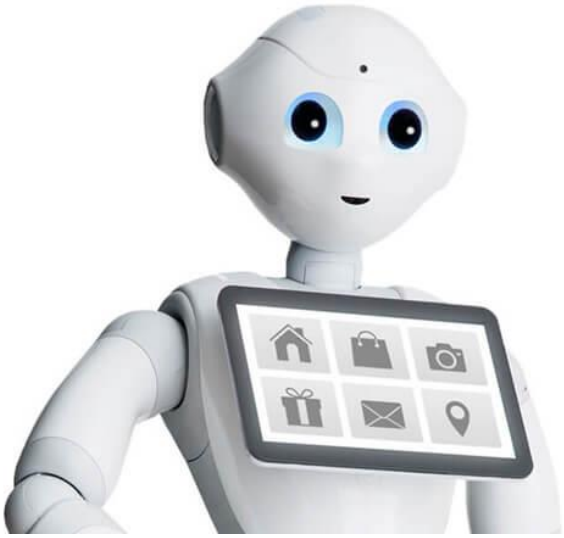
MASTER THESIS

SOCIALLY ASSISTIVE ROBOTS IN THE ELDERLY CARE

THE ATTITUDES OF HEALTHCARE PROFESSIONALS TOWARDS THE USE OF SOCIALLY ASSISTIVE ROBOTS



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PREFACE

"Nobody said it was easy. No one ever said it would be this hard."

– Coldplay, the Scientist

In front of you lies the master thesis 'Socially assistive robots in the elderly care - The attitudes of healthcare professionals towards the use of socially assistive robots'. This thesis was written as part of my graduation from the Health Sciences program of the University of Twente in Enschede. I have conducted this study from February 2019 until July 2019.

During this research I learned a lot about socially assistive robots. When I started this thesis, the use of socially assistive robots in the elderly care was an unknown innovation for me. In the meantime, I have learned what a socially assistive robot can do for both the elderly and the healthcare professionals. I think this is an interesting innovation of which we will hear more in the future. In addition, I found it interesting and instructive to experience how the opinions and attitudes of care providers towards these types of innovations can differ and how the organisations deal with this.

Conducting this research and writing this thesis was a challenge for me. The words *'nobody said it was easy. But no one said it would be this hard.'* well described my feelings about the past six months. These words were used by my first supervisor to motivate me at a moment that I didn't know how to complete this thesis anymore. These words have stayed with me for the rest of the time and have helped me to get the motivation back every time. I would therefore like to thank my first supervisor for these and all other supportive words and valuable feedback. I would also like to thank the other two supervisors for their support and valuable feedback. Without the help of all three supervisors I would not have been able to give shape to this study as it is now lying before you. Thank you all.

I would also like to thank all respondents for their participation in this study. Without these respondents, I would not have been able to conduct this study.

Finally, I would like to thank my friend, family and friends for their interest in my research, their valuable feedback and their support to bring this thesis and my time at university to a successful end.

I hope you enjoy reading this thesis.

Marije Schutte
Enschede, July 12, 2019

ABSTRACT

Introduction: Due to an increased demand in the long-term elderly care as result of the ageing population, high staff turnover and staff shortages, the burden for the working healthcare professionals is increasing. To prevent this burden, socially assistive robots can be helpful. The attitudes of the professionals in the elderly care organisation towards the use of socially assistive robots can differ per individual and per profession and the attitudes are influenced by several determinants. This study has the aim to examine the attitudes of the different professionals in the elderly care organisation towards the use of socially assistive robots and the determinants that influenced these attitudes.

Method: This study had a qualitative study design and semi-structured interviews were conducted with twelve professionals in two different elderly care organisations. To conduct the semi-structured interviews, an interview script was used. This interview script consists of the determinants that were defined in the theoretical framework. The determinants were based on the model of Fleuren, the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology. The interviews were verbatim transcribed with AmberScript. The transcripts were analysed with Atlas.ti by using a deductive approach. The determinants of the theoretical framework were used as labels during the encoding phase of the data analysis.

