally, another variable was created to capture the difference in technology acceptance

scores between the two trials. The data was formatted in both long and wide formats in order the perform the various statistical tests in Stata17.

Hypotheses testing

To answer the hypotheses a mixed-method approach was used, combining both qualitative and quantitative data to enhance the reliability and validity of the results. Both Hypothesis 1a and Hypothesis 2a were tested using a multi-level analysis and a two-sample t-test. Multi-level analysis was used to account for the repeated measures of the data due to the two trials. Moreover, the two-sample t-test was conducted to solely analyse the dependent variables of the first trial. The aim was to examine the impact of various factors, such as the scenario, time period of the scenario, task, years of experience, and general attitude towards technology, on both technology acceptance and the four stages of the cognitive process involved in forming an opinion. Additionally, the results of the conventional content analysis were used to support the answers found from the statistical tests.

Hypothesis 1b was evaluated by conducting a two-sample t-test to examine the difference in responses provided in the technology acceptance questionnaire for trial one and trial two between two groups: those who had viewed the scenario in the first trial and those who had viewed it in the second trial.

Hypothesis 2b was tested by evaluating the differences in answers given to the open-ended question for trial one and trial two, based on the topics and the expansiveness of the provided answers.

Assumption checking

The assumptions for multi-level analyses were checked. This included testing for: 1) no multi-collinearity (using pwcorr and estat vif commands in STATA); 2) homoscedasticity (using imtest and hettest commands in STATA); 3) linearity; 4) independent errors (using predict e command in STATA) and; 5) the Hausman test (using Hausman command in STATA). Likewise the assumptions for a two-sampled t-test were addressed. This included testing for: 1) independency of the variables; 2) normality (tested by swilk and sktest commands in STATA); 3) homogeneity of variances (Levene's test, robvar in STATA) and; 4) random sampling.

Chapter 3

Results

The hypotheses were tested by combining the results from the quantitative analyses and the results from the qualitative analyses. Furthermore, additional exploratory research was conducted.

3.1 Descriptives

The caregivers were stratified into two distinct groups: group 1 and group 2. In the experimental design, group 1 received the scenario during the second trial, while group 2 encountered the scenario during the first trial (see Figure 4). In both groups, the order of tasks was randomized to mitigate potential bias. Upon careful examination of the collected data, it was discovered that one caregiver did not complete the second trial, and another caregiver provided 'neutral' responses for all questions. Consequently, it was decided to exclude these two cases from the analysis. As a result, group 1 consisted of six caregivers, whereas group 2 included eight caregivers.

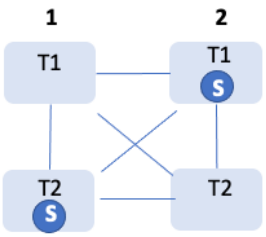


Figure 4. Study design

The bar chart presented in Figure 5 illustrates the technology acceptance scores of formal caregivers when exposed to the scenario in either trial 1 or trial 2. Upon careful examination of the chart, there appears to be no significant distinction in technology acceptance between individuals who were exposed to the scenario and those who were not. Furthermore, no observable order effect resulting from the exposure to the scenario can be observed. Moreover, the bar chart indicates a technology acceptance means around 3.5, assuming caregivers are slightly positive in their technology acceptance rating of the HAAL dashboard (see Table 3).

Similarly, Figure 6 shows the scores on the four stages of the cognitive process of opinion forming among formal caregivers when exposed to the scenario in either trial 1 or trial 2. After analysing the bar chart, no remarkable differences can be observed in the various stages because of the scenario exposure. Additionally, it is worth noting that there are no apparent

major issues in terms of comprehension, retrieval, judgment, or response stages, as indicated by the means not falling below 3 (indicating a neutral response).

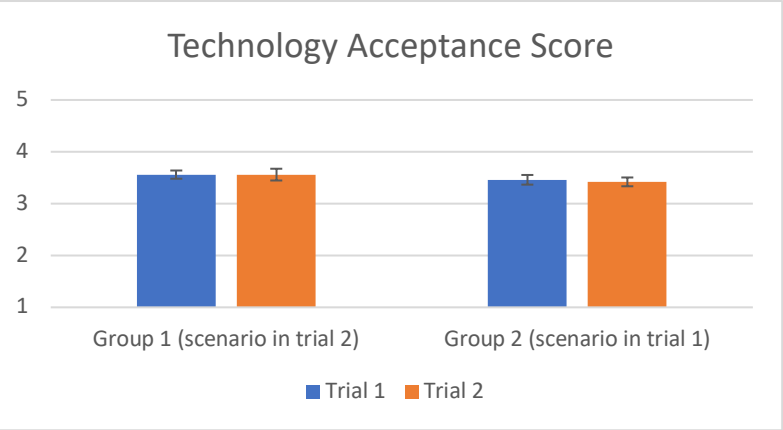
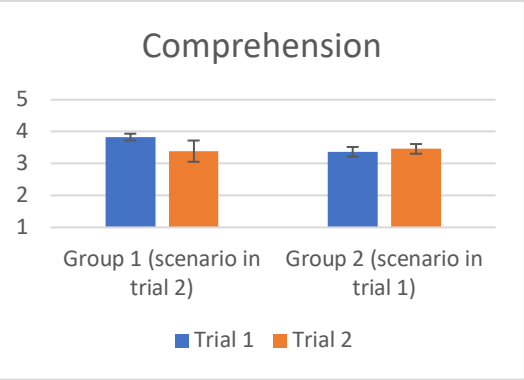


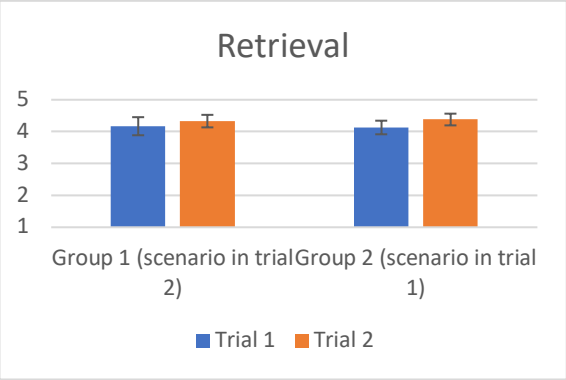
Figure 5. Technology acceptance scores of formal caregivers when being exposed to the scenario in either trial 1 or trial 2. The technology acceptance score is given for both trials.

Table 3. overview technology acceptance (TA).

		Group 1		Group 2	
		M	*SD*	*M*	*SD*
Technology acceptance	Trial 1	3.56	.22	3.46	.28
	Trial 2	3.56	.30	3.42	.24

Note. Group 1: scenario in trial 2. Group 2: scenario in trial 1.





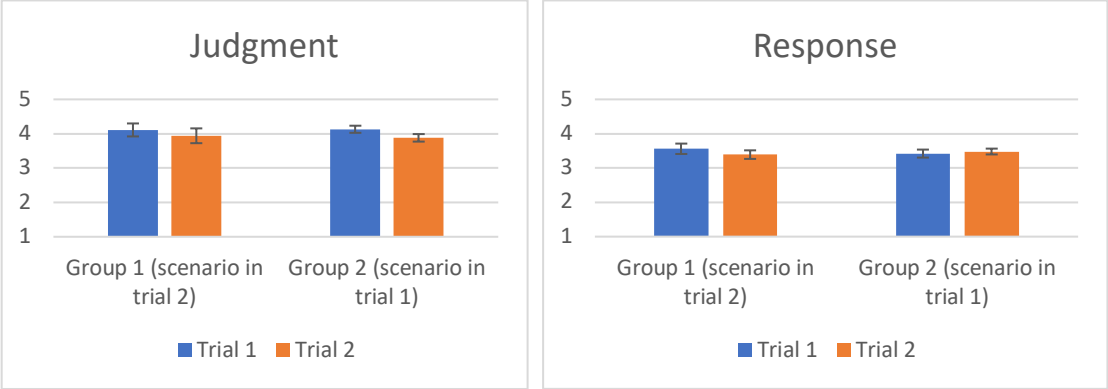


Figure 6. The scores for the four stages of the cognitive process of opinion forming of formal caregivers when being exposed to the scenario in either trial 1 or trial 2. The technology acceptance score is given for both trials.

Table 4. Overview stages of the cognitive process of opinion forming.

		Group 1		Group 2	
		M	*SD*	*M*	*SD*
Comprehension	Trial 1	3.83	.28	3.37	.45
	Trial 2	3.39	.88	3.46	.43
Retrieval	Trial 1	4.17	.75	4.13	.64
	Trial 2	4.33	.52	4.38	.52
Judgment	Trial 1	4.11	.50	4.13	.31
	Trial 2	3.94	.57	3.88	.31
Response	Trial 1	3.56	.40	3.42	.35
	Trial 2	3.39	.33	3.48	.24

Note: Group 1: scenario in trial 2. Group 2: scenario in trial 1.

3.2 Hypothesis testing

Hypothesis 1a:

The addition of anticipatory exploration influences technology acceptance.

H1a: quantitative analysis

A multilevel analysis was conducted to examine if the independent variables (scenario exposure, scenario in first or second trial, tasks 1 or 2, years of work experience and general attitude towards the technology) have a significant influence on the technology acceptance score. A multi-level analyses was used to account for the repeated measure of the technology acceptance since all participants conducted two trials.

First, the assumptions for the multi-level analyses were tested. All assumptions were met except for linearity since the plots presented a random cloud of data points. To both account for the small sample size (n=14) and the violation of linearity 'robust' was applied to the multi-level analyses. Robust statistical methods are designed to be less sensitive to these violations and can still produce valid inferences or estimates even when assumptions are violated. Next, it is checked if a multi-level analysis is indeed required by running the empty model. The rho is .75 (p<0.001) meaning that there is a large part of the variance, 75 percent, is explained on the individual level. Therefore, it is important to take the individual into account as a component of the model.

The results of the multi-level analyses revealed an overall R-squared of .33 with a corresponding p-value <0.001, suggesting that 33% of the variability in the technology acceptance could be explained by the independent variables included in the model. It is found that the trial in which the scenario was given, has a significant effect on technology acceptance (p= 0.028). Having seen the scenario in the second trial of the study led to an increase of .21 in the average technology acceptance. However, given the low sample size and the lack of support of the qualitative results, these findings are dismissed as individual differences.

The observation of the data suggested that participants approached the second trial less seriousness compared to the first. Therefore, it was decided to additionally perform a two-sample t-test specifically focusing on comparing the technology acceptance scores of the first trial. First, the assumptions for a two-sample t-test were tested. No assumptions were violated as such a two-sampled t-test was performed. The results revealed no significant difference in the mean of technology acceptance between group 1 and group 2 (t(12) = 0.67, p = 0.51). The mean score of technology acceptance for caregivers who saw the scenario (group 2) (M=3.46, SD= 0.10) did not significantly differ from the mean score of technology acceptance for caregivers who did not see the scenario (group 1) (M= 3.56, SD = 0.09).

Besides the data of the two trials of the technology acceptance scores, caregivers responded to three extra statements at the end of the survey. This was to gain more direct insight into the added value of the scenario. The two questions relevant for hypothesis 1a are described below:
Question 1: "The scenario has given me new relevant information on the HAAL dashboard."
Question 2: "I adjusted my opinion on the HAAL dashboard after having seen the scenario."

The results of the one-sample t-test for question 1 indicate a significant difference in the mean score (M=4.14, SD=0.66) compared to the neutral score of "3" (t(14)=5.87, p<0.001). Thus, it can be concluded that caregivers report that the scenario has provided them with new information on the HAAL dashboard. Regarding question 2, the one-sample t-test revealed no significant difference in the mean score (M=2.71, SD=0.99) compared to the neutral score of "3" (t(14)=-1.075, p=0.301). Therefore, it can be inferred that caregivers have not adjusted their opinion on the HAAL dashboard due to the scenario.

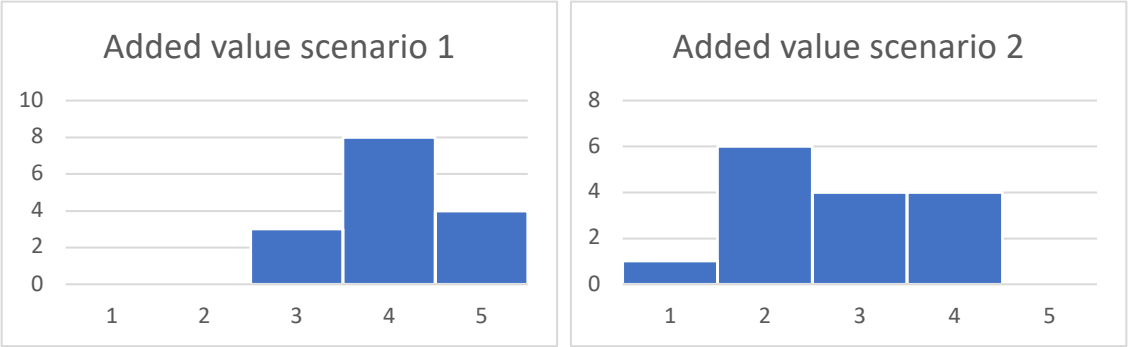


Figure 7. Left: Histogram question 1: “The scenario has given me new relevant information on the HAAL dashboard.” Right: Histogram question 2: “I adjusted my opinion on the HAAL dashboard after having seen the scenario.”

H1a: qualitative analysis

To gain a deeper understanding of the influence of the scenario on the technology acceptance, a qualitative approach was employed, which involved the use of open-ended questions and conducting short interviews.

By analyzing the responses to the open-ended question, if there was anything new mentioned in the scenario that was important for their opinion, caregivers often responded that it was important for them to know about the flaws of the system that might lead to providing falsified information, see quotes below:

"that incorrect information is also provided” (P1)
“that the system occasionally makes mistakes” (P4)
“attention was specifically given to the potential pitfalls” (P7)
“and that sometimes notifications are not immediately urgent or not true." (P10)

The objective of the interview was to delve deeper into their perceived distinctions between the introduction video and the scenario video, as well as to understand the perceived impact of these videos on the caregivers' perception of the HAAL dashboard. The findings from the analysis of the transcribed interviews have yielded the following key conclusions, which are presented below:

The responses regarding the addition of the scenario were all exclusively positive. Caregivers mentioned that it provided them with a better understanding of the HAAL dashboard: *The scenario does give you a better idea of what is meant." (P3) "Now I have a better picture of it." (P1) "So I think that the second video is especially helpful in clarifying things for us as nurses or other healthcare providers." (P11).* Additionally, some caregivers started visualizing how they could apply the technology to their own clients: *"I will think about a specific person and fill in the information, and then I think, oh yes." (P11) Another caregiver mentioned, "I always need an example (of my own client), and then I can easily relate." (P3).*

Against expectations, the acknowledgment of the ethical aspects addressed in the scenario was rarely mentioned. Caregivers frequently focused on the practical aspects when discussing the scenario*: "[...], so you see the practical execution more" (P3) "[...] You start thinking in practical terms." (P11) "It's clear how you could potentially work with it." (P11).* Although caregivers initially seemed to overlook the ethical aspects of the scenario, once the purpose of the scenario was explained to them, they confidently expressed their agreement to it:
"Yes, no, but now that you mention it, I do think, oh. Yes, I understand what you mean, and I recognize that in the video." (P5) "Yes, yes, yes, I understand what you mean: yes, definitely." (as a response to the question: did you indeed feel that the introduction video focused more on functionalities and the scenario also touched on ethics?) (P11) or *"Yes, for example, the privacy part..." (as a response to the question: after seeing the scenario, were you more triggered to think about ethical aspects?) (P7).*

Surprisingly, while caregivers initially may not have explicitly addressed ethical concerns or societal implications during the interview, in hindsight they acknowledge the importance of paying attention to these factors. Furthermore, they highlight the challenge of identifying the specific information regarding the technology that may be missing but is relevant to forming an informed opinion, such as ethics.
"You know, with this type of research, you have to keep looking further and think, yes, but what is there? What are you missing? And then I think, that's always been challenging for me. But now that you say that, I think, oh yes, that ethical aspect, you actually miss that. Yes, at least I notice that with myself, that you don't really think about it thoroughly." (P11) "Yes, you did think about it, but it's good to see it clarified again. And it brings it back into focus, so to speak." (P7).

Furthermore, one caregiver stated that although it provided her with a better understanding of the HAAL dashboard, she doesn't think it led to a change in her opinion. *"That not necessarily, no, I don't think so." (as a response to the question: did the video on the scenario make you change your mind about the technology?) (P5).*

In summary, the data is not conclusive in answering the hypothesis, the addition of anticipatory exploration influences technology acceptance. The quantitative analysis of the technology acceptance questionnaire revealed no evidence of the scenario influencing technology acceptance. This finding is supported by the overall neutral response to the question: *I adjusted my opinion on the HAAL dashboard after having seen the scenario.* Although caregivers didn't change their opinions they did indicate that the scenario provided them with new and relevant information regarding the HAAL dashboard. Caregivers regularly mentioned during the interviews that the scenario helped them gain a better understanding of the HAAL dashboard. Additionally, the qualitative results revealed that the aspects of unreliable information or advice from the HAAL dashboard were particularly important for forming their opinions. However, despite the scenario's focus on the positive and negative implications regarding ethical concerns, caregivers do not refer to ethical aspects when asking for the difference between the introduction video and the scenario video; rather, the caregivers' focus is mainly on practical considerations. Nevertheless, when explaining the underlying concept of the scenario, caregivers in hindsight do agree that ethical aspects were addressed, and its relevance is

acknowledged. This indicates that anticipatory exploration does indeed play a role in technology acceptance.

Hypothesis 1b:
Receiving anticipatory exploration leads to adjusting opinions regarding technology acceptance.

H1b: quantitative analysis
It was expected that group 1, who saw the scenario in the second trial, would adjust their opinion more compared to group 2, who saw the scenario in the first trial already (see Figure 4). Although there seems to be a promising trend in the bar chart in Figure 8, the two-sample t-test revealed no significant difference in the mean of technology acceptance adjustment between group 1 and group 2 ($t(12) = 1.37$, $p = 0.196$). The mean score of adjusting technology acceptance for caregivers who saw the scenario in the second trial (group 1) ($M = .19$, $SD = .13$) did not significantly differ from the mean score of adjusting technology acceptance for caregivers who saw the scenario in the first trial (group 2) ($M = .11$, $SD = 0.09$). However, it is to be noted that the effect size is $d = .71$, meaning a moderate to large effect.

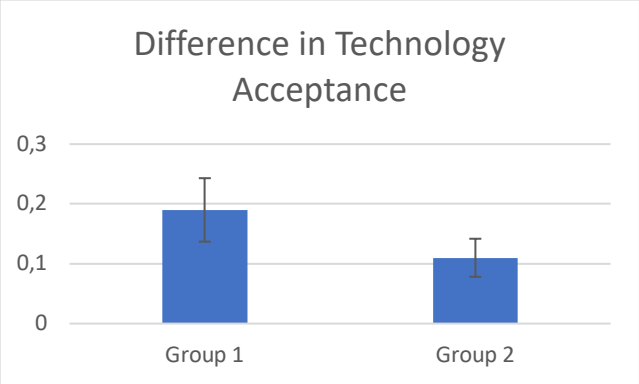


Figure 8. The average differences in technology acceptance score for Group 1: scenario in trial 2. Group 2: scenario in trial 1.

Hypothesis 2a:
The addition of anticipatory exploration leads to a more easily perceived evaluation of technology acceptance.

H2a: quantitative analysis
Multilevel analyses were conducted to examine the relationship between technology acceptance and the four different stages of the cognitive process of response forming: comprehension, retrieval, judgment, and response. Similarly, as to hypothesis 1a multi-level analysis assumptions were checked. All assumptions for were met except for linearity, therefore it was decided to apply 'robust'. Furthermore, it was checked whether multi-level analyses are indeed required by running the empty models. The resulting rho's depicted in Table 5, indeed showed that multi-level analyses are needed in order to account for the individual levels. Although the rho for 'response' is not significant it is still decided to perform a multi-level

analysis to stay coherent with the other analyses. No significant effects are found for any of the independent variables (see Appendix 2C).

Table 5. Results of the empty models

	Rho	*P*-value
Comprehension	.46	.049
Retrieval	.57	.026
Judgment	.74	.002
Response	.15	.259

Similar as to hypothesis 1a, it was decided to perform two-sample t-tests to test for the various stages of the cognitive process of opinion forming solely for the first trial. It was found that normality was not met for retrieval (Shapiro-Wilk test p= 0.045) and response (Skweness-Kurtosis p = 0.002). Therefore, Wilcoxon rank-sum tests were performed. The results of the Wilcoxon rank-sum tests revealed a significant difference in comprehension (z =-2.114, p= 0.035) and no significant differences in retrieval (z= -0.295, p= 0.768), judgment (z= -0.654, p= 0.513) and response (z= .166, p= 0.868). The mean score of comprehension for caregivers who did not see the scenario (group 1) (M= 3.83, SD= .28) was higher compared to the mean score of comprehension for caregivers who did see the scenario (group 2) (M= 1.67, SD= .24). However, the qualitative results do not reveal any difficulties regarding comprehension. Given the low sample size, these findings are dismissed as individual differences.

Besides the data from the self-constructed questionnaire on the cognitive model of opinion forming, caregivers responded to three extra statements at the end of the survey. The question relevant for hypothesis 2 is described below:
Question 3: “After seeing the scenario, I was able to complete the questions on the HAAL dashboard more easily.”

The one-sample t-test reveals no significant difference in the mean score (M=3.5, SD=1.02) compared to the neutral score of "3" (t(14)= 1.825, p= 0.089). Therefore, it can be inferred that the scenario has not helped the caregivers in filling in the technology acceptance questionnaire more easily.

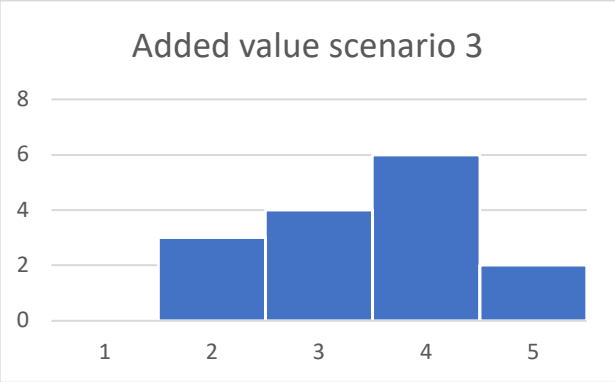


Figure 9. Histogram question 3: "After seeing the scenario, I was able to complete the questions on the HAAL dashboard more easily."

The previous multi-level analysis and the analysis of *Question 3,* investigated the process of opinion forming on the overall technology acceptance level. However, it is possible that certain components of the questionnaire were perceived as more challenging than others. To gain further insight, caregivers were specifically asked to indicate which questions from the technology acceptance questionnaire they found difficult. The results are depicted in Figure 10. Notably, questions that were perceived as difficult at least twice are outlined below:

10: Trust: I trust that the dashboard will give me the right advice.
11: Trust: I would follow the advice given to me by the dashboard.
15: Perceived Risk: I perceive the use of the dashboard as a risk to the clients.
16: Perceived Risk: I perceive the use of the dashboard as a risk to myself.
20: Anxiety: I am concerned about potential changes in the healthcare process due to the use of the dashboard.

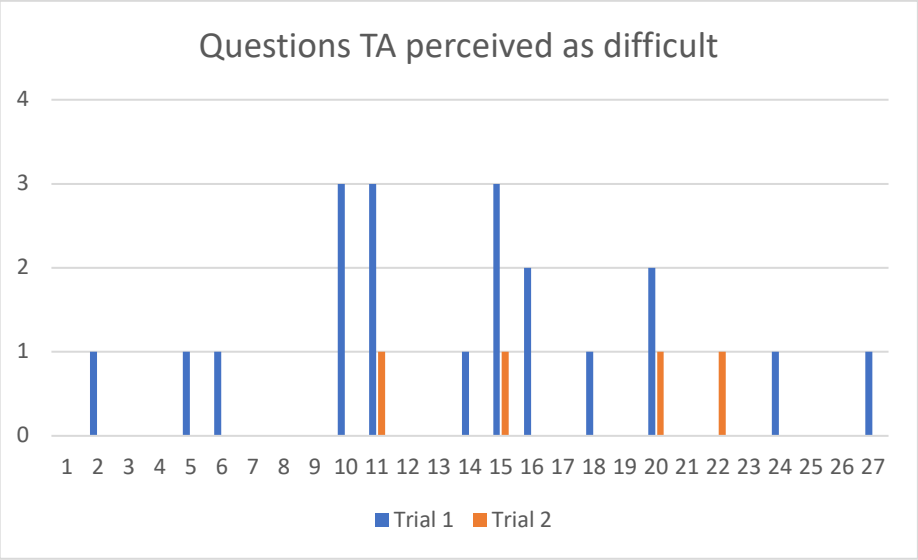


Figure 10. Number of times a question from the technology acceptance questionnaire was perceived as difficult.

H2a: qualitative analysis

Four open-ended questions related to the stages of the cognitive process for forming an opinion were included in both trials of the study. As previously mentioned the second trial was not as effective as anticipated, making it difficult to analyze within subjects effects.

Comprehension: Did you experience difficulties understanding the questions? If so, what was the reason for that?
Retrieval: Is there anything you would have liked to know about the dashboard that would have been important to form your opinion about it?
Judgment: Is there anything you would have liked to know about the dashboard that would have been important to form your opinion about it?
Response: Is there anything else you would like to share about your perspective on the dashboard that hasn't been addressed in the questions so far?

For the questions on comprehension and judgment, all caregivers answered 'no' and thus no additional information was given. As for the responses on retrieval and response questions, no remarkable differences were found for caregivers who had seen the scenario and those who had not. However, one caregiver stated *"Clear videos. After video 2, it became clearer again, making it easier to fill in the questions for the second time. Whereas after video 1, I needed more information to answer the questions."(P10).*
Additionally, there are some noteworthy findings in the overall responses. The majority of the responses were related to practical aspects of the HAAL dashboard. For example for 'retrieval' it contained answers such as*: "User-friendly, especially on a phone." (P4) "Implementation costs."(P7) "Who decides the level of dementia that goes into the dashboard, and can caregivers assign these labels?*" (P9) ,but also the answers given to the 'response' question contained primarily practical aspects: : *"To what extent is there a benefit if it can only be used for a limited number of people?"(P3) "It has to work and be user-friendly."(P4) "How does this information reach the caregiver? Through an app, text message, phone call, a team member, and then passed on?"(P10)*
Surprisingly, when asking caregivers after the introduction video for the potential risks, the majority of the response is related to ethical aspects: *"[...] forgetting **the actual needs** of the client or overlooking things."(P1) "**Less personal**."(P2) "Client's **privacy**."(P3) "[...] while predictions may not be accurate at all, to what extent can this be **trusted**? (P5)" "How are risks handled? And who determines this? Is it the caregiver, the client, the family? Together? What if there is no agreement?"(P6).*

Furthermore, some interesting findings related to the cognitive process for forming an opinion are found in the interviews. First of all, caregivers still have doubts about their opinion of the HAAL dashboard. *"When I see it like this, well, on the one hand, yes, on the other hand, no. I marked that as neutral because there are actually quite a few good things about it, I think, but there are also some things that make me think mmm..." (P1).* It is expected that when having experienced the technology, more things will become clear and might even lead to changing one's opinion:

"Yes, I think that through experiencing it, they will change their minds."(P3). Additionally, as mentioned before, it is hard to identify what kind of information on the technology you are missing that is of relevant for your opinion.
"You know, with this type of research, you have to keep looking further and think, yes, but what is there? What are you missing? And then I think, that's always been challenging for me. But now that you say that, I think, oh yes, that ethical aspect, you actually miss that. Yes, at least I notice that with myself, that you don't really think about it thoroughly." (P11)

In summary, the quantitative analysis of the technology acceptance questionnaire did not provide evidence of the scenario having a positive influence on the four stages of the cognitive process involved in opinion forming. However, some remarkable things are found in the qualitative analysis. When asking caregivers about the perceived risks of the use of the HAAL dashboard their responses and concerns mainly focus on the ethical aspects of the HAAL dashboard. On the other hand, when asking what they still want to know about the HAAL dashboard the responses are predominantly related to practical aspects. This disparity is somewhat unexpected, as one might expect caregivers to inquire about the risks to gain a better understanding of the technology. This raises the question of whether ethical concerns are difficult to get a grasp on and causes difficulties in establishing questions about ethical concerns. This notion is supported by the data since the questions related to ethical concerns, such as trust, perceived risk, and anxiety, were perceived as more challenging to answer. Furthermore, a caregiver indicated that she experienced difficulty in identifying information that is important for her opinion forming, such as ethical aspects. The caregiver observed a lack of thorough consideration of ethical aspects, yet acknowledged its importance.

Overall, it was observed that caregivers showed fluctuating opinions. They are still searching for an opinion and are not yet certain about their stance. Some caregivers highlight both the positive and negative aspects of the HAAL dashboard and are uncertain about whether to assess the HAAL dashboard positively or negatively. Other caregivers expect to get a clearer perspective on the HAAL dashboard after having used the technology for a certain period of time, indicating that their current perspective is still uncertain. The process of forming an opinion on the HAAL dashboard presents an intriguing dynamic with still a lot of uncertainties. For this case study, the scenario did not lead to a more easily perceived evaluation of technology acceptance.

Hypothesis 2b
H3: The addition of anticipatory exploration leads to more in-depth argumentations for formulating their opinion on technology acceptance.

H2b: qualitative analysis
The four open-ended questions related to the four stages of the cognitive process (see hypothesis 2) were asked twice since the study contained two trials. As previously mentioned, the second trial was not as effective as anticipated. Open-ended questions were often not filled in for the second trial, making it hard to assess the hypothesis within subjects. As for between

subjects no remarkable differences in either length or topic addressing were found for the responses.

3.3 Explorative research

The scenario aims to raise awareness of both the positive and negative implications of ethical concerns. Therefore, it is to be expected that the scenario will have a greater impact on the components related to ethical concerns (e.g. trust, perceived risk) compared to other components (e.g. perceived ease of use, facilitating conditions) in the technology acceptance questionnaire. As depicted in Figure 10, the components trust, perceived risk, and anxiety in the technology acceptance questionnaire are perceived as more challenging in comparison to other components, which is in line with the expectations. For the explorative research, the impact of the scenario is investigated for the components that were perceived as challenging (trust, perceived risk, and anxiety), rather than focusing on the overall technology acceptance.

The effect of the scenario on the components of trust, perceived risk, and anxiety were analysed for the first trial, using a Wilcoxon rank-sum test since the normality assumptions for trust (Shapiro-Wilk test $p < 0.005$) and anxiety (Shapiro-Wilk test $p < 0.001$) were violated. The results of the Wilcoxon rank-sum test revealed a significant difference in trust, $z = 2.31$, $p = 0.021$. The mean score of trust for caregivers who did not see the scenario (group 1) ($M = 3.86$, $SD = 0.38$) was higher compared to the mean score of trust for caregivers who did see the scenario (group 2) ($M = 3.17$, $SD = 0.61$) (see Figure 11). However, no significant differences were found for perceived risk z = -.16, $p = 0.869$, and anxiety $z = 1.24$, $p = 0.214$.

The significant difference in trust between caregivers who saw the scenario and those who did is not surprising. In the qualitative results for hypothesis 1a, it was already shown that it was new for the caregivers to know about the flaws of the system and that it might also provide them with falsified information. These new insights gained from the scenario likely had a significant influence, leading to a decrease in their trust in the system.

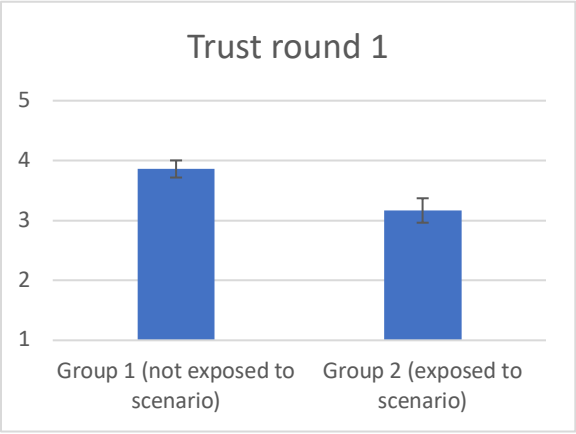


Figure 11. Trust for caregivers who were exposed to the scenario and those who were not.

Chapter 4

Discussion

The aim of the study was to gain more insights into the relation between anticipatory exploration and technology acceptance when evaluating a DSS in healthcare. It was evaluated if the inclusion of a scenario video illustrating the ethical implications of the HAAL dashboard resulted in different responses in the technology acceptance questionnaire. Additionally, the study aimed to investigate how anticipatory exploration affects the response validity of technology acceptance by evaluating the four stages of the cognitive process of opinion forming (Tourangeau, 2003).

4.1 Effect of anticipatory exploration on technology acceptance

Previous research has already demonstrated the significance of ethics for the user. For instance, the study of Etemad-Sajadi et al. (2022) revealed that ethical-related factors such as social cues, trust/safety, responsibility, and privacy/data protection have an impact on users' intention to use technology. However, no investigation has been conducted regarding the extent to which these components influence technology acceptance when anticipatory exploration is implemented.

In this study, it was found that the inclusion of a scenario focusing on the ethical implications of the HAAL dashboard was perceived as valuable by caregivers. Although it did not directly impact the technology acceptance score, interviews revealed that caregivers have gained a better understanding of the HAAL dashboard compared to solely watching the introduction video. Therefore, it can be concluded that the inclusion of a scenario already contributes to a more responsible evaluation process, as researchers have an obligation to fully inform users (Stilgoe et al., 2013).