Results: The attitudes of the respondents were divided in the respondents with a positive and open attitude and the respondents with a wait-and-see attitude. The determinants that seemed to have a positive effect on the attitudes were compatibility, complexity, knowledge, self-efficacy, awareness of content of innovation, client cooperation, relevance for client and social support. The determinants with a twofold effect were observability, personal benefits/drawbacks and time available. The determinant coordinator/leadership had a negative effect on the attitudes of the respondents with a wait-and-see attitude and the determinant subjective seemed to have no influence on the attitudes. This study did not find an answer on differences between professions, but it found that respondents with a coordinating or facilitating role had more positive attitudes than their colleagues. The moderators that seemed to influence the relation between the determinants and attitude are the gender and level of education.

Discussion: The results in this study must be interpret carefully, because the study sample was too small. As a result, a comparable study is needed with a larger study sample. Besides, a quantitative study can be useful to find causal relations between the determinants, moderators and attitudes. A practical recommendation for the organisations is to invest in train the nurses in the department, because their wait-and-see attitude is influence by a knowledge deficit and lack of skills.

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1. INTRODUCTION

The global population is ageing as result of increased life expectancy and decreased birth rates. (1) In the European Union, the percentage of people aged 65 and above was 29,6% in 2016. This percentage will increase to 51,2% in 2070. This means that there were 3,3 working people for every elderly person (65 year and above) in 2016 and that will change to 2,0 working people per elderly person in 2070. As consequence of the ageing population, the demand for healthcare services such as the long-term elderly care will increase. (1) Related to the increased demand, the healthcare costs are rising. (2) Besides, the long-term elderly care is dealing with a high staff turnover and staff shortages (1). Due to the ageing population and the proportionally decreasing number of working people, less healthcare professionals can shoulder the increased demand for healthcare. (3) In order to prevent the increasing burden for the working healthcare professionals and to maintain the current level of quality of care for the elderly living in nursing homes, technologies such as socially assistive robots can be helpful (4).

The socially assistive robot is a robot that supports a human-like interaction between the robot and the elderly in order to provide emotional and cognitive support (5–7). There are two types of socially assistive robots, namely the service robots and the companion robots. The service robot performs different tasks based on the input of the elderly. Due to the support of the service robot, the elderly can continue to live independently in their own domestic environments. (3,8,9) The elderly living in nursing homes need human support by daily activities. It is therefore that service robots will not fully take over the tasks of the caregivers, but the service robots are a supportive tool to assist the elderly and caregivers. The companion robot provides companionship to the elderly in order to improve the quality of life, health and psychological well-being (3,8,10). The most well-known companion robot in the nursing homes and most studied robot in literature is Paro, a fluffy seal robot. Paro is found to be effective as an intervention to reduce symptoms of agitation and depression, reduce loneliness and improve the communication and social skills of the elderly. (11–14)

The use of socially assistive robots in the care for the elderly is relatively new in Dutch elderly care organisations. Currently, most organisations use socially assistive robots in pilot settings. In order to continue the use of socially assistive robots after the pilot, it is important that the professionals in the elderly care organisation accept the socially assistive robots and integrate them into their daily work routines. Otherwise, the implementation of the socially assistive robots in the care for the elderly will not be successful (15). To accept the socially assistive robots and integrate them into the daily work routines, the professionals in the elderly care passes several adoption phases. De Graaf et al. (16) defined five adoption phases, namely the pre-adoption, adoption, adaptation, incorporation and identification phase. The time to pass through these different phases varies from person to person, but in general, according to the diffusion of innovation theory of Rogers (17), there are five different groups of adopters. These five groups of adopters are respectively 1) innovators, 2) early adopters, 3) early majority, 4) late majority and 5) laggards (17). The innovators and early adopters are the first adopters of the socially assistive robots. They will use the robot and because of their use, they will motivate the early majority. This group motivates the late majority and finally the laggards will accept the use of socially assistive robots. (17,18) In order to successfully implement the socially assistive robots in the care for the elderly, it is important for the organisation to consider that the professionals in their organisation are all part of an adopter group and that the time to pass through the several adoption phases will differ per person. Finding the innovators and investing in the early adopters are success factors for an organisation to motivate the other three groups of adopters to start using the socially assistive robots too. (18)

The attitude of the professional in the elderly care organisation can differ in each adoption phase and is influenced by different factors in each phase. De Graaf et al. (19) examined which determinants influenced the attitudes of the general Dutch population towards the use of socially assistive robots. They found that the attitude of the individuals in the adoption phase is influenced by the determinants previous experience, self-efficacy, status and privacy concerns. The determinants that influenced the attitudes of the individuals after the

adoption phase were the perceived usefulness, enjoyability and sociability. (19) Other determinants that influenced the attitudes of the individuals were perceived usefulness (= performance expectancy in UTAUT), perceived ease of use (= effort expectancy in UTAUT), social influence, facilitating conditions, privacy concerns and ethical concerns. These determinants were found by several studies that examined the attitudes of the elderly and nurses in the domestic environment. (19–22) While several studies have already been conducted the determinants that influence the attitudes of the general population or the elderly and nurses in the domestic environment, no research has been done to examine the determinants that influence the attitudes of the professionals in the elderly care organisation. Therefore, this study has the aim to fill the knowledge gap.