Furthermore, it was found that the statements related to trust, perceived risk and anxiety of the technology acceptance questionnaire were perceived as more challenging to evaluate. It is to be noted that these components are related to ethical concerns in AI systems, especially in healthcare, where patients' lives are literally on the line (Choudhury, 2022; Kumar et al., 2023). Results showed that the caregivers' levels of trust reduced after having seen the scenario. This is not surprising since caregivers previously indicated in the open-ended questions that it was new for them to know about the flaws of the system and that it might also provide them with falsified information. Note that the goal was not to obtain higher technology acceptance but rather to measure a more truthful technology acceptance. The addressing of the flaws by the caregivers can even be of added value. By caregivers starting to look critically at DSS, they can

identify areas of concern for innovators to address. By measuring a more truthful technology acceptance, you ensure that technology is less likely to be shelved after implementation.

4.2 Response validity

This study investigated if caregivers experienced difficulties in responding to the technology acceptance questionnaire. Consequently, it was investigated if the inclusion of a scenario illustrating potential ethical implications would contribute to a more profound evaluation of the technology acceptance of the DSS.

The findings indicate that caregivers encountered difficulties when considering and discussing ethical concerns. For instance, the components closely related to ethics, such as trust, perceived risk, and anxiety, were perceived as more challenging to address. Interestingly, qualitative findings revealed that ethical aspects were often overlooked in both the interviews and the open-ended questions. Only upon further clarification during the interviews, regarding the scenario's underlying concept of addressing ethical implications, caregivers in hindsight acknowledged that ethical aspects were indeed addressed in the scenario. Moreover, they expressed their thoughts on the relevance of including such ethical considerations. Nevertheless, the explanation of why the caregivers overlook ethical concerns or experienced questions related to ethical concerns as challenging is up for discussion.

The belief in technology is influenced by ethical concerns, as demonstrated by previous research (Fiske et al., 2019; Kooli & Al Muftah, 2022; Richardson et al., 2021). Failure to address or adequately comprehend these ethical concerns can lead to doubts about the validity of our responses regarding technology acceptance. Building upon the findings of this study, it is anticipated that caregivers may encounter challenges during the process of opinion formation. Specifically, it is expected that difficulties may arise in *retrieving* relevant information or forming *judgments* related to ethical concerns.

The retrieval stage might encounter deficits caused by a lack of information regarding the implications of the HAAL dashboard. Given the complexity and rapid evolution of technology, it poses challenges for individuals to stay well-informed about all relevant issues (Wolff, 2021).
Perhaps the scenario was too limited in addressing the ethical implications, either by not adequately addressing all ethical concerns or by not delving deep enough into the details. For future research it is recommended to conduct more thorough research on the ethical implications and explore effective strategies for effectively communicating these implications through a scenario. Besides, the scenario should be validated by multiple caregivers.

Another explanation for not addressing ethical concerns due to retrieval deficits can be explained by the first- and second-order barriers in technology integration (Ertmer, 1999). The results showed that caregivers focussed primarily on the practical aspects of the HAAL dashboard, rather than on the ethical concerns of the implementation. First-order barriers are related to the more practical aspects of the technology and are often described in terms of the types or resources (e.g., equipment, time, training, support), referring to topics such as "Is the application user-friendly on the phone?" or "What are the implementation costs?". First-order

barriers are easy to measure and relatively easy to eliminate. The reduction of first-order barriers allows second-order barriers or issues to surface. Second-order barriers are typically rooted in users' underlying beliefs and may not be immediately apparent to others. This may be because they are less tangible than first-order barriers, but also because they are more personal and deeply ingrained (Ertmer, 1999). It appears that users will initially focus on the first-order barriers related to short-term effects of the technology which typically revolve around the individual level, such as time allocation or user-friendliness of the HAAL dashboard. Only after having addressed the first-order barriers do users contemplate the long-term effects that encompass societal impact such as de-humanization due to reduced interaction with caregivers.

Interest arises in exploring the ethical implications addressed by users through a long-term study. The prolonged use of technology might provide the opportunity to clarify some of the first-order barriers, allowing users to start thinking more critically about the ethical implications of technology, such as privacy issues, security risks, or its social and psychological effects. Research on long-term studies has demonstrated that the preferences and attitudes of users toward technology change over time (Wu et al., 2014). By utilizing technology for extended periods, we become aware of its potential consequences. For instance, it has been noted that long-term use of AI interventions could lead to some patients or patient groups becoming overly attached to these applications (Fiske et al., 2019). In case of the HAAL dashboard, caregivers could over-rely on the care advice given by the dashboard, potentially leading to inaccurate diagnoses or treatments. These types of experiences can lead to a reconsideration of our ethical views on technology. Nevertheless, the question remains as to whether the extended time of utilization of the technology holds the key for gaining a thorough comprehension of the ethical concerns at hand, or if ethics remains an aspect that we continue to struggle with forming opinions on, considering that ethics is frequently understood at a subconscious level (van Velsen et al., 2022). Furthermore, long-term studies will give more insight into the adoption curve of technology. It takes time for people to adjust their attitude toward technology (Sobhanmanesh et al., 2023), potentially leading to shifts in technology acceptance as well.

In terms of judgment, caregivers' opinions were observed to fluctuate, indicating they are still uncertain about their opinion of the technology. Some caregivers highlight both the positive and negative aspects of the HAAL dashboard and are uncertain about whether to assess the HAAL dashboard positively or negatively. Even when all relevant information is available, it can still be challenging to form opinions on ethical concerns. Ethical dilemmas often require making compromises, which means that choosing one aspect comes at the expense of another. For example, a caregiver may prioritize client safety, but in doing so, they must accept a reduction in privacy (Verbeek & Tijink, 2020). Forming opinions on moral judgments is difficult when the only way to satisfy one moral value is to neglect another (Guzmán et al., 2023).

To enhance the validity of responses and attain a more truthful technology acceptance, it is crucial to investigate the underlying causes of the challenges we encounter in opinion forming on ethical issues. By identifying the shortcomings in the various stages of the cognitive process

of opinion forming, strategies can be developed to overcome them. This, in turn, will foster more informed and meaningful discussions on ethical considerations.

4.3 Improving the 'traditional' approach of technology acceptance evaluation

Despite many uncertainties regarding the thought processes on ethical concerns of the HAAL dashboard, several points have become clear from this study. Although the scenario did not lead to an easier evaluation of technology acceptance, it was found that caregivers do consider ethical concerns important for their technology acceptance even though they did not directly express them. From this, two important conclusions can be drawn for the field of evaluating technology acceptance.

Firstly, without explicitly addressing ethical aspects in technology evaluation, the results might not contain robust opinions regarding technology acceptance. The study revealed that caregivers do value ethics, but often experience difficulties to think about it themselves. Secondly, even when ethical aspects are included in the evaluation of technology acceptance, their robustness can still be questioned since it seems that people find it difficult to form opinions on ethical matters concerning technology.

Given the importance of attending to ethical implications, further research is necessary to investigate the most effective approaches for conducting anticipatory exploration. The scenario has led to a decrease in trust levels but still demonstrated limited impact in creating awareness of the potential ethical implications of the dashboard. Having explicitly mentioned the ethical concerns, rather than implicitly, could have helped caregivers reflect on ethical issues, although caution must be paid to avoid being overly directive.

Furthermore, other potential strategies for representing anticipatory exploration can provide a deeper insight into how individuals think about ethics and foster meaningful discussions. For instance, RI workshops explore potential positive and negative technology implications through collaborative activities (Lukkien et al., 2023). Whereas focus groups can uncover participants' perspectives and experiences on ethical implications through group discussions (Richardson et al., 2021). These strategies require active participation, leading to more active thinking and might therefore be more effective in anticipatory exploration as compared to watching a scenario. However, a drawback of workshops and focus groups is the limited number of participants that can participate.

Furthermore, this study highlights the limitation of relying solely on technology acceptance questionnaires for evaluation. Questionnaires are often considered a practical and cost-effective method for assessing technology acceptance levels (Sekhon et al., 2022). It is easy to distribute and can therefore reach a wide audience. Moreover, the standardized format makes it easy to analyze a large quantity of data. (Ryan et al., 2012). Previous research by He et al. (2022) has already criticized technology acceptance studies for solely involving quantitative data collection methods including questionnaires based on technology acceptance models. It is criticized for neglecting ethical considerations and the absence of objective indicators. In line with the present study, limitations on solely relying on technology acceptance questionnaires

are acknowledged. Interesting results would not have been revealed without the addition of the qualitative method of conducting interviews. Therefore, it is important to complement questionnaire-based technology acceptance evaluation with other methods such as interviews, focus groups, or workshops to encourage in-depth reflection and exploration of ethical concerns (Lukkien et al., 2023; Richardson et al., 2021).

Chapter 5
Limitations and recommendations

It is essential to acknowledge the limitations of the current study. Firstly, it is crucial to note that this study focuses specifically on the HAAL dashboard as a case study. While the findings and insights obtained from this research are applicable to the HAAL dashboard, it is important to recognize that studies exploring anticipatory exploration in different technologies may yield different outcomes.

Additionally, it is important to highlight that this study is primarily exploratory in nature. Therefore, conducting further research is necessary to gain a more inclusive understanding of the impact of anticipatory exploration on the evaluation of technology acceptance.

The scenario has shown limitations in creating awareness of the ethical implications. Although the discussion addresses constraints regarding the cognitive process of opinion forming, it could also be attributed to the fact that the ethical aspects were mentioned too implicitly. Directly mentioning ethical aspects (instead of indirectly as was done in the scenario) can also help lower the threshold for caregivers to reflect on ethical issues, although caution must be paid to avoid being overly directive. Furthermore, enhancing the explicitness of the scenario's content has the potential to foster greater awareness of the ethical implications associated with it. This can be accomplished by conducting comprehensive research and validation that actively engages caregivers.

Moreover, there are several methodological limitations that should be addressed. Firstly, it was noted that participants approached the second trial with less seriousness compared to the first trial. Notably, one caregiver did not complete the second trial and another consistently selected 'neutral' for all questions. One possible explanation for participant dropout could be attributed to the length of the survey (Hoerger, 2010). The considerable effort required to complete the same questionnaire for a second time may have led to more superficial responses during the second trial. Additionally, the limited stimulus provided to prompt participants to provide different answers in the second trial might have also played a role. This issue was particularly apparent for participants in the second group, who only had to perform a small task on the dashboard before being asked to fill in the questionnaire again. This observation is supported by the fact that one caregiver expressed confusion regarding the repeated questionnaire.

Secondly, typically a cross-over design contains a wash-out phase to eliminate the effects of the previous trial and allow a return to baseline before the start of the next trial (Sambandan & Turcu-Stiolica, 2018). However, due to the restricted time of the study, no washout phase was

implemented between the two trials. Consequently, caregivers in the second group, who had already been exposed to the scenario in the first trial, might not have had adequate time to revert to their baseline opinions, potentially influencing their responses in the second trial.

Thirdly, the questionnaire designed for measuring the response validity by assessing the four stages of the cognitive process of opinion forming was not validated. As a result, the validity and reliability of the obtained results may be subject to questioning. Furthermore, the attempt to evaluate the difficulty level of a questionnaire by utilizing another questionnaire seems paradoxical, casting doubt on the legitimacy of this method. An alternative method to evaluate response validity, as demonstrated in the research conducted by Ryan et al. (2012), involves conducting small interviews. However, in the current study the decision was made to employ questionnaires due to the advantages of a quick and widespread implementation, which is often preferred for evaluating technology acceptance (He et al., 2022).

Fourthly, A limitation of the technology acceptance questionnaire is the absence of a "don't know" (DK) response option. Considering that without anticipatory exploration, it might be more challenging to complete certain statements, the inclusion of this feature could have been valuable. Currently, it is not possible to determine whether participants select '3' because they genuinely hold a neutral opinion or because they are clueless about the statement (Krosnick & Presser, 2010). However, some researchers express concerns about including a DK option as it may encourage selecting "I don't know" simply to avoid engaging in the cognitive processes necessary to answer the item (Krosnick & Presser, 2010).

At last, for the methodological limitations, the HAAL dashboard is still under construction. As a result, the tasks assigned may not have fully demonstrated the complete range of capabilities the dashboard can offer. However, the chosen tasks aim to emphasize the main features of the dashboard, including the necessary actions to adequately identify the health issues of the client. But still, this lack of clarity regarding the dashboard's capabilities may have contributed to the caregivers' emphasis on practical aspects. For future research, it should be considered to implement anticipatory exploration iteratively throughout the design process. Determining how to ‘well-time’ anticipatory processes cannot be done with a general formula; rather, context-specificity is necessary so that they are early enough to be constructive but late enough to be meaningful (Fraaije & Flipse, 2020).

Chapter 6

Conclusion

The aim of this study was to gain more insights into the relation between anticipatory exploration and technology acceptance when evaluating a decision support system (DSS) for dementia caregivers. A scenario was used as anticipatory exploration, aiming to create awareness on the ethical and societal implications of the DSS. It was hypothesized that this would lead to a shift in technology acceptance and increase response validity.

First of all, caregivers expressed that the scenario contributed to an enhanced understanding of the Decision Support System (DSS). However, against expectations, exposure to the scenario did not result in an overall shift in technology acceptance. Although, it did result in a decrease in the technology acceptance component trust.

Furthermore, the study revealed that caregivers experienced difficulties in responding to ethical-related statements. However, no support was found for the scenario contributing to a more easily perceived technology acceptance evaluation. Still, caregivers indicated that ethics is important for their opinions, therefore it is crucial for future research to determine the most effective methods for conducting anticipatory exploration. In addition, it is recommended to complement questionnaire-based technology acceptance evaluation with qualitative methods such as interviews to capture more in-depth reflections and exploration of ethical concerns.

Overall, the study highlights the potential of including anticipatory exploration in order to contribute toward a more responsible evaluation of technology acceptance. The traditional methodology for assessing technology acceptance might no longer be sufficient, as it overlooks ethical considerations. By measuring a more truthful technology acceptance and increasing response validity, technology can be optimized according to user needs and values. This in turn, increases the likelihood of successful implementation and ultimately, in the context of healthcare technologies, contributes to improved quality of care and reduced caregiver workload.

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Appendix A: Method

A1: Mails + survalyzer set-up

Mail (onderzoek)

Beste NAAM,
Bedankt dat je mee wilt doen aan het onderzoek naar een 'beslissing ondersteunend' dashboard in de dementiezorg. Mijn naam is Fleur, ik ben een master student aan de Technische Universiteit van Eindhoven. Voor mijn master thesis voor de master Human Technology Interaction, onderzoek ik de acceptatie van een 'beslissing ondersteunend dashboard' door zorgverleners van mensen met dementie. Daarbij is jullie visie op het gebruik van zo'n dashboard in de zorg erg belangrijk.

In het kort, een 'beslissing ondersteunend' dashboard helpt zorgverleners in het bepalen van de benodigde zorgacties. Het dashboard verzamelt informatie over de persoon door middel van verschillende zorgtechnologieën die bij de persoon in huis staan. Deze data wordt vervolgens gebruikt om inzichten te geven in de fysieke en mentale gezondheid van de persoon. Op basis hiervan kan het dashboard aanbevelingen doen over mogelijke vervolgstappen die de zorgverlener kan nemen.

Het onderzoek duurt ongeveer **30 minuten** en bestaat uit:
- 2 video's
- 2 kleine taken op het dashboard (online)
- Vragenlijsten
- (Eventueel nagesprek)

Voor deelname geldt een vergoeding voor **10 euro** die na afronding van het onderzoek wordt overgemaakt.

Tijdens het onderzoek voer je 2 taken uit met betrekking tot een cliënt. Jouw cliënt voor deze taken is:
JOHAN BAKKER

Gelieve dit onderzoek uit te voeren voor 6 mei.
Mocht je nog vragen hebben mail gerust!

Hieronder vind je de link naar het onderzoek:
https://vilans.survalyzer.eu/beslissingondersteunenddashboard1

Met vriendelijke groet,
Fleur de Korver

*In bijlage informed consent

Mail (nagesprek)

Beste NAAM,
Ik heb van Dominic vernomen dat je deelneemt in het onderzoek naar een 'beslissing ondersteunend' dashboard. Dankjewel daarvoor ;).
Voor het onderzoek wil ik graag wat meer weten over de visie van de zorgverlener, over het gebruik van zo'n dashboard in de zorg.
Ik ben benieuwd wat jullie zien als de voordelen, maar ook wat je denkt dat mogelijke risico's zijn.

Zou ik je misschien, nadat je het online onderzoek hebt ingevuld, kort mogen bellen (via teams of telefoon) om jouw visie over het dashboard te horen?

Groetjes,
Fleur de Korver

Survalyzer

Introductie pagina

Beste deelnemer,
Bedankt dat je deelneemt aan het onderzoek naar een 'beslissing ondersteunend' dashboard
Hieronder volgt wat achtergrondinformatie over het onderzoek.

Dit onderzoek wordt uitgevoerd binnen het HAAL project van Vilans (een kennis organisatie voor zorg en ondersteuning). In dit internationale project werken organisaties vanuit Nederland, Denemarken, Italië en Taiwan samen aan het onderzoek naar, en het ontwerp van een 'beslissing ondersteunend' dashboard. Op het moment wordt het eerste prototype van dit dashboard in de zorg getest.

In het kort, een 'beslissing ondersteunend' dashboard helpt zorgverleners in het bepalen van de benodigde zorgacties. Het dashboard verzamelt informatie over de persoon door middel van verschillende zorgtechnologieën die bij de persoon in huis of in de zorginstelling staan. Deze data wordt vervolgens gebruikt om inzichten te geven in de fysieke en mentale gezondheid van de persoon. Op basis hiervan kan het dashboard aanbevelingen doen over mogelijke vervolgstappen die de zorgverlener kan nemen.

Voor mijn master thesis voor de master Human Technology Interaction, onderzoek ik de acceptatie van een 'beslissing ondersteunend dashboard' door zorgverleners van mensen met dementie. Daarbij is **jullie visie op het gebruik van zo'n dashboard in de zorg** erg belangrijk.

Het onderzoek duurt ongeveer **30 minuten** en bestaat uit:
- 2 video's
- 2 kleine taken op het dashboard (online)
- Vragenlijsten
- (Eventueel nagesprek)

Voor deelname geldt een vergoeding voor **10 euro** die na afronding van het onderzoek wordt overgemaakt.

Alvast bedankt voor je deelname!

Met vriendelijke groet,
Fleur de Korver

Informed consent

Geïnformeerde toestemming

Ervaringen met HAAL dashboard

- Ik heb de informatie van het bijbehorende informatieformulier voor deelnemers, die in de mail als bijlage was toegevoegd, gelezen en begrepen.

- Ik heb de gelegenheid gekregen om vragen te stellen. Mijn vragen zijn voldoende beantwoord en ik had voldoende tijd om te beslissen of ik meedoe.

- Ik weet dat mijn deelname volledig vrijwillig is. Ik weet dat ik kan weigeren deel te nemen en dat ik mijn deelname op elk moment tijdens de studie kan stopzetten, zonder opgaaf van redenen. Ik weet dat ik de toestemming om mijn gegevens te gebruiken kan intrekken tot 24 uur nadat de gegevens zijn vastgelegd.

- Ik ga ermee akkoord om vrijwillig deel te nemen aan dit onderzoek uitgevoerd door de onderzoeksgroep Human Technology Interaction van de Technische Universiteit Eindhoven.

- Ik weet dat geen informatie die kan worden gebruikt om mij of mijn reacties in dit onderzoek persoonlijk te identificeren, zal worden gedeeld met iemand buiten het onderzoeksteam.

BOX Ik geef toestemming om deel te nemen aan dit onderzoek

- Meer informatie over de verwerking van gegevens door Vilans vind je in de privacyverklaring. Link

Social demographics

- Wat is je je naam? _____
- Wat is je functieomschrijving? _____
  (meerkeuze opties:
  Verzorgende IG (EVV) (NAH)
  (wijk)Verpleegkundige
  Coördinator
  Woonzorgbegeleider
  Specialist ouderengeneeskunde
  Helpende

Anders, namelijk:

- In welke zorgsetting verleen je zorg aan ouderen? (dropwdown: verpleeghuis, thuiszorg)
- Ik geef voornamelijk zorgverlening aan ouderen met: lichte / milde/ zware (meerdere opties) dementie.
- Hoe lang werk je al als zorgverlener voor ouderen met dementie? _____
- Hoeveel werkdruk heb je de afgelopen tijd ervaren bij het uitvoeren van je werk?
  Weinig druk O O O O O Veel druk

Technologie algemeen

- Ik ben op de hoogte van de laatste technologische ontwikkelingen
  O Sterk mee oneens O mee eens O neutraal O oneens O sterk mee eens
- Ik sta ervoor open om nieuwe technologieën uit te proberen
  O Sterk mee oneens O mee eens O neutraal O oneens O sterk mee eens
- Ik ben in staat om mezelf nieuwe technologieën aan te leren
  O Sterk mee oneens O mee eens O neutraal O oneens O sterk mee eens

- Ben je bekend met het HAAL project? JA / NEE
- Heb je al eens eerder over een 'beslissing ondersteunende' technologie gehoord? JA / NEE
- Kan je me kort vertellen wat je hierover weet?
  _____

Video introductie

Het HAAL dashboard noemen we een 'beslissing ondersteunend' dashboard. Dit houdt in dat het dashboard inzichten kan geven over de gezondheid van de persoon met dementie en aanbevelingen kan doen over mogelijke vervolgstappen die de zorgverlener kan nemen. De video hieronder geeft een introductie over het HAAL dashboard.

Video introductie

- Benoem 1 of 2 positieve punten aan het HAAL dashboard. ____
- Benoem 1 of 2 risico's van het gebruik van het HAAL dashboard.____

Taak 1

Voor het volgende onderdeel vragen we je om een kleine taak uit te voeren op het HAAL dashboard. Iedere deelnemer van het onderzoek heeft een eigen cliënt

toegewezen gekregen. **De naam van deze cliënt vind je in de mail.** Zorg ervoor dat je de taken alleen voor deze ene cliënt uitvoert.

*Het dashboard is nog in ontwikkeling. Niet alle functies van het dashboard zijn werkzaam

Hieronder vindt je de link naar het HAAL dashboard:
http://haal.jef.it

De inlogcodes die je hiervoor mag gebruiken zijn:
Naam: fleur2
Ww: Pinkelotje!1

De taal kan rechts boven aangepast worden. 

Taak 1

Volgens het HAAL dashboard is het van belang om vandaag langs *cliënt X* te gaan. Zoek het profiel van *cliënt X* op in het tabblad '**cliëntenlijst'**.

- Welk niveau van dementie is er geconstateerd bij *cliënt X*? Dropdown: LOW / MEDIUM / HIGH
  Klik vervolgens op het profiel van cliënt X.
- Op welk zorgdomein kan *cliënt X* extra zorg of aandacht gebruiken? Dropdown: slaap / welzijn/ cognitie / fysiek

* *cliënt X* = Naam van jouw toegewezen cliënt (zie mail)

Taak 2

Voor het volgende onderdeel vragen we je om een kleine taak uit te voeren op het HAAL dashboard. Iedere deelnemer van het onderzoek heeft een eigen cliënt toegewezen gekregen. **De naam van deze cliënt vind je in de mail.** Zorg ervoor dat je de taken alleen voor deze ene cliënt uitvoert.

*Het dashboard is nog in ontwikkeling. Niet alle functies van het dashboard zijn werkzaam.

Hieronder vindt je de link naar het HAAL dashboard:
http://haal.jef.it

De inlogcodes die je hiervoor mag gebruiken zijn:

Naam: fleur2
Ww: Pinkelotje!1

De taal kan rechts boven aangepast worden. 

Taak 2

Je krijgt een notificatie dat er iets mis is met *cliënt X*. Zoek het profiel van *cliënt X* op in het tabblad '**dringende situaties'**.

- Wat is de situatie van *cliënt X*? Dropdown: val incident/ dwaal incident /langdurige inactiviteit
- Je bent bij *cliënt X* langs geweest en hebt het incident verholpen. Klik op 'start afhandelen' zodat het incident de status 'afgehandelde situatie' krijgt.

* *cliënt X* = Naam van jouw toegewezen cliënt (zie mail)

Scenario

Het HAAL dashboard noemen we een 'beslissing ondersteunend' dashboard. Dit houdt in dat het dashboard inzichten kan geven over de gezondheid van de persoon met dementie en aanbevelingen kan doen over mogelijke vervolgstappen die de zorgverlener kan nemen. De video hieronder schetst een scenario van het gebruik van het HAAL dashboard, en geeft een beeld over hoe het de zorg mogelijk beïnvloed.

Video scenario

Vragenlijst acceptability + moeilijkheids

Sterk mee oneens / oneens / neutraal / eens / sterk mee eens

Perceived ease of use	1. Ik vind het dashboard er overzichtelijk uitzien
_	2. Ik vond de informatie die nodig was om de opdrachten in het HAAL dashboard uit te voeren makkelijk te vinden.
_	3. Ik denk dat ik het makkelijk vind om het dashboard te gebruiken
Facilitating conditions	4. Ik vind het HAAL dashboard gebruiksvriendelijk
_	5. Het HAAL dashboard is toepasselijk voor al mijn cliënten

Perceived adaptiveness	6. Ik denk dat het algoritme van het HAAL dashboard zich aanpast aan de verschillende behoeftes van cliënten
Intention to use	7. Ik zou het HAAL dashboard graag willen gebruiken
Perceived enjoyment	8. Ik zou plezier halen uit het gebruik van het HAAL dashboard
_	9. Ik vind dat het dashboard een mooie lay-out heeft
Trust	10. Ik vertrouw erop dat het dashboard me het juiste advies geeft
_	11. Ik zou het advies opvolgen dat het dashboard mij geeft
Social influence	12. Ik denk dat de zorginstelling graag wil dat ik het HAAL dashboard gebruik
_	13. Als collega's het HAAL dashboard gebruiken, zal ik sneller geneigd zijn om het ook te gaan gebruiken
_	14. Ik denk dat ik serieuzer genomen word door cliënten en collega's, als ik het dashboard wel gebruik
Perceived risk	15. Ik vind het gebruik van het dashboard een risico voor de cliënten
_	16. Ik vind het gebruik van het dashboard een risico voor mijzelf
_	17. Ik vind het gebruik van het dashboard een risico voor de maatschappij
Anxiety	18. Wanneer ik het HAAL dashboard gebruik, ben ik bang dat ik informatie of meldingen verkeerd begrijp of interpreteer
_	19. Als ik het HAAL dashboard gebruik, ben ik bang om verkeerde keuzes te maken in mijn zorgverlening
_	20. Ik maak me zorgen over de mogelijke veranderingen in het zorgproces vanwege het gebruik van het dashboard
Perceived usefulness	21. Ik denk dat het dashboard me kan helpen kiezen voor de juiste acties voor de zorg voor de persoon met dementie.
_	22. Ik denk dat het dashboard me helpt om mijn dagelijkse planning beter in te vullen
_	23. Ik denk dat het HAAL dashboard zorgverleners kan ondersteunen in hun werk
Attitude towards technology	24. Ik denk dat het HAAL dashboard de werkdruk van de zorgverleners verlicht
_	25. Ik denk dat het HAAL dashboard helpt bij het kunnen leveren van goede zorg voor mensen met dementie
_	26. Ik denk dat het gebruik van het HAAL dashboard een positief effect kan hebben op de kwaliteit van leven van mensen met dementie
_	27. Ik vind het een goed idee om gebruik van het HAAL dashboard in de dementiezorg te implementeren

De volgende vragen gaan over jouw gedachtegang tijdens het invullen van de vragen over de acceptatie van het HAAL dashboard hierboven.

- Waren er vragen die je moeilijk vond om te beantwoorden? Zo ja, geef de nummers van de vragen. *Bijv. 6, 8, 9*

  _____

- Geef voor iedere vraag die je zojuist opgeschreven hebt aan hoe moeilijk je deze vraag vond op een schaal van 1 tot 10. *Bijv. vraag1: 8, vraag3: 6*

  _____

De volgende vragen gaan over jouw gedachtegang tijdens het invullen van de vragen over de acceptatie van het HAAL dashboard hierboven.

Begrijpelijkheid
Begreep je de vraag / vragen?

- Ik vond het moeilijk om een bepaald woord/ bepaalde woorden uit de vragen over het HAAL dashboard te begrijpen
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Ik vond de vragen over het HAAL dashboard grammaticaal moeilijk te begrijpen
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Ik begreep wat de vraag inhield, en dus wat de onderzoeker van me wilde weten
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Heb je moeilijkheden ervaren met het begrijpen van de vragen? Zo ja, waar lag dat aan?

  _____

Beschikking van informatie
Had je de benodigde informatie tot je beschikking om de vragen te beantwoorden?

- Voor het onderzoek, had ik al een goed idee over wat een 'beslissing ondersteunend' dashboard, zoals het HAAL dashboard inhoudt (bijvoorbeeld d.m.v. Nieuws, social media etc.)
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Mijn voorkennis over een 'beslissing ondersteunend systeem' heeft een rol gespeeld bij het invullen van de vragen over het HAAL dashboard.
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens
  O ik had geen voorkennis

- Ik heb voldoende informatie gehad over het HAAL dashboard om de vragen over dit dashboard te kunnen beantwoorden
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Is er iets wat jij nog graag over het HAAL dashboard had willen weten wat voor jouw belangrijk was geweest voor je mening over het dashboard?

  _____

Mening vorming
Op basis van de verkregen informatie, vond je het moeilijk om een mening te vormen?

- Het idee wat ik had over een 'beslissing ondersteunend' dashboard voor dit onderzoek, komt overeen met de informatie die ik over het HAAL dashboard heb verkregen tijdens dit onderzoek
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens
  O ik had geen voorkennis

- Ik ben overtuigd van mijn mening over het HAAL dashboard.
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Ik ben zeker over mijn antwoorden die ik heb ingevuld over het HAAL dashboard
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Vond je het moeilijk om een mening te vormen over het HAAL dashboard? Zo ja, kan je uitleggen waarom je dit lastig vindt?
  _____

Antwoorden
Vond je het moeilijk om je mening over te brengen in de vragen?

- Ik heb mijn mening over het HAAL dashboard goed kunnen uiten in de vragen over het dashboard
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Ik denk dat mijn mening over het dashboard duidelijk is op te maken uit de door mij gegeven antwoorden
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Ik vond dat er meer en/of ander soort vragen nog gesteld moesten worden
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

  Is er nog iets dat je wilt delen over jouw visie op het dashboard wat in de vragen nog niet naar voren is gekomen?
  _____

Evaluatie C

Deze vragen gaan over jouw mening over de toegevoegde waarde van het scenario.

- Het zien van het scenario heeft mij nieuwe relevante informatie gegeven
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Ik heb mijn mening over het HAAL dashboard na het zien van het scenario bijgesteld
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Na het zien van het scenario kon ik de vragen over het dashboard makkelijker invullen
  O sterk mee oneens O oneens O neutraal O eens O sterk mee eens

- Is er iets nieuws in het scenario benoemd wat voor jou belangrijk was om een mening te vormen over het HAAL dashboard? Zo ja, wat was dat?

_____

Afsluiter 1

Bedankt voor je deelname aan dit onderzoek!
Mocht je nog vragen hebben over het onderzoek kan je me altijd mailen:
f.dekorver@vilans.nl

Mocht je nog geen gesprek met mij gepland hebben en lijkt het je wel leuk om mij wat meer te vertellen over je visie van het HAAL dashboard, kan je hieronder je contact gegevens achterlaten en neem ik contact met je op.

BOX Ja, ik sta open voor een gesprek (via teams of telefoon) om meer te vertellen over mijn visie over het HAAL dashboard.

BOX: Teams: emailadres _____

BOX: Bellen: telefoonnummer _____

Mocht er al een gesprek gepland staat, ik kijk er naar uit om jouw visie te horen!

Afsluiter 2

De vergoeding voor deelname bedraagt **10 euro.** Je naam en rekening nummer kan je sturen naar f.dekorver@vilans.nl Het bedrag zal binnen 5 werkdagen worden overgemaakt

Naam: _____
Rekeningnummer: _____

Een verdere uitleg over de achterliggende gedachte van het experiment zal via de mail verstuurd worden.

Bedankt, en keep up the good work!
.

Debriefing (mail)

Bedankt voor je deelname aan het onderzoek. Hieronder volgt een uitleg over het doel van dit onderzoek:

Een veel gebruikte methode om 'technologie acceptatie' onderzoek uit te voeren is door deelnemers eerst een introductie te geven over de technologie (zoals in de introductie video). Hierin wordt vaak alleen de basiskennis over de technologie en de functionaliteiten geïntroduceerd. Vervolgens testen deelnemers de nieuwe technologie (taak 1 en 2). Op basis hiervan wordt er naar de mening van de deelnemers gevraagd met behulp van acceptatie vragenlijsten.