Most of the existing studies about the attitudes of the individuals towards the use of socially assistive robots in the care for the elderly were focused on the nurses. However, more professions are involved in the use of socially assistive robots in an elderly care organisation like the managers and IT staff. The attitudes of the different professions in the organisation and the determinants that influence the attitudes can differ, because each profession created their own attitude as result of the historically differences in culture, power and identity (23). For example, the attitudes of managers are based on the strategic and tactical perspective of using the socially assistive robot, while the attitudes of nurses are based on the operational perspective. (6) Because different professions are involved in the use of socially assistive robots in caring for the elderly, the attitudes and the determinants that can influence the attitudes vary from one profession to another, this study is focused on all professions that are involved in the use of socially assistive robots in the organisation.

The main advantage of this study is that it will examine both individual differences in attitudes as the differences in attitudes of various professions in the organisation. As a result, the different attitudes of the various professionals in the organisation can be well interpreted and the organisation can consider this during the implementation of the socially assistive robot in the care for the elderly. The related research question is: *"Which factors influence the attitude of different professionals in an elderly care organisation towards the use of socially assistive robots?"*

To answer this research question, the following sub-questions will be answered:

A) What are the attitudes of different professionals towards the use of socially assistive robots?
B) To what extent do the determinants related to the characteristics of socially assistive robots influence the attitude of the professional?
C) To what extent do the determinants related to the individual characteristics influence the attitude of the professional?
D) To what extent do the determinants related to the professional characteristics influence the attitude of the professional?
E) To what extent do the determinants that influence the attitude of the professionals differ among different professions?
F) To what extent do moderators influence the attitude of the professional?

This study will give a contribution to the scientific literature in order to learn more about factors that influence the attitude of different professionals in an elderly care organisation towards the use of socially assistive robots in the care for the elderly. The societal value of this study is that it will help the elderly care organisations to understand different attitudes among individuals and different professions in the organisation. Understanding these differences in attitude will help the organisation to optimize the use of socially assistive robots in their organisation and to foster the use of socially assistive robots in the whole organisation.

To answer the research questions, the next chapter will discuss the theoretical framework. In this section, the different types of socially assistive robots and a model to understand the determinants that could influence the attitudes of different professionals in the organisation will be discussed. After discussing the theoretical framework, the method of this study will be discussed. This will be followed by the results and the discussion.

2. THEORETICAL FRAMEWORK

The healthcare sector deals since 1990 with different technological innovations, such as electronic patient record (EPR), digital imaging and healthcare robots. (23) The primary intention of these healthcare robots is to improve or protect the health and lifestyle of the user (24). The robot varies from surgery robots, assistive robots to socially assistive robots (7,24). While the surgery robots are used in the hospitals and the assistive robots are used in the home environment of the user, the socially assistive robots are used most often in the care for the elderly living in nursing homes or receiving home care. This paper focusses on the care for the elderly in nursing homes and home care and therefore, only attention will be given to socially assistive robots. In this theoretical framework, the different types of the socially assistive robots will be discussed first. After this, a model and a table will be discussed with the determinants that could influence the attitude of the different professionals in the elderly care organisation towards the use of socially assistive robots.

2.1 SOCIALLY ASSISTIVE ROBOTS

This first section of the theoretical framework discusses the socially assistive robot and the current knowledge on the use of these robots in the care for the elderly.