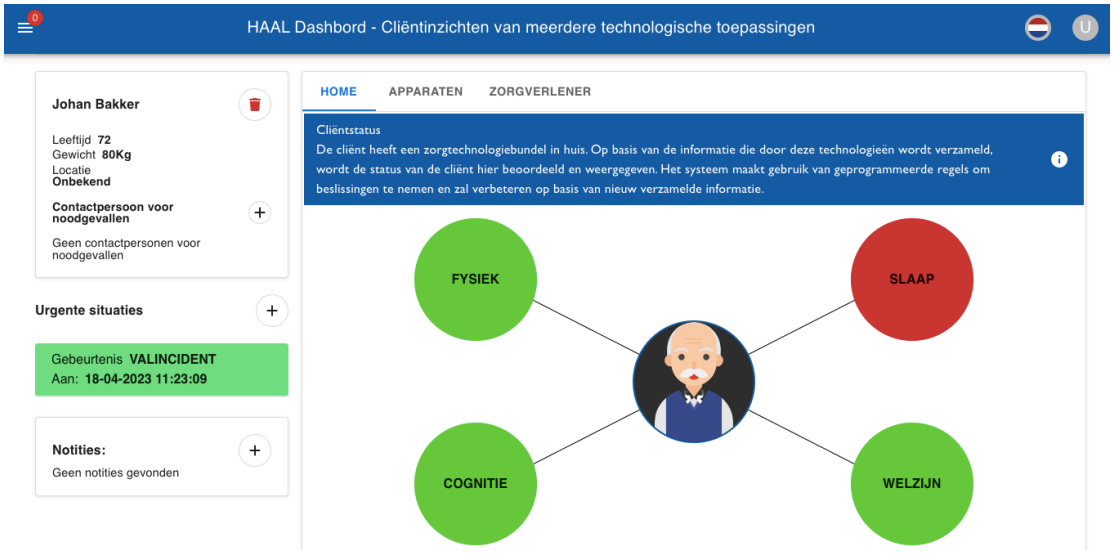
Een aspect dat vaak over het hoofd wordt gezien in deze methode, zijn de ethische vraagstukken. Het implementeren van een nieuwe technologie roept nieuwe vragen op als; *Wat gebeurt er met de data? Wie is er verantwoordelijk als er iets fout gaat?* Of *Neemt de technologie het werk van mij over?*
Het scenario was bedoeld om de potentiële positieve en negatieve effecten van het HAAL dashboard te belichten en daarmee deelnemers na te laten denken over vraagstukken rondom ethiek. Het doel hiervan is om deelnemers de 'bigger picture' van de technologie te laten zien, zodat ze een beter onderbouwde mening over de technologie kunnen vormen.

Mocht je hier nog vragen over hebben mag je me natuurlijk altijd mailen.

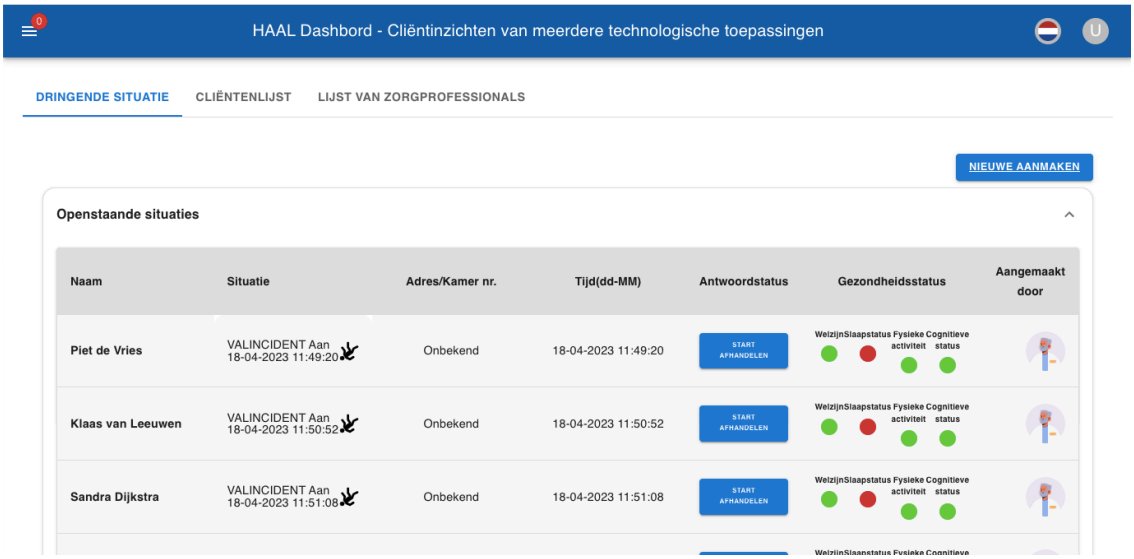
Met vriendelijke groet,
Fleur de Korver

A2: Tasks on dashboard

Taak 1



Taak 2



Taak 2

Je krijgt een notificatie dat er iets mis is met cliënt X. Zoek het profiel van cliënt X op in het tabblad 'dringende situaties'.

Wat is de situatie van cliënt X?

* cliënt X = Naam van jouw toegewezen cliënt (zie mail)

- ○ Valincident
- ○ Dwaalincident
- ○ Langdurige inactiviteit

Je bent bij cliënt X langs geweest en hebt het incident verholpen.

Klik op 'start afhandelen' zodat het incident de status 'afgehandelde situatie' krijgt.

* cliënt X = Naam van jouw toegewezen cliënt (zie mail)

A3: Introduction and scenario text for audio

Introduction

Dit is Amanda, een wijkverpleegkundige voor ouderen met dementie. Vanwege de vergrijzing in Nederland en het te kort aan zorgpersoneel, ervaart Amanda hoge werkdruk en vindt ze het moeilijk om hoogwaardige zorg te blijven geven. Ze realiseert zich dat technologie haar kan helpen in het verbeteren van de kwaliteit van de zorg, maar ziet ertegenop om verschillende apps te moeten gebruiken voor de verschillende technologieën. Gelukkig doen Amanda en haar collega's sinds kort mee aan het HAAL project, een internationaal project tussen Nederland, Taiwan, Italië en Denemarken. Het doel van het project is om een 'beslissing ondersteunend' dashboard te ontwikkelen dat de gegevens van verschillende zorgtechnologieën kan samenvoegen

De technologieën die bij de personen thuis geïnstalleerd word, vallen onder verschillende categorieën. Zo is er sensortechnologie, dat helpt om gedragspatronen van ouderen te monitoren. Denk hierbij aan sensoren in het huis, sensoren in een matras of een gps tracker.
Een andere categorie is mobiliteit. Hierbij kan technologie op een speelse wijze ingezet worden om de persoon met dementie mobiel te houden.
En als laatste is er technologie die helpt met de dag structuur en hun herinnering. Hieronder valt bijvoorbeeld een sociale robot, die met behulp van spraak ouderen kan helpen met hun dagplanning of een medicijndispenser die medicijnen op een specifiek tijd afgeeft.

Amanda leert dat het HAAL dashboard de data van de verschillende technologieën samenvoegt om zo een inzichtelijk beeld te geven over het welzijn van de persoon. In het dashboard worden grafieken en informatie weergegeven die inzicht geven in bijvoorbeeld de slaapkwaliteit, eetpatronen en fysieke of mentale gezondheid van de persoon.
Daarnaast geeft het dashboard niet alleen inzicht, maar geeft het ook voorspellingen. Een algoritme in het dashboard analyseert alle beschikbare data en geeft vervolgens meldingen over mogelijke risico factoren, zoals het risico op een val of eetproblematiek. Ook doet het directe aanbevelingen over vervolgstappen die de zorgverlener kan nemen om zo risico factoren te beperken.

Dit helpt zorgverleners zoals Amanda om meer gepersonaliseerde zorg te geven, en om bepaalde achteruitgang in gezondheid en welzijn in een eerder stadium te herkennen. Het dashboard kan Amanda helpen om te zien welke zorg acties er nodig zijn en welke cliënten er onmiddellijke zorg nodig hebben. Zo kan Amanda hoogwaardige zorg blijven leveren en wordt haar werkdruk verlaagt.

Scenario

In dit scenario neemt Amanda je mee in een dag als zorgverlener voor ouderen met dementie. Vandaag gaat ze langs bij Piet. Piet is 81 jaar oud en heeft vergevorderde dementie. De dochter van Piet, Sandra, heeft samen met de zorgverleners en de werknemers van het HAAL project gekeken welke zorg technologieën het beste bij hem zouden passen.
Omdat Sandra vanwege haar eigen gezin en werk niet altijd op haar vader kan letten zijn er in het huis van Piet technologieën geïnstalleerd die het gedragspatroon van hem kunnen herkennen. Zonder de hulp van het HAAL dashboard was het voor Piet niet mogelijk geweest om langer zelfstandig thuis te kunnen blijven wonen.

Amanda ontvangt een notificatie op haar dashboard, hierin staat dat Piets slaaproutine de laatste tijd afwijkt. Piet is afgelopen week vaak 's nachts uit bed gestapt. Het dashboard toont Amanda grafieken die weergeven hoe vaak Piet 'nachtelijke wandelingen' heeft gemaakt. En ze ziet dat inderdaad hij vaker uit bed is gestapt de afgelopen weken.
Amanda is het daarom ook eens met het voorstel van het dashboard om de sociale robot die in Piets huis staat, Piet eraan te laten herinneren dat het tijd is om terug naar bed te gaan.

Amanda komt zelf alleen een halfuurtje per dag langs en had zonder het dashboard pas in een later stadium gemerkt dat de slaap kwaliteit van Piet achteruitgaat. Doordat het dashboard haar hierop wees, kon ze op tijd ingrijpen en een volledige ontregeling van het dag nacht ritme voorkomen. Het dashboard denkt in dit geval dus proactief mee met de zorgverlener. Doordat het systeem data verzamelt van de verschillende zorg technologieën kan het weloverwogen beslissingen aandragen.

Een belangrijk aspect is dat het dashboard de data inzichtelijk kan laten zien aan Amanda, zodat zij zelf de keuze kan maken of de voorgestelde actie door het dashboard volgens haar ook inderdaad juist is. Zo houdt Amanda de controle en bepaalt zij of ze het advies opvolgt of niet. Het dashboard heeft Amanda al meerdere malen geholpen om de juiste zorg toe te passen. Echter heeft ze ook van haar collega's gehoord dat het dashboard volgens hen ook wel eens onjuist advies geeft, zo werd er bij een client aan gegeven dat er geen verhoogd val risico was, terwijl de cliënt een week later toch viel. Bij een andere cliënt gaf het systeem steeds opnieuw aan dat de client niet genoeg at, omdat de koelkast sensor geen signaal afgaf. Dit terwijl achteraf bleek dat de client 's ochtends voldoende eten voor de hele dag uit de koelkast haalde.

Om ervoor te zorgen dat er een goede balans blijft tussen het vertrouwen in het dashboard en de eigen kundigheid van de zorgverlener, krijgen Amanda en haar collega's nog regelmatig training over het gebruik van het dashboard. Tijdens deze training worden zo ook mogelijke valkuilen van het dashboard besproken. Echter is dit geen garantie voor het voorkomen van misverstanden in de zorgaanbevelingen van het HAAL dashboard.

Het dashboard helpt Amanda niet alleen om meer persoonsgerichte zorg te verlenen, maar ook om efficiënter te kunnen werken en daarmee de zorgdruk te verlagen. Voordat ze het dashboard gebruikte bezocht Amanda haar cliënten minimaal 3 keer per week. Nu kijkt ze aan het begin van haar werkdag welke cliënt er zorg nodig heeft. Zo helpt het dashboard haar om efficiëntere keuzes te maken in haar dag indeling en kan ze iedere cliënt zorg op maat geven.

Aangezien het dashboard nu aandraagt welke cliënten zij het beste zorg aan kan besteden, betekend dat ook dat ze sommige cliënten, die minder zorg nodig hebben, ze nu ook minder vaak zal zien. Ze merkt dat sommige cliënten dit toch wel jammer vinden.
Amanda moet er ook rekening mee houden, dat doordat ze efficiënter kan werken, ze meer cliënten onder haar hoede zal krijgen. Dit ook vanwege de nog steeds toenemende vraag naar zorg.

Samen met het HAAL team, kijken Amanda en haar collega's hoe het HAAL dashboard verder kan worden ontwikkeld en op een goede manier ondersteuning kan bieden in de dementie zorg.

Bullet point overzicht (waar het scenario op gebaseerd is)

Value's: autonomy, well-being & safety, transparency & explainability, responsibility & accountability, inclusiveness & equity.

- **Accuraat.** Betere kwaliteit zorg
  VOOR:
    - 24/7 data. Betere onderbouwde keuzes. (well-being)
    - Doelgerichter het probleem aanpakken (well-being)
    - Vroegtijdig. (well-being)
  TEGEN:
    - Aandacht voor je patiënt verliest (dehumanization)
    - Wiens fout als er niet correct gehandeld wordt? (responsibility)
    - Het vermogen om zelf keuzes te blijven maken (autonomy)
    - Verliest kundigheid
- **Efficiënter** zorg leveren
  VOOR:
    - Doelgerichter, weet gelijk wat het probleem is. (well being)
  TEGEN:
    - Dashboard prioriseert zorg. Kan dat patienten met minder urgente zorg daardoor over het hoofd wordt gezien. (dehumanization)
    - Dehumanization. Wordt efficiënter, dus je krijgt meer patiënten.
    - Information overload

Transparency – Blijven begrijpen waar bepaalde keuzes op gebaseerd zijn.
Privacy – angst wat er met de data gebeurd.

Appendix B: Results

B1: important snippets from interview coding

H1a The addition of anticipatory exploration influences technology acceptance. (interview)

Praktisch
Duidelijker beeld
Visualiseren

Nou, door het scenario heb je inderdaad wel meer een beeld van wat er bedoeld wordt, dus je ziet de praktische uitvoering wat meer (1. Sabine Hinnen --edited, Pos. 34)

En dat vond ik wel verhelderend (1. Sabine Hinnen --edited, Pos. 36)

Je krijgt zo met die filmpjes wel een duidelijk beeld van wat er speelt en hoe het ingezet kan worden (2. Pien ter Haar kopie--edited (1), Pos. 25)

De eerste was het echt een beetje zo van wat houdt het nou precies in, en met de tweede zag je een beetje hoe het werkte en wat er dus ook misging in. (3. Lisanne Jacobs --edited, Pos. 6)

ik heb altijd een voorbeeldje nodig en dan kan ik heel goed, zeg maar plaatsen. (3. Lisanne Jacobs --edited, Pos. 12)

Want ik dacht ook echt zo van: ja, die tweede, die tweede video is leuk. Ik weet nu wel wat het inhoudt ik heb wel een mening gevormd. Nu heb ik wel nog een beter beeld erbij, maar ik ben, zeg maar heel erg zo van ik ga dingen gelijk plaatsen in hoe ik het zou meemaken. Zelf. Dus bij de eerste video, dan heb ik al drie cliënten, zeg maar in mijn hoofd, die ik zo en hoe ik die zou koppelen zeg, maar dus ik heb hem al meteen in m'n hoofd, zeg maar geïmplementeerd. (3. Lisanne Jacobs --edited, Pos. 73)

Ja, nou weet je wat het vooral was, die eerste video is natuurlijk puur ja kort en een niet een hele uitgebreide video. Het is gewoon heel kort en bondig wat er vertelt wordt, en wat het doel is en wat je ermee kunt. En in die tweede video zie je eigenlijk gewoon heel duidelijk hoe je er eventueel zelf mee aan te werk gaat. Dus ik denk dat die tweede video vooral heel erg, ja veel verduidelijken is voor ons als verpleegkundige of andere zorgverleners. (4. Carlijn Maas kopie--edited, Pos. 53)

Ja, ik heb zelf dan heel snel bij dat soort video's, dat is wel heel grappig. Dan ga ik altijd zelf een cliënt die ik zelf in de zorg heb. Ga ik dan en dan denk ik: oh, ja, oké, hoe zou dat dan bij die cliënt bijvoorbeeld zijn? (4. Carlijn Maas kopie--edited, Pos. 55)

Heel praktisch ga je dan denken, oké, dan ga ik eens die persoon in gedachten nemen en dan ga ik dat is invullen en dan denk ik, oh, ja. (4. Carlijn Maas kopie--edited, Pos. 57)

Ja, vooral dat ik natuurlijk zelf, dat dit een beetje realistisch maakt naar je eigen werk toe. Van goh, hoe gaan we dat, zouden we dat hierin kunnen toepassen, dat eigenlijk voornamelijk. (4. Carlijn Maas kopie--edited, Pos. 82)

Fleur: Ja, is er iets wat toen je het scenario had gezien? Is het tweede video? Is daar iets toen bijgekomen waardoor je het nu opeens over nieuwe dingen na ging denken?

Floortje: Nee, niet-direct want op zich was dat hetgeen wat ook in mijn hoofd vloog zo van ja, maar wat als? Als het geeft verkeerde informatie of het blijkt anders te zijn, en eigenlijk dat scenario kwam ook uitrollen in dat filmpje. (5. Floortje Groot --edited, Pos. 36-37)

Ethisch?

Achteraf ethiek inzien Triggert scenario om over ethiek na te denken?

Ja, nee, maar ja, nu je het zegt, dan denk ik wel van oh. Ja, ja, ik snap wel wat je bedoelt en ik herken dat wel in de video. (2. Pien ter Haar kopie--edited (1), Pos. 51)

Fleur: Ja, als ik het je zo zeg, had je dan had je inderdaad het gevoel dat de introductie wat meer op functionaliteiten en het scenario ook een stukje ethiek aanraakte.