The *socially assistive robot* is a robot developed to interact with humans in order to provide functional, emotional and cognitive support to the user, e.g. the elderly. (5–7) The socially assistive robots are easily understandable and have a likeable interface, through which the user likes to interact with the robot. Two types of socially assistive robots can be distinguished, namely service robots and companion robots. (3,8,10) The *service robots* perform tasks to support the user with daily activities. Tasks of a service robot are among others assisting the user by eating, toileting and dressing, doing households tasks and monitoring the health and safety of the user. (3,8,9) Examples of the service robots are Pearl, Care-O-bot and Bandit. (9,25) In contrast to the service robot, the *companion robot* does not perform any task. The companion robot acts as a companion to the user with the aim to improve the quality of life, health and the psychological well-being of the user. (3,8,10) Examples of the companion robot are AIBO (a dog-like robot), Paro (a fluffy seal), Tessa (a flowerpot), Pepper and NAO (humanoid robots).

The involved elderly care organisations in this study made use of socially assistive robots Pepper and Tessa. Pepper is a humanoid robot and is shown in figure 1. The robot can provide companionship, because the robot can recognize faces and basic human emotions. (26) The user can start a verbal conversation or they can use the touchscreen on the breast of the robot to interact with the robot. (27,28) The robot can recognize faces and basic emotions. Furthermore, the robot can collect data via the camera and microphone, it can provide games and physical exercises and it can give reminders to the elderly, e.g. drug reminders. (28) The robot is also used as an assistant in a company to welcome, inform and guide visitors. (26) The socially assistive robot Tessa is a robot that looks like a flowerpot, see figure 1. This robot provides a daily structure for community-dwelling elderly with dementia. The robot provides this structure by pronouncing text fragments such as tasks, appointments, reminders or suggestions for activities. The text fragments pronounced by Tessa can be set up in an app or web page by the (in)formal care providers. (29)

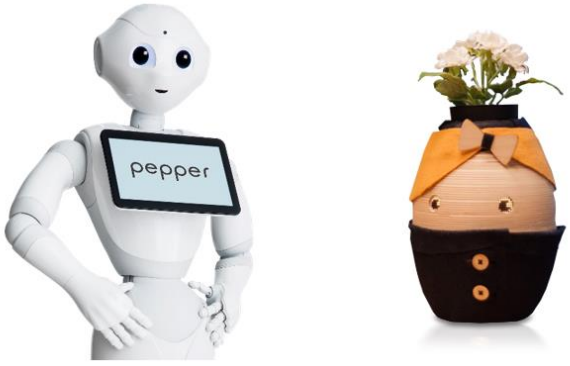

FIGURE 1: PEPPER AND TESSA

The existing literature on the effects of socially assistive robots on the well-being of the elderly did not use Pepper and Tessa yet. In this study, the assumption is made that the effects of Pepper and Tessa on the well-being of the elderly are comparable to the other socially assistive robots that have already been studied previously. Overall, the existing studies found positive results on the well-being of the elderly and in relieving the burden for the professional and informal caregivers. (24,25,30) Most studies used the socially assistive robots AIBO and Paro. These two animal-like companion robots reduce loneliness (13,31). Three studies (12,14,32) found improvements in the social skills of the elderly and in the communication between the elderly and their caregivers as result of the use of Paro. Another effect of Paro is a reduction in symptoms of agitation, depression and other problematic behaviours. (11,14) Studies that used the humanoid companion robots or the service robots to examine the effects of use on the elderly are scarce. At least three studies focussing on the effects of the humanoid companion robots on the user were found. The study of Khosla et al. (33) showed that the emotional engagement, visual engagement and behavioural engagement significantly improved among elderly with dementia by using Matilda, a PaPeRo robot. The other study of Louie et al. (34) examined the acceptance and attitudes of the elderly towards the robot Brian 2.1 during a demonstration session with this robot. The results of this study showed positive attitudes of the elderly towards the robot. Additionally, the users had minimal anxiety to use the robot and they perceived the robot as easy to use. (34) A pilot study of Bedaf et al. (35) examined the experiences of elderly, informal caregivers and healthcare professionals with Care-O-bot 3. In this study, the participants were positive towards the idea of a robot that would provide support to live independently, unless the limited functionalities of the robot. For further use, the participants in the study of Bedaf et al. (35) wished that the robot is able to perform more complex tasks. But overall, the quality of the discussed studies is low due to the chosen method or small sample sizes. Therefore, more research is needed to strengthen the conclusions, but the socially assistive robots seem to have opportunities in the care for the elderly. (13,30)

2.2 Model and professionals in the organisation

The socially assistive robots are intended to be used by elderly who receive home care or who are living in the nursing homes. Several professionals in the elderly care organisation are involved in the use of the socially assistive robot, as well as the informal caregivers of the elderly. Each stakeholder has a different role in the organisation and they all have a different attitude towards the use of the socially assistive robot as result of their own needs, expectations and experiences. (23–25) It is important to consider all the different stakeholders; this study however focusses only on the different professionals in the elderly care organisation who are involved in the use of socially assistive robots in the care for the elderly. This choice is made, because the professionals in the organisation are responsible for the implementation of the socially assistive robot in the care for the elderly, and the elderly themselves and their informal caregivers depend on this. In this paragraph, the determinants that influence the attitudes of the different professionals towards the socially assistive robots will be discussed, based on the existing literature. In order to do this, a model and a table with determinants will be discussed.

To understand the determinants that influence the attitudes of the different professionals, the model of figure 2 and the related table 1 are created. The model of figure 2 is mainly based on the model of Fleuren et al. (36,37) and table 1 is based on the 29 determinants in the Measurement Instrument for Determinants of Innovations (MIDI), an instrument that belongs to the model of Fleuren et al. (36,37). An overview of all determinants of MIDI are given in appendix A. Both the model as the table contains several changes which will be discussed further.

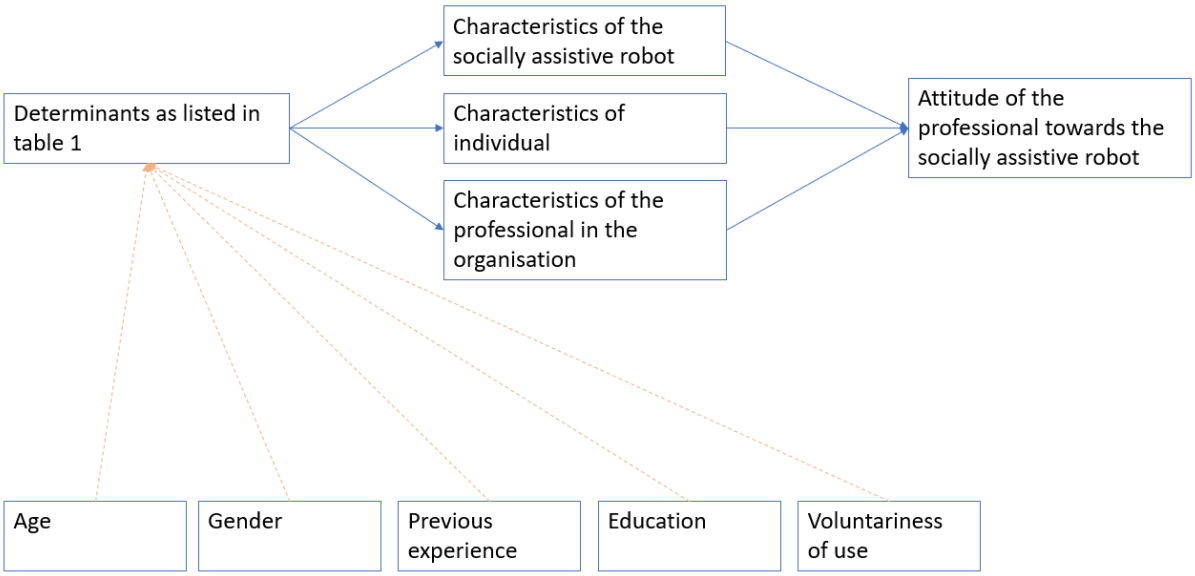

FIGURE 2: MODEL FOR THE ATTITUDES OF THE PROFESSIONALS TOWARDS THE SOCIALLY ASSISTIVE ROBOTS IN THE ELDERLY CARE DURING THE IMPLEMENTATION PHASE.

The first difference of the model in comparison with the model of Fleuren et al. (36,37) is that the model of figure 2 did not include the different adoption phases as Fleuren et al. (36,37) has. This is because this study is only focussed on the implementation phase of the socially assistive robot in the care for the elderly.