Carlijn: Ja, ja, ja, ik snap wel wat jij bedoelt dan: ja, zeker (4. Carlijn Maas kopie--edited, Pos. 87-88)

Carlijn: Ja, snap ik inderdaad, je weet dat dat wel een beetje is met dit soort onderzoeken van kijk, ja, eigenlijk moeten we wel verder nog weer kijken van ja, maar wat is er dan? Wat mis je dan nog? En dan denk ik van dat vond ik altijd wel lastig. Maar nu je dat zo zegt, dan denk ik van oh, ja, dat stukje Ethiek, dat mis je dan eigenlijk wel. Ja, dat merk ik dan tenminste bij mezelf, maar dat je er dan eigenlijk niet echt helemaal over nadenkt. (4. Carlijn Maas kopie--edited, Pos. 84)

Ja, nee, eigenlijk dus niet. Maar name, nu jij het zo benoemt, dan begrijp ik het wel, maar het is niet zo dat ik daar bewust zo over na heb gedacht heeft, nee dat niet. (4. Carlijn Maas kopie--edited, Pos. 90)

Ik miste het in eerste instantie niet. Maar ja, ik denk dat het wel goed is, ja. (4. Carlijn Maas kopie--edited, Pos. 92)

Niet per se nagedacht, maar ik denk dat je sowieso nooit blindelings moet gaan vertrouwen op de data die je voor je ziet, maar altijd een combi moet zijn van eigen klinisch redeneren ook aan de hand van de data die je krijgt. (5. Floortje Groot --edited, Pos. 45)

Fleur: Ja, ja, dus dat was inderdaad mijn vraag. Of dat jij na dat scenario, ben jij ook meer getriggerd geweest om meer te gaan na te denken over ethische aspecten,

Floortje: Jawel dat wel

Floortje: Nouja bijvoorbeeld het stukje privacy. Als je het leven van de client binnendringt maar het heeft ook goede doelen. Wat weegt dan zwaarder? (5. Floortje Groot --edited, Pos. 64-66)

Floortje: Nee, maar het geeft je wel altijd weer even opnieuw. Ja, aandachts momentje van, hè

Fleur: Ja, het is wel, je hebt er wel over nagedacht, maar wel fijn dat je het effe verduidelijkt ziet.

Floortje: En even weer vernieuwd onder de aandacht bracht, zeg maar (5. Floortje Groot --edited, Pos. 70-72)

Mening aangepast

Dat dat niet eens zozeer nee, dat nee, dat denk ik niet. (2. Pien ter Haar kopie--edited (1), Pos. 53)t?

H2a: The addition of anticipatory exploration leads to a more easily perceived evaluation of technology acceptance. (interview)

Ervaring nodig
Moeilijk om mening te vormen
Gemis van ethiek

Een stukje het onbekende (1. Sabine Hinnen --edited, Pos. 12)

Ja, dat denk wel dat door het ervaren ze van mening zullen veranderen. (1. Sabine Hinnen --edited, Pos. 16)

mensen gewoon goed geïnformeerd moeten zijn (1. Sabine Hinnen --edited, Pos. 32)

aan de hand van die filmpjes gaan mensen, denk ik, wel eerder begrijpen en snappen waarom zo'n technologie wordt ingezet. (2. Pien ter Haar kopie--edited (1), Pos. 33-34)

Fleur: Ja, en heb jij nog vraagtekens gehad, over bepaalde normen en waarde van het gebruik van zo'n technologie?

Pien: Nee, ook eigenlijk niet. (2. Pien ter Haar kopie--edited (1), Pos. 34-35)

(Eerst geen onduidelijkheden, maar als je erover begint komen er toch nieuwe vragen op)

Zoals ze krijgen minder zorg, angst dat het op een andere manier gedaan wordt. Maar we merken wel dat de weerstand kleiner wordt naarmate we het inzetten (2. Pien ter Haar kopie--edited (1), Pos. 59)

Als ik het zo zie, wel, van de ene kant wel, aan de andere kant niet. Ik heb die als neutraal ingevuld, want er zit er eigenlijk best wel veel goede dingen in, denk ik, maar er zitten ook best wel wat dingen in waarvan ik denk mmm... (3. Lisanne Jacobs --edited, Pos. 32)

Ethiek, dat mis je dan eigenlijk wel. Weet je dat wel wel goed, dat je dat dan? Ja, dat merk ik dan tenminsten bij mezelf maar dat je dan eigenlijk niet echt helemaal over nadenkt. (4. Carlijn Maas kopie--edited, Pos. 84)

Ja, nee, eigenlijk dus niet. Maar name, nu jij het zo benoemt, dan begrijp ik het wel, maar het is niet zo dat ik daar bewust zo over na heb gedacht heeft, nee dat niet. (4. Carlijn Maas kopie--edited, Pos. 90)

Niet per se nagedacht, (5. Floortje Groot --edited, Pos. 45)

B2: open-ended questions coded

Groep	Naam	Toelichting DSS	Positief DSS	Risico DSS	Begrijpelijkheid	Retrieval: wil je nog iets weten	Waarom moeilijk mening vormen	Response: wil je nog iets delen over je visie	Iets nieuws scenario?
1	Lisanne	er worden soms robots ingezet om structuur bij dementerende in de dag te houden	overzichtelijk, toegankelijk voor zorgverleners veel technologie die de dementerende zo lang mogelijk thuis kan laten wonen op een verantwoorde manier.	sommige zorgverleners kijken misschien niet verder dan de haal en vergeten zo de **daadwerkelijke behoeftes** van de client of zien zo dingen over het hoofd die nieuwe risicos zijn.	1: - 2: -	1:In hoe verre is dit al ontwikkeld en wordt het ergens al gebruikt 2: nee	-	1: Nee 2: -	dat er ook foutieve info wordt gegeven. Lagere niveaus handelen nl naar wat ze moeten doen en kijken niet verder dan het zorgdoel.
1	Noah		Persoonlijk behandelplan wat aansluit op de cliënt. Risico's worden op tijd gesignaleerd. Voor- of achteruitgang in de gezondheid wordt eerder gesignaleerd. De werkdruk op	Blind staren op het dashboard en alleen maar uit gaan van de data die op het dashboard beschikbaar is, dat maakt het misschien iets **minder persoonlijk**.	1: - 2:-	1:Nee. 2: nee	-	1:- 2: -	Nee.

			zorgverleners neemt af en de kwaliteit van de zorg wordt op die manier weer vergroot.						
1	Sabine H.		vanuit meerdere kanten informatie verzamelen bij thuiswonenden handig omdat je hier vaak onvoldoende zicht hebt op gedrag	**privacy** van de client	1: - 2:-	1: ja, wie beslist het niveau van dementie welke in het dashboard komt te staan, en mag je als zorgverlener deze labels geven. 2: -	-	1: In hoeverre worden andere disciplines en familie betrokken. Is er rekening mee gehouden dan dementerenden vaak tegen technologieen zijn en zij wel toestemming moeten geven als dit in hun woning ingezet wordt? In hoeverre is hier winst te behalen als het maar bij een beperkt aantal mensen in te zetten is. Ik konde vraag over het niveau van dementie niet goed beantwoorden omdat er bij mijn client unknown stond. 2: -	-
1	Patricia		Je kunt sneller schakelen tussen prioriteiten. Je hebt alles in 1 overzicht staan wat het gebruiksvriendelijk maakt Het geeft je aanbevelingen	Het blijft technologie. Als het niet werkt of heeft een **storing** heb je geen overzicht meer.	1: - 2: -	1: hoe gebruiksvriendelijk is het op bijvoorbeeld telefoon. 2: nee	-	1: Mijn visie en wat ik merk in de praktijk. Het moet wel werken, en gebruiksvriendelijk zijn. Makkelijk uit te leggen zijn, want er zijn vele mensen die niet goed zijn met technologie, waarbij dit eerder een last gaat zijn dan een ontlasting 2: Zorg ervoor dat het gebruiksvriendelijk word voor mensen die geen idee hebben van	Fijn dat er benoemd werd dat het systeem af en toe fouten maakt, waardoor je niet de juiste acties kunt inzetten. Goed dat dit blijft door ontwikkelen.

								technologie. Anders wordt het meer een last van een ontlasting	
2	Pien	Deze technologieen moeten het dagelijks leven van clienten (met dementie) makkelijker maken zodat clienten langer zelfredzaam zijn en daardoor ook langer thuis kunnen blijven wonen.	Er zijn verschillende catergorieen die je makkelijk op 1 dashboard kunt zien. Niet meer voor ieder apparaat een andere website gebruiken. Dit maakt het veel overzichtelijker, makkelijker en scheelt de zorgmedewerker tijd.	Zorgmedewerkers kunnen uit gaan van de voorspellingen terwijl voorspellingen misschien wel helemaal niet kloppen, in hoe verre is dit te **vertrouwen**? Meldingen bij mogelijk risico, gaat dit de zorg niet juist weer meer tijd kosten bijvoorbeeld als we langs gaan bij vals alarm.	1: - 2: -	1:Het is duidelijk zo. Ik denk wanneer ik er meer mee zal gaan werken, er vanzelf wel vragen zouden komen maar voor nu kan ik niets bedenken. 2: -		1: - 2: -	-
2	Lieke		- Zorg op maat leveren, er wordt veel meer gekeken naar wat een cliënt wel/niet kan - Zorgverleners weten waar de risico's liggen, dus kunnen hier op anticiperen	- Ik ben benieuwd of er dan nog wel gekeken wordt naar de cliënt zelf door de zorgverlener, of dat er alleen maar uit wordt gegaan van de technologie - Hoe wordt er om gegaan met risico's? en wie bepaald dit? Is dit de zorgverlener, de cliënt, de familie? Samen? wat als je er niet uitkomt? **(Fleur: verantwoordelijkheid)**	1: - 2: -	1: / 2: -		1: - 2: -	Er staat alleen valincident en pending, dus ik kan er nog niet veel verder mee
2	Floortje		overzicht en gebruik van alle applicaties zichtbaar binnen 1 app of zorgomgeving. Meerdere aspoecten van de zorg worden geanalyseerd	**Minder persoonlijke zorg**. Menselijk fysiek contact verminderd. Andere vorm van vereenzaming. verkeerd interpreteren van de data?	1: - 2: -	1: Kosten van implementatie mogelijk? Wie draait hier voor op. De inzet van deze hulpmiddelen en de koppeling naar het HAAL dashboard		1: Nee niks anders om te delen. Ik vindt alleen het risico van minder contact met klanten en meer overname door technologie altijd iets wat goed overwogen moet	Nee, er werd juist aandacht gegeven aan de mogelijk valkuilen van het gebruik van dit systeem en zorgtechnologieen.

						2: Zie eerdere beantwoording van deze vraagstelling		worden ook voor sociaal aspect, vereenzaming en de gezondheidsproblematiek die daar ook bij kan komen kijken. Apparaten kunnen geen emoties meten. 2: zie antwoord eerdere vraagstelling	
2	Meike		Ik vind het een positief punt dat door middel van deze technologie op verschillende gebieden uitspraak kan worden gedaan en dat verschillende onderdelen van de cliënten (slaappatroon, eetpatroon, beweging, etc.) samen worden gevoegd en daarbij een conclusie geven. Zo kan snel een disbalans en dergelijke worden opgespoord en kunnen hier vroegtijdig acties op worden uitgezet. Verder kunnen cliënten dmv dit systeem langer thuis wonen, omdat er vanaf een afstand gemonitord kan worden.	Ik vind het een risico dat wanneer er bijvoorbeeld gebruik wordt gemaakt van een beweging sensor e.d. bij de dementerende cliënt thuis, dat wanneer de cliënt nog samen woont met partner (wel of niet dement) invloed gaat hebben op de resultaten. Hoe wordt gemonitord of daadwerkelijk alleen de gegevens van de juiste cliënt doorgegeven worden en niet bijvoorbeeld de beweging van partner mee word genomen in het dashboard. Komen alleen de metingen van de juiste cliënt binnen?	1: - 2: -	1: Misschien verschillende pagina's, meerdere voorbeelden en meer over de precieze werking en adviezen die het dashboard zou geven hoe dat dit er dan uit zou zien 2: Welke opties er nog meer op zitten, hoe de adviezen die gegeven zouden kunnen worden eruit zouden zien op het dashboard, misschien iets interactiefs (dat ik zelf de adviezen in het dashboard zou kunnen zien etc).		1: Denk zeker dat het nuttig is, ook om dit binnen het team meerdere keren te bespreken een hier naar te kijken waar mogelijkheden zijn 2: Ik denk dat het zeker een goede implementatie zou kunnen zijn, maar vind inderdaad het risico dat verkeerde gegevens worden doorgegeven groot.	-
2	Iris		Het goed kunnen monitoren op mogelijke problemen die voorspeld kunnen worden door goed te monitoren hoe het met iemand gaat.	Medicatie die wordt gegeven door een robot kan niet altijd voordelig werken, omdat mensen slecht horend zijn waardoor ze het niet horen, of het zakje er af scheuren even ergens	1: - 2: -	1: Nee alles is duidelijk, het doel is duidelijk wat je er mee wilt bereiken en hoe je efficiënter kunt werken wat in veel		1: nee 2: nee	Nee niet een specifiek iets wat belangrijk was. Heb een duidelijker beeld gekregen.

			Het zo lang mogelijk zelfstandig wonen kunnen bieden door dat er veel technologie is waardoor dat ook echt kan. Het haal dashboard is een positieve technologie die gebruikt kan worden in de zorg, om zo vroegtijdig mogelijke gevaren te ontdekken doordat alles daarin goed wordt bijgehouden. Dus als er dan verandering in het patroon komt je hier sneller actie op kan ondernemen.	neer leggen en vervolgens niet meer weten waar ze het hebben neer gelegd. Gps, is een groot nadeel dat het niet altijd nauwkeurig werkt. Er zit vaak een storing in waardoor je niet precies kan zien waar iemand is. Het risico van een medicatie deler, is dat mensen die slechthorend zijn hem niet horen. En mensen die licht dementerend zijn het zakje er af kunnen scheuren ergens anders neer kunnen leggen en het zo toch vergeten.		gevallen voordelig werkt voor de cliënt 2: Nee alles is duidelijk			
3	Sabine V	Technologie die de zorgverleners ontzorgt en clienten meer zelfredzaam maakt.	- meer inzicht in hoe de cliënt in een verpleeghuis of thuis functioneert, omdat een zorgverlener niet 24/7 bij de cliënt is. - sneller kunnen schakelen om de juiste acties in te zetten, omdat je zicht hebt op meerdere factoren hoe het met de cliënt gaat. Daar heb je niet altijd zicht op als zorgverlener, nu wordt er meer gemeten.	- de zorgverlener moet voldoende in beeld blijven. Een vorm van blended care waarbij technologie en fysieke zorg een combi moet blijven. - meet wat je moet weten en doe er ook wat mee. Dat alleen wordt ingezet wat nodig is en niet 'over' gaan meten met data. Dan kan het ook juist meer werk worden voor de zorgverleners.	1: - 2: -	1: Bij het klikken op de client, had ik graag nog de aangesloten 'apparaten' zien staan. Zodat ik wat meer informatoe had, welke techniek en evt welke kamer het valincident had gemeten. 2: Nee, duidelijke filmpjes. Na filmpje 2 was er weer meer duidelijker, waardoor de vragen een 2de keer invullen makkelijker was. Waarbij ik na filmpje 1 nog wat meer informatie nodig had		1: Misschien nog de urgentie van het probleem weergeven en via welke weg dit bij de zorgverlener komt? Via app, sms, belletje, een persoon van team en dan doorgegeven? En wat er verwacht wordt van zorgverlener? direct naar de client, bellen, contactpersonen inschalen etc. 2: -	- ja, het stuk over dat de zorgproces anders wordt ingericht en het 'anders werken'. En dat soms meldingen niet meteen acuut of niet waar zijn, dua dat een fysieke blik altijd goed is. Blended care leveren.