The second difference between the model of figure 2 and the model of Fleuren et al. (36,37) are the differences in category groups of the different determinants. The model of Fleuren et al. (36,37) consists of four category groups, namely the characteristics of the innovation, characteristics of the adopting person (user), characteristics of the organisation and the characteristics of the socio-political context. The characteristics of the innovation in the model of Fleuren et al. (36,37) is changed in the *'characteristics of the socially assistive robot'* in the model of figure 2. This group of characteristics includes the determinants procedural clarity, compatibility and observability. These three determinants include the functionality of the socially assistive robot, how that functionality will fit in the elderly care organisation and if the effects of the socially assistive robots are visible in the organisation. (17,38) The characteristics of the adopting person (user) in the model of Fleuren et al. (36,37) are divided in the characteristics of the individual and the characteristics of the professional in the organisation in the model of figure 2. In this study, this distinction is made in order to find the degree to which the personal characteristics and the professional characteristics influence the attitude of the different professionals. The characteristics of the individual include all the determinants that are related to the personal characteristics, namely personal benefits/drawbacks, self-efficacy, knowledge and complexity. For self-efficacy and knowledge, it is debatable whether they belong to the characteristics of the individual or to the characteristics of the professional in the organisation, because an IT-professional have more knowledge and skills related to technology than a nurse. Among nurses, the knowledge and skills could also differ, based on their interest in technology. Because it can differ among individuals, the knowledge and self-efficacy are in this study related to the *'characteristics of the individual'*. Because this study focuses on the attitudes of the professionals, the definition focused on the perceived ease of use fits better and is more linked to the individual. Therefore, the complexity in this study belongs to the characteristics of the individual. The *'characteristics of the professional in the organisation'* contain the determinants that can have a different influence on the attitudes of the different professions in the organisation. These determinants are relevance for client, professional obligation, client satisfaction, client cooperation, social support, subjective norm, coordinator/leadership, descriptive norm, information accessible about the use of the innovation, awareness of content of innovation and time available. All professions in the organisation can experience the influence of these determinants in different ways, based on their profession, knowledge and skills. In comparison with the model of Fleuren et al. (36,37), are the

characteristics of the organisation and the characteristics of the socio-political context excluded in the model of figure 2. This is because this study is mainly focussed on the attitudes of the professionals in one elderly care organisation. As result, no differences will be found in the determinants related to these two groups of characteristics. The changes in the category groups in the model of figure 2 are also visible when comparing table 1 with the MIDI. Besides, not all the determinants of the MIDI are included in table 1, because they are not all assumed to be relevant to clarify the differences in attitudes among the different professionals. Thus, all the assumed irrelevant determinants in MIDI are excluded in table 1. Additionally, the matching determinants of TAM and UTAUT in comparison with the determinants in MIDI are given in a separate column in table 1.

TABLE 1: DETERMINANTS THAT COULD INFLUENCE THE ATTITUDES OF THE PROFESSIONALS TOWARDS THE SOCIALLY ASSISTIVE ROBOTS IN THE ELDERLY CARE DURING THE IMPLEMENTATION PHASE. THE INNOVATION MENTIONED BELOW IS IN THIS CASE THE SOCIALLY ASSISTIVE ROBOT.

Determinant	Definition	Related concepts
Characteristics of the socially assistive robot		
Compatibility	Degree to which the use of the socially assistive robot is compatible with the values and needs of the professional and the working method in place. (17,38)	UTAUT: Facilitating conditions (39)
Observability	Degree to which the outcomes of the socially assistive robots are visible to others. (17,38)	
Procedural clarity	Extent to which the use of the socially assistive robot is described in clear steps / procedures. (38)	
Characteristics of the individual		
Complexity	Degree to which the individual perceive the socially assistive robot as ease of use. (38)	TAM: perceived ease of use (40) UTAUT: effort expectancy (39)
Knowledge	Degree to which the individual user has the knowledge needed to use the socially assistive robot. (38)	
Personal benefits/drawbacks	Degree to which using the use of the socially assistive robot has advantages or disadvantages for the individual user themselves. (38)	
Self-efficacy	Degree to which the individual believes he or she is able to use the socially assistive robot. (38)	
Characteristics of the professional in the organisation		
Awareness of content of innovation	Degree to which the professional has learnt about the content of the socially assistive robot. (38)	
Client cooperation	Degree to which the professional expects clients to cooperate with the socially assistive robot. (38)	
Client satisfaction	Degree to which the professional expects clients to be satisfied with the use of the socially assistive robot. (38)	
Coordinator/leadership	The presence of one or more persons responsible for coordinating the implementation of the socially assistive robot in the organisation. (38)	
Descriptive norm	Colleagues' observed behaviour; degree to which colleagues use the socially assistive robot according to the respondents. (38)	
Information accessible about the use of the innovation	Accessibility of information about the use of the socially assistive robot. (38)	
Professional obligation	Degree to which the socially assistive robot fits in with the tasks for which the professional feels responsible when doing his/her work. (38)	
Relevance for client	Degree to which the professional believes the socially assistive robot is relevant for his/her client, because it	TAM: perceived usefulness (40)

	achieves the client objectives as intended by the socially assistive robot. (38)	UTAUT: performance expectancy (39)
Social support	Support experienced or expected by the professional from important social referents relating to the use of the socially assistive robot (e.g. from colleagues, other professionals they work with, heads of department or management). (38)	
Subjective norm	The influence of important others on the use of the socially assistive robot by the professional. (38)	UTAUT: social influence (39)
Time available	The amount of time that is available for the professional to use the socially assistive robot. (38)	Facilitating conditions

The third difference is the influence of other technology acceptance models in both the model as the table. The model includes the moderators of the Unified Theory of Acceptance and Use of Technology (UTAUT) (39) and the moderators that are discussed by Flandorfer (10). The moderators in UTAUT are age, gender, experience and voluntariness of use. (39) Another moderator is the level of education (10). Because the education is closely related to the experiences with technology, this moderator was not included in UTAUT, but it is included separately in the model of figure 2. Related to the moderator age, the assumption is that younger professionals in the organisation have a more positive attitude towards the use of socially assistive robots than the older professionals. This can be assumed, because younger professionals might be more familiar with modern technologies. Besides, an increase in age is related to more difficulties to learn working with new technologies. (10,39) Because the age of the professionals can differ in each profession, it is important to consider the ages per individual and not per profession. In contrast to age, gender, level of education and experience can be linked to the different professions. Males are often more familiar with technology than females, thus males are expected to have a more positive attitude towards the use of socially assistive robots. (10) Linking gender to the functions of the managers, IT staff and nurses in the elderly care organisation, most managers and IT staff are males and most nurses are females. (41) It is therefore that this study expects that the managers and IT staff have a more positive attitude towards the use of socially assistive robots than the nurses. When looking to the moderator level of education, persons with a higher level of education are expected to be more willing to use the technology than persons with a lower level of education. Usually, people with a lower level of education tend to have more negative feelings than people with a higher level of education. (10) Managers have most of the time a hbo degree or a university degree, the IT staff can have a mbo, hbo and a university degree and the nurses can also have different levels of education, namely a nurse with the mbo degree in level 3[1] (VIG-nurse), mbo degree in level 4[1] (mbo-v nurse) and hbo degree[1] (hbo-v nurse). Based on these different levels of education per function, this study expects that managers, and the IT staff and nurses with a higher level of education have a more positive attitude towards the use of socially assistive robots than their colleagues with a lower level of education. For this reason, this study considers the different levels of education for each function. Another moderator is the experience. The more experience the professional has with technologies such as the socially assistive robots, the more they have positive attitudes towards the use of socially assistive robot. (10,39) Because of the educational background of the IT staff, it is expected that they will have a lot of experiences with technologies which will result in positive attitudes. Based on the functions of the managers, it is expected they experience the socially assistive robots from a strategic and tactical perspectives and it is expected that the nurses will experience the use of socially assistive robots from an operational perspective (6). The moderator voluntariness affects the social influence in UTAUT, because professionals need more social influence to accept the use of socially assistive robots when the use is mandatory. (39) This moderator is hard to link to the different professions, because of the different approaches in the organisation. Imaginable is that in some organisations

[1] The abbreviations VIG, mbo-v nurse and hbo-v nurses are abbreviations for the Dutch terms for the different types of nurses, respectively Verzorgende Individuele Gezondheidszorg (verzorgende IG / VIG), mbo-verpleegkundige (mbo-v) and hbo-verpleegkundige (hbo-v).

the managers are responsible for the decision to use a socially assistive robot and the nurses and the IT staff must follow. In that case, they use of top-down approach and then the voluntariness could influence the attitudes. In contrast, a lot of elderly care organisations are self-managing organisations, including the two elderly care organisations included in this study. Self-managing is a bottom-up approach in which the self-managing team of nurses can decide whether they like to use the socially assistive robot in the care for the elderly or not and the IT staff is supportive to the nurses. (42) In self-managing organisations, the use of socially assistive robots is voluntary for the nurses and IT staff and therefore, this study expects that this moderator does not influence the attitudes of the professionals in the included elderly care organisations.

3. METHOD

This study will discuss