						om de vragen in te vullen.			
3	Carlijn		- Het is erg compact en daardoor overzichtelijk. - De werkdruk neemt af.	- Bepaalde risicofactoren worden vergeten/niet geregistreerd. - Bepaalde cliënten begrijpen technologiën niet.	1: - 2: -	1: Nee. 2: nee		1: Nee. Eigenlijk is alles wel duidelijk! 2: Nee	Nee.
3	Miranda		Minder werkdruk All benodigde informatie op een bereikbare plek	Dat je dingen te laat gaat signaleren omdat je afhankelijk bent van het dashboard.	1: - 2: -	1: Nee alles was duidelijk 2: nee		1: Nee 2: Nee	Nee
4	Sanne A	Technologie die op basis van informatie beslissingen kan nemen. Hiermee kunnen zorgverleners ondersteund worden in hun dagelijkse werkzaamheden door op basis van de bestaande informatie adviezen en beslissingen weer te geven.	Het systeem kan ondersteunen met adviezen geven en-of risico's te signaleren. Hierdoor wordt er breder gekeken naar de cliënt dan nu in de praktijk mogelijk wordt gedaan. Met name op het gedeelte van risico signalering. Betreft adviezen kan dit een enorme meerwaarde zijn om de zorgmedewerker een steuntje in de rug te bieden bij specifieke situaties.	informatie wordt niet juist geïnterpreteerd door het systeem waardoor er verkeerde adviezen uitkomen. Als de zorgverlener niet ook zelf nadenkt, maar de adviezen **blind opvolgt** kunnen er onwenselijke of schadelijke situaties ontstaan voor de cliënt. **(Fleur: autonomy)**	1: - 2: -	1: nee 2: nee		1: Er zal rekening gehouden moeten worden met zorgmedewerkers die niet sterk digitaal vaardig zijn. Voor hen zal elke verandering in het werken met digitale middelen een extra uitdaging zijn. Hierin ligt ook een verantwoording voor de organisatie die dit HAAL dashboard zal implementeren. Echter kan er vanuit het dashboard mogelijk al rekening worden gehouden met deze doelgroep aan medewerkers. 2: nee	nee
4	Lisa		1. Je hebt alle gegevens makkelijk op 1 plek en werk hierdoor erg overzichtelijk 2. Je kan hierdoor sneller ingrijpen om de	Er kan mischien weerstand worden geboden door oudere werknemers omdat ze op een nieuwe manier moeten gaan werken dan die ze gewend zijn.	1: - 2: -	1: Of hier ook de contact gegevens van de familie in staan en of hier in het algemeen ook rapportages in verwerkt kunnen		1: Ik heb niets meer om toe te voegen 2: -	-

			doel gerichte zorg te verbeteren. inplaats van dat je dit werkelijk zichtelijk moet zien en moet constateren op het moment dat het eigenlijk al te laat is zoals vaak na een incident dat de lijsten worden opgestart.			worden en niet alleen de gegevens van de technologische middelen. 2: -			
4	Lindsay		- Je kan makkelijk zien welke risico's een cliënt loopt - Je kan alles in 1 overzicht zien en niet dat je voor alles naar een ander dashboard moet	- Als dit via internet is en/of het programma ligt eruit dan kan je niet bij de gegevens. Als dit in het weekend of avonden is is er vaak niemand beschikbaar om dit porbleem op te lossen.	1: - 2: -	1: Nee 2: nee		1: - 2: nee	nee
4	Cisca		direct inzicht in de gegevens van de client, je kunt direct handelen bij incident	geen sociale contacten meer met client. Systeem moet up to date zijn en internet bereikbaar	1: - 2: -	1: In hoeverre betrouwbaar,wat kost het voor tijd om dit bij te houden (Up to date) voor de zorgverleners. Zijn de kosten lager dan de zorgverleners? 2: nee		1: Prima deze ondesteuning ,als het ook maar een ondersteuning blijft . DIt ligt natuurlijk aan de zorgvragers, de een wordt proffecionelerer, de andere "lui"en denken het zal wel goed zijn": . Juist de bezeken naar de client vind ik erg belangrijk , hoeft niet direct van wijkverpleegkundigen te zijn maar wel van een andere zorgverlener(ig niveua 2).Zodat de client direct contact heeft met zorgverleners. 2: nee	nee

Ethisch, Praktisch, foutieve gegevens, duidelijker beeld

Benoem 1 of 2 positieve punten van het HAAL dashboard. Benoem 1 of 2 risico's van het HAAL dashboard.
Compr. Heb je moeilijkheden ervaren met het begrijpen van de vragen? Zo ja, waar lag dat aan?
Retr. Is er iets wat jij nog graag over het dashboard had willen weten wat voor jou belangrijk was geweest voor je mening over het dashboard?
Judg. Vond je het moeilijk om een mening te vormen over het dashboard? Zo ja, waar lag dit aan?
Resp. Is er nog iets dat je wilt delen over jouw visie op het dashboard wat in de vragen nog niet naar voren is gekomen?
Is er iets nieuws in het scenario benoemd wat voor jou belangrijk was om een mening te vormen over het HAAL dashboard? Zo ja, wat was dat?

B3: Stata17 code

MT1: For wide format

```
clear all
import excel "/Users/fleur/Documents/MTP Vilans/Data analyze/Data_zorgverleners.xlsx", sheet("Blad1") firstrow
set more off

tab groep

********* Gen new vars  **********

//m_accep1
egen m_accep_1 = rmean (accep1 accep2 accep3 accep4 accep5 accep6 accep7 accep8 accep9 accep10 accep11 accep12 accep13 accep14 accep15 accep16 accep17 accep18 accep19 accep20 accep21 accep22 accep23 accep24 accep25 accep26 accep27)

//m_accep2
egen m_accep_2 = rmean(accep2_1 accep2_2 accep2_3 accep2_4 accep2_5 accep2_6 accep2_7 accep2_8 accep2_9 accep2_10 accep2_11 accep2_12 accep2_13 accep2_14 accep2_15 accep2_16 accep2_17 accep2_18 accep2_19 accep2_20 accep2_21 accep2_22 accep2_23 accep2_24 accep2_25 accep2_26 accep2_27)

egen m_trust_1 = rmean (accep10 accep11)
egen m_trust_2 = rmean (accep2_10 accep2_11)

egen m_risk_1 = rmean (accep15 accep16)
egen m_risk_2 = rmean (accep2_15 accep2_16)

egen m_anxiety_1 = rmean (accep18 accep19 accep20)
egen m_anxiety_2 = rmean (accep2_18 accep2_19 accep2_20)

egen m_attitude_1 = rmean (accep24 accep25 accep26 accep27)
egen m_attitude_2 = rmean (accep2_24 accep2_25 accep2_26 accep2_27)

// m_begrijpelijkheid
egen m_comprehension_1 = rmean(begrijpelijkheid1 begrijpelijkheid2 begrijpelijkheid3)
egen m_comprehension_2 = rmean(begrijpelijkheid21 begrijpelijkheid22 begrijpelijkheid23)

// m_retrieval
egen m_retrieval_1 = rmean(retrieval3)
egen m_retrieval_2 = rmean(retrieval23)

// m_judgment
egen m_judgment_1 = rmean(judgment1 judgment2 judgment3)
egen m_judgment_2 = rmean(judgement21 judgement22 judgement23)

//m_antwoorden
egen m_response_1 = rmean(antwoorden1 antwoorden2 antwoorden3)
egen m_response_2 = rmean(antwoorden21 antwoorden22 antwoorden23)

gen diff_accep1_accep2 = abs(m_accep_1 - m_accep_2)
```

```
gen adjust_accep1_accep2 = m_accep_1 - m_accep_2



*** outliers ****
//drop if naam == "Miranda "
// deel 2 alles neutraal ingevuld

//drop if naam == "Lisa"
// deel 2 niet ingevuld


****** descriptive: acceptatie ***********

sum m_accep_1 if groep == 1
sum m_accep_2 if groep == 1

sum m_accep_1 if groep == 2
sum m_accep_2 if groep == 2

sum m_accep_1 if groep == 3
sum m_accep_2 if groep == 3

sum m_accep_1 if groep == 4
sum m_accep_2 if groep == 4

//graph bar m_accep_1 m_accep_2, over(groep)

gen origineel = .
replace origineel = 1 if groep == 1 | groep == 3
replace origineel = 2 if groep == 2 | groep == 4

//graph bar m_accep_1 m_accep_2, over(origineel)

sum m_accep_1 if origineel == 1
sum m_accep_2 if origineel == 1

sum m_accep_1 if origineel == 2
sum m_accep_2 if origineel == 2


****** descriptive: difficulty ***********

/*
graph bar m_comprehension_1 m_comprehension_2, over(origineel) title("comprehension")
name(graph1, replace)
graph bar m_retrieval_1 m_retrieval_2, over(origineel) title("retrieval") name(graph2, replace)
graph bar m_judgment_1 m_judgment_2, over(origineel) title("judgment") name(graph3, replace)
graph bar m_response_1 m_response_2, over(origineel) title("response") name(graph4, replace)

graph combine graph1 graph2 graph3 graph4, rows(2)
*/

sum m_comprehension_1 if origineel == 1
sum m_comprehension_2 if origineel == 1
```

```
sum m_comprehension_1 if origineel == 2
sum m_comprehension_2 if origineel == 2

sum m_retrieval_1 if origineel == 1
sum m_retrieval_2 if origineel == 1
sum m_retrieval_1 if origineel == 2
sum m_retrieval_2 if origineel == 2

sum m_judgment_1 if origineel == 1
sum m_judgment_2 if origineel == 1
sum m_judgment_1 if origineel == 2
sum m_judgment_2 if origineel == 2

sum m_response_1 if origineel == 1
sum m_response_2 if origineel == 1
sum m_response_1 if origineel == 2
sum m_response_2 if origineel == 2



******** Hypotheses testing **************

*H1.1: Heeft het scenario invloed op de acceptatie
*H1.2: SD van groep 1,3 is groter dan SD 2,4
*H2: Heeft het scenario invloed op moeilijkheid invullen (comp, retr, judm, answ)
*H3: -- (kwali, more in depth)

*H1.1
ttest m_accep_1, by(origineel)

sum waardescenario1
//hist waardescenario1
ttest waardescenario1 == 3
** " Het zien van het scenario heeft mij nieuwe relevante informatie gegeven "

sum waardescenario2
//hist waardescenario2
ttest waardescenario2 == 3
** " Ik heb mijn mening over het HAAL dashboard na het zien van het scenario bijgesteld "



*H1.2

ttest diff_accep1_accep2, by(origineel)
//graph bar diff_accep1_accep2, over(origineel)

sum diff_accep1_accep2 if origineel == 1
sum diff_accep1_accep2 if origineel == 2



tab adjust_accep1_accep2 if origineel == 1
tab adjust_accep1_accep2 if origineel == 2
```

```
*  H2
ranksum m_comprehension_1, by(origineel) // p= 0.0345
ranksum m_retrieval_1, by(origineel)
ranksum m_judgment_1, by(origineel)
ranksum m_response_1, by(origineel)

sum m_comprehension_1 if origineel == 1
sum m_comprehension_1 if origineel == 2

//Ranksum has les statistical power.

sum waardescenario3
//hist waardescenario3
ttest waardescenario3 == 3



** " Na het zien van het scenario kon ik de vragen over het HAAL dashboard makkelijker invullen "

*  Explorative

ranksum m_trust_1, by(origineel)
//outliers terug in voor sample size. Trust is significant
// p = 0.0209
ranksum m_risk_1, by(origineel)
ranksum m_anxiety_1, by(origineel)


//graph bar m_trust_1, by(origineel)
//graph bar m_risk_1, by(origineel)
//graph bar m_anxiety_1, by(origineel)

x

sum m_trust_1 if origineel == 1
sum m_trust_1 if origineel == 2



******** Assumption checking for t-test *******

/*
** Checking for normality assumptions ( t-test)
hist indiv if country==1, normal title(spain)
sktest indiv if country==1
swilk  indiv if country==1
// if rejected, so no normality, use ranksum test

** checking for homogenity assumption (t-test)
robvar needsocial, by(group)
// W0 NOT significant (so higher than 0.05)
// No issues with the homogeneity of variance assumption
// If issue, put unequal behind the ttest
// use welch -->
```

```
*/

// Check normality
sktest m_accep_1 if origineel == 1
swilk m_accep_1 if origineel == 1
sktest m_accep_1 if origineel == 2
swilk m_accep_1 if origineel == 2
// not rejected

// Check homogenity
robvar m_accep_1, by(origineel)
// not rejected

// check normality
sktest diff_accep1_accep2 if origineel == 1
swilk diff_accep1_accep2 if origineel == 1
sktest diff_accep1_accep2 if origineel == 2
swilk diff_accep1_accep2 if origineel == 2
// not rejected

// check homogenity
robvar diff_accep1_accep2, by(origineel)
// not rejected

// Check normality
sktest m_comprehension_1 if origineel == 1
swilk m_comprehension_1 if origineel == 1
sktest m_comprehension_1 if origineel == 2
swilk m_comprehension_1 if origineel == 2
// not rejected

// Check homogenity
robvar m_comprehension_1, by(origineel)
// not rejected

// Check normality
sktest m_retrieval_1 if origineel == 1
swilk m_retrieval_1 if origineel == 1
sktest m_retrieval_1 if origineel == 2
swilk m_retrieval_1 if origineel == 2 // rejected
// not rejected


// Check homogenity
robvar m_retrieval_1, by(origineel)
// not rejected

// Check normality
sktest m_judgment_1 if origineel == 1
swilk m_judgment_1 if origineel == 1
sktest m_judgment_1 if origineel == 2
swilk m_judgment_1 if origineel == 2
// not rejected

// Check homogenity
```

```
robvar m_judgment_1, by(origineel)
// not rejected

// Check normality
sktest m_response_1 if origineel == 1
swilk m_response_1 if origineel == 1
sktest m_response_1 if origineel == 2  //rejected
swilk m_response_1 if origineel == 2   // rejected
// not rejected

// Check homogenity
robvar m_response_1, by(origineel)
// not rejected


// Check normality
sktest m_trust_1 if origineel == 1
swilk m_trust_1 if origineel == 1 // rejected
sktest m_trust_1 if origineel == 2
swilk m_trust_1 if origineel == 2
// not rejected

// Check homogenity
robvar m_trust_1, by(origineel)
// not rejected

// Check normality
sktest m_risk_1 if origineel == 1
swilk m_risk_1 if origineel == 1
sktest m_risk_1 if origineel == 2
swilk m_risk_1 if origineel == 2
// not rejected

// Check homogenity
robvar m_risk_1, by(origineel)
// not rejected

// Check normality
sktest m_anxiety_1 if origineel == 1
swilk m_anxiety_1 if origineel == 1 // rejected
sktest m_anxiety_1 if origineel == 2
swilk m_anxiety_1 if origineel == 2
// not rejected

// Check homogenity
robvar m_anxiety_1, by(origineel)
// not rejected
```

MT2: For long format

```
clear all
import excel "/Users/fleur/Documents/MTP Vilans/Data analyze/Data_2_zorgverleners.xlsx", sheet ("Blad1") firstrow clear
set more off

**** new variables ****
sum
egen m_accep = rmean(accep1 accep2 accep3 accep4 accep5 accep6 accep7 accep8 accep9 accep10 accep11 accep12 accep13 accep14 accep15 accep16 accep17 accep18 accep19 accep20 accep21 accep22 accep23 accep24 accep25 accep26 accep27)
egen m_techalgemeen = rmean(techalgemeen_1 techalgemeen_2 techalgemeen_3)
egen m_begrijpelijkheid = rmean(begrijpelijkheid_1 begrijpelijkheid_2 begrijpelijkheid_3)
egen m_retrieval = rmean(retrieval_1 retrieval_2 retrieval_3)
egen m_judgment = rmean(judgment_1 judgment_2 judgment_3)
egen m_antwoorden = rmean(antwoorden_1 antwoorden_2 antwoorden_3)

egen m_trust = rmean (accep10 accep11)
egen m_risk = rmean (accep15 accep16)
egen m_anxiety = rmean (accep18 accep19 accep20)
egen m_attitude = rmean (accep24 accep25 accep26 accep27)

gen origineel = .
replace origineel = 1 if groep == "een" | groep == "drie"
replace origineel = 2 if groep == "twee" | groep == "vier"

/*
m_accep = acceptatie rating van de technologie
scenario = heb je het scenario over ethiek gezien (0= nee 1= ja)
period = wanneer heb je het scenario gezien (1= eerste deel, 2= tweede deel)
task = heb je het scenario in combinatie gehad met taak 1 of taak 2 (1 = taak 1, 2 = taak 2)
jaar_ervaring = aantal jaar werkend in de dementiezorg
m_techalgemeen = rating van tech optimist of pessimist (1-5)
*/

**** correct data ***
destring id, replace

**** descriptive *****
//graph bar m_accep, over(scenario)

**** outlier *****
drop if id == 12



******** Hypotheses testing **********

*H1.1: Heeft het scenario invloed op de acceptatie
*H1.2: SD van groep 1,3 is groter dan SD 2,4
*H2: Heeft het scenario invloed op moeilijkheid invullen (comp, retr, judm, answ)
*H3: -- (kwali, more in depth)
```

*** H:1.1 Multi level analyses *****

xtset id
xtreg m_accep
xttest0

/*Since rho > 0.10 (rho = 0.75) (the variance at the class level is namely 0.064(?)) multilevel analysis is necessary.
Since the p value that results from the xttest0 equals 0.0000 we can say that the part of the variance at class level is significantly different from zero.
*/

*Rho is wel erg hoog (0.75). Bijna alle variantie is te wijden aan de persoon. Maakt dat het een slecht model? Of?

*Heeft het nu om interactie effect toe te voegen?

*Er zijn geen variabelen om te splitten(?) Scenario geprobeerd (is enige X within variable), werkte niet.

xtset id
xtreg m_accep scenario period task jaar_ervaring m_techalgemeen, robust

*Geen van deze factoren heeft een significant effect op acceptability.
*71% van de variantie wordt verklaart door het individu zelf.
* The R-squared is laag (within = 0.026, between = 0.26). The model explains 26% of the variance of acceptance. Maar geen van de x's zijn significant?

// Robust model //

xtset id
xtreg m_accep scenario period task jaar_ervaring m_techalgemeen, robust
//Period is nu sig (p=0.028), dit was zonder robust eerst niet.

** H:2 **

xtset id
xtreg m_begrijpelijkheid
xttest0

xtset id
xtreg m_begrijpelijkheid scenario period task jaar_ervaring, robust
// rho= 0.46
// nothing significant

xtset id
xtreg m_retrieval
xttest0

xtset id
xtreg m_retrieval scenario period task jaar_ervaring, robust
// rho = 0.57
// nothing significant

```
xtset id
xtreg m_judgment
xttest0

xtset id
xtreg m_judgment scenario period task jaar_ervaring, robust
// rho = 0.74
// nothing significant

xtset id
xtreg m_antwoorden
xttest0

xtset id
xtreg m_antwoorden scenario period task jaar_ervaring, robust
// rho 0.15
// nothing significant


xtset id
xtreg m_trust scenario period task jaar_ervaring m_techalgemeen, robust

xtset id
xtreg m_risk scenario period task jaar_ervaring m_techalgemeen, robust

xtset id
xtreg m_anxiety scenario period task jaar_ervaring m_techalgemeen, robust

xtset id
xtreg m_attitude scenario period task jaar_ervaring m_techalgemeen, robust


ttest m_trust, by(origineel)

*** H1.1 : ttest ****

// ttest m_accep_1, by(origineel) -> zie MT_1

**** H1.1: waarde scenario ****

 -> zie MT_1
tab waardescenario1
//hist waardescenario1
** " Het zien van het scenario heeft mij nieuwe relevante informatie gegeven "

tab waardescenario2
//hist waardescenario2
** " Ik heb mijn mening over het HAAL dashboard na het zien van het scenario bijgesteld "

tab waardescenario3
//hist waardescenario3
** " Na het zien van het scenario kon ik de vragen over het HAAL dashboard makkelijker invullen "


*/
```

```
******* Assumption checking multi-level analyses *******
// Multi level assumption \\
xtset id
xtreg m_accep scenario period task jaar_ervaring m_techalgemeen, fe
estimates store fixed
xtreg m_accep scenario period task jaar_ervaring m_techalgemeen, re
estimates store random
hausman fixed random
* p>0.05 assumption is met (p = 0.77)

//No Multi-collinearity\\

*There must be no strong correlation between two or more predictor variables
pwcorr scenario period task jaar_ervaring m_techalgemeen
reg m_accep scenario period task jaar_ervaring m_techalgemeen
estat vif
/*
Assumption is met.
When performing the test pwcorr we see that none of the correlations gets a
value above 0.8 which is good.
We check again for multi-collinearity by using the estat vif command, which also
doesn't give us any values to worry about since no single VIF gets above 10
(hightest single VIF = 1.87) and the mean VIF doesn't get above 2.5 (mean VIF =
1.39).
*/

//Homoscedasticity\\

* All residuals are from a distribution with an equal variance.

imtest
hettest
hettest, rhs
// p>0.05 assumption is met


//Linearity\\

// The "true" model should be linear.

//rvfplot
//avplots
// is not linear -> robust

//Independent errors\\
/*
You should not have dependent errors, and we obviously do here, that is why
we started running multilevel in the first place.
*/
reg m_accep scenario period task jaar_ervaring m_techalgemeen, robust

//Errors (residuals) are distributed normally\\
//*Check if the residuals are normally distributed.
predict e, resid
```

sktest e
swilk e
*p> 0.05. Assumption is met

B4: Screenshots of Stata17 output

Hypothesis 1A

```
. xtreg m_accep

Random-effects GLS regression                   Number of obs     =         29
Group variable: id                              Number of groups  =         15

R-squared:                                      Obs per group:
     Within  = 0.0000                                         min =          1
     Between = 0.0000                                         avg =        1.9
     Overall = 0.0000                                         max =          2

                                                Wald chi2(0)      =          .
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =          .
```

m_accep	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
_cons	3.47492	.0625635	55.54	0.000	3.352298	3.597542
sigma_u	.22367247					
sigma_e	.128109					
rho	.7529862	(fraction of variance due to u_i)				

```
. xttest0

. xtreg m_accep scenario period task jaar_ervaring m_techalgemeen, robust
(1 missing value generated)

Random-effects GLS regression                   Number of obs     =         29
Group variable: id                              Number of groups  =         15

R-squared:                                      Obs per group:
     Within  = 0.0258                                         min =          1
     Between = 0.3938                                         avg =        1.9
     Overall = 0.3345                                         max =          2

                                                Wald chi2(5)      =      20.77
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0009

                                  (Std. err. adjusted for 15 clusters in id)
```

m_accep	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
scenario	.026551	.0540073	0.49	0.623	-.0793014	.1324035
period	.21937	.1000858	2.19	0.028	.0232055	.4155345
task	-.0840691	.1371676	-0.61	0.540	-.3529126	.1847744
jaar_ervaring	-.0152995	.0101669	-1.50	0.132	-.0352263	.0046272
m_techalgemeen	-.1562359	.0935357	-1.67	0.095	-.3395624	.0270906
_cons	3.66631	.2543222	14.42	0.000	3.167848	4.164772
sigma_u	.20955469					
sigma_e	.13121883					
rho	.71833887	(fraction of variance due to u_i)				

```
. ttest m_accep_1, by(origineel)

Two-sample t test with equal variances

   Group |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
---------+--------------------------------------------------------------------
       1 |       6    3.555556    .0865959    .2121159    3.332954    3.778157
       2 |       8    3.462963    .0992328    .2806727    3.228315    3.697611
---------+--------------------------------------------------------------------
Combined |      14    3.502645    .0665393    .2489672    3.358896    3.646395
---------+--------------------------------------------------------------------
    diff |            .0925926    .1373717               -.2067146    .3918998
------------------------------------------------------------------------------
    diff = mean(1) - mean(2)                                      t =   0.6740
H0: diff = 0                                     Degrees of freedom =       12

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.7435         Pr(|T| > |t|) = 0.5131          Pr(T > t) = 0.2565


. ttest waardescenario1 == 3

One-sample t test

Variable |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
---------+--------------------------------------------------------------------
waarde~1 |      15    4.066667    .1817027    .7037316    3.676953     4.45638
------------------------------------------------------------------------------
    mean = mean(waardescenario1)                                  t =   5.8704
H0: mean = 3                                     Degrees of freedom =       14

    Ha: mean < 3                 Ha: mean != 3                 Ha: mean > 3
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000

. ** " Het zien van het scenario heeft mij nieuwe relevante informatie gegeven "


. ttest waardescenario2 == 3

One-sample t test

Variable |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
---------+--------------------------------------------------------------------
waarde~2 |      15    2.733333    .2481679    .9611501    2.201066    3.265601
------------------------------------------------------------------------------
    mean = mean(waardescenario2)                                  t =  -1.0745
H0: mean = 3                                     Degrees of freedom =       14

    Ha: mean < 3                 Ha: mean != 3                 Ha: mean > 3
 Pr(T < t) = 0.1504         Pr(|T| > |t|) = 0.3008          Pr(T > t) = 0.8496

. ** " Ik heb mijn mening over het HAAL dashboard na het zien van het scenario bijgesteld "
```

Hypothesis 1B

```
. ttest diff_accep1_accep2, by(origineel)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf.	interval]
1	6	.1913581	.0544471	.1333676	.0513973	.3313188
2	8	.111111	.0305094	.0862937	.0389677	.1832544
Combined	14	.1455026	.0299395	.1120232	.0808224	.2101829
diff		.0802471	.0585539		-.047331	.2078251

```
    diff = mean(1) - mean(2)                                      t =   1.3705
H0: diff = 0                     Degrees of freedom =       12

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9022         Pr(|T| > |t|) = 0.1956          Pr(T > t) = 0.0978
```

Hypothesis 2A

```
. xtreg m_begrijpelijkheid scenario period task jaar_ervaring, robust
(1 missing value generated)

Random-effects GLS regression                   Number of obs     =         29
Group variable: id                              Number of groups  =         15

R-squared:                                      Obs per group:
     Within  = 0.1786                                         min =          1
     Between = 0.1950                                         avg =        1.9
     Overall = 0.1727                                         max =          2

                                                Wald chi2(4)      =      25.77
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                  (Std. err. adjusted for 15 clusters in id)
```

m_begrijpel~d	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
scenario	.2445947	.1533488	1.60	0.111	-.0559635	.5451528
period	-.1673494	.3093945	-0.54	0.589	-.7737515	.4390528
task	-.1304517	.2825805	-0.46	0.644	-.6842993	.4233959
jaar_ervaring	-.0331179	.0316157	-1.05	0.295	-.0950836	.0288477
_cons	2.050535	.351658	5.83	0.000	1.361298	2.739772
sigma_u	.4089338					
sigma_e	.37472008					
rho	.54357615	(fraction of variance due to u_i)				

Comprehension

```
. xtreg m_retrieval scenario period task jaar_ervaring, robust
(1 missing value generated)

Random-effects GLS regression                   Number of obs     =         29
Group variable: id                              Number of groups  =         15

R-squared:                                      Obs per group:
     Within  = 0.1710                                         min =          1
     Between = 0.2900                                         avg =        1.9
     Overall = 0.2352                                         max =          2

                                                Wald chi2(4)      =       9.93
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0416

                                    (Std. err. adjusted for 15 clusters in id)
```

m_retrieval	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
scenario	.2643331	.1757781	1.50	0.133	-.0801857	.6088519
period	.3148405	.3223371	0.98	0.329	-.3169286	.9466096
task	-.429543	.3093263	-1.39	0.165	-1.035811	.1767254
jaar_ervaring	.0666218	.0420259	1.59	0.113	-.0157475	.148991
_cons	3.140483	.689282	4.56	0.000	1.789515	4.491451
sigma_u	.53566001					
sigma_e	.44242711					
rho	.59446335	(fraction of variance due to u_i)				

Retrieval

```
. xtreg m_judgment scenario period task jaar_ervaring, robust
(1 missing value generated)

Random-effects GLS regression                   Number of obs     =         29
Group variable: id                              Number of groups  =         15

R-squared:                                      Obs per group:
     Within  = 0.0429                                         min =          1
     Between = 0.1243                                         avg =        1.9
     Overall = 0.0656                                         max =          2

                                                Wald chi2(4)      =       4.14
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.3874

                                    (Std. err. adjusted for 15 clusters in id)
```

m_judgment	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
scenario	.0868778	.101953	0.85	0.394	-.1129464	.286702
period	-.0462762	.2643822	-0.18	0.861	-.5644557	.4719034
task	.0172249	.2564237	0.07	0.946	-.4853564	.5198062
jaar_ervaring	-.0309116	.0309178	-1.00	0.317	-.0915093	.0296862
_cons	4.264564	.3568337	11.95	0.000	3.565183	4.963945
sigma_u	.37883364					
sigma_e	.24770006					
rho	.70051621	(fraction of variance due to u_i)				

Judgment

```
. xtreg m_antwoorden scenario period task jaar_ervaring, robust
(1 missing value generated)

Random-effects GLS regression                   Number of obs     =         29
Group variable: id                              Number of groups  =         15

R-squared:                                      Obs per group:
     Within  = 0.0714                                         min =          1
     Between = 0.1820                                         avg =        1.9
     Overall = 0.1450                                         max =          2

                                                Wald chi2(4)      =       5.41
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.2479

                                  (Std. err. adjusted for 15 clusters in id)
------------------------------------------------------------------------------
             |               Robust
 m_antwoorden |Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
     scenario |  -.1182848   .1133388    -1.04   0.297    -.3404247     .103855
       period |   .0334987   .1358473     0.25   0.805    -.2327572    .2997546
         task |   .0401275   .1222705     0.33   0.743    -.1995182    .2797733
jaar_ervaring |  -.0265067    .017036    -1.56   0.120    -.0598965    .0068832
        _cons |   3.583035   .1868384    19.18   0.000     3.216838    3.949231
-------------+----------------------------------------------------------------
      sigma_u |  .13650063
      sigma_e |  .28347339
          rho |  .18822609   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Response

```
. *  H2
. ranksum m_comprehension_1, by(origineel) // p= 0.0345

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

   origineel |       Obs    Rank sum    Expected
-------------+---------------------------------
           1 |         6          31          48
           2 |         9          89          72
-------------+---------------------------------
    Combined |        15         120         120

Unadjusted variance       72.00
Adjustment for ties       -7.33
                          ------
Adjusted variance         64.67

H0: m_comp~1(origin~l==1) = m_comp~1(origin~l==2)
          z = -2.114
Prob > |z| = 0.0345
Exact prob = 0.0519
```

Comprehension

```
. ranksum m_retrieval_1, by(origineel)

Two-sample Wilcoxon rank-sum (Mann–Whitney) test

   origineel |       Obs    Rank sum    Expected
-------------+---------------------------------
           1 |         7          57        59.5
           2 |         9          79        76.5
-------------+---------------------------------
    Combined |        16         136         136

Unadjusted variance       89.25
Adjustment for ties      -17.59
                         ------
Adjusted variance         71.66

H0: m_retr~1(origin~l==1) = m_retr~1(origin~l==2)
          z = -0.295
Prob > |z| = 0.7677
Exact prob = 1.0000
```

Retrieval

```
. ranksum m_judgment_1, by(origineel)

Two-sample Wilcoxon rank-sum (Mann–Whitney) test

   origineel |       Obs    Rank sum    Expected
-------------+---------------------------------
           1 |         7        53.5        59.5
           2 |         9        82.5        76.5
-------------+---------------------------------
    Combined |        16         136         136

Unadjusted variance       89.25
Adjustment for ties       -4.99
                         ------
Adjusted variance         84.26

H0: m_judg~1(origin~l==1) = m_judg~1(origin~l==2)
          z = -0.654
Prob > |z| = 0.5133
Exact prob = 0.5351
```

Judgment

```
. ranksum m_response_1, by(origineel)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test
```

origineel	Obs	Rank sum	Expected
1	7	61	59.5
2	9	75	76.5
Combined	16	136	136

```
Unadjusted variance       89.25
Adjustment for ties       -7.48
                          ------
Adjusted variance         81.77

H0: m_resp~1(origin~l==1) = m_resp~1(origin~l==2)
         z =  0.166
Prob > |z| = 0.8683
Exact prob = 0.9355
```

Response

```
. ttest waardescenario3 == 3

One-sample t test
```

Variable	Obs	Mean	Std. err.	Std. dev.	[95% conf.	interval]
waarde~3	15	3.466667	.255728	.9904304	2.918185	4.015149

```
    mean = mean(waardescenario3)                     t =   1.8249
H0: mean = 3                      Degrees of freedom =       14

    Ha: mean < 3                 Ha: mean != 3                 Ha: mean > 3
 Pr(T < t) = 0.9553         Pr(|T| > |t|) = 0.0894          Pr(T > t) = 0.0447
```

```
. ranksum m_trust_1, by(origineel)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

   origineel |       Obs    Rank sum    Expected
-------------+---------------------------------
           1 |         7        80.5        59.5
           2 |         9        55.5        76.5
-------------+---------------------------------
    Combined |        16         136         136

Unadjusted variance       89.25
Adjustment for ties       -6.56
                          ------
Adjusted variance         82.69

H0: m_trus~1(origin~l==1) = m_trus~1(origin~l==2)
         z =  2.309
Prob > |z| = 0.0209
Exact prob = 0.0325
. ranksum m_risk_1, by(origineel)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

   origineel |       Obs    Rank sum    Expected
-------------+---------------------------------
           1 |         7          58        59.5
           2 |         9          78        76.5
-------------+---------------------------------
    Combined |        16         136         136

Unadjusted variance       89.25
Adjustment for ties       -7.22
                          ------
Adjusted variance         82.03

H0: m_risk_1(origin~l==1) = m_risk_1(origin~l==2)
         z = -0.166
Prob > |z| = 0.8685
Exact prob = 0.9519


. ranksum m_anxiety_1, by(origineel)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

   origineel |       Obs    Rank sum    Expected
-------------+---------------------------------
           1 |         7          71        59.5
           2 |         9          65        76.5
-------------+---------------------------------
    Combined |        16         136         136

Unadjusted variance       89.25
Adjustment for ties       -3.81
                          ------
Adjusted variance         85.44

H0: m_anxi~1(origin~l==1) = m_anxi~1(origin~l==2)
         z =  1.244
Prob > |z| = 0.2135
Exact prob = 0.2488


.
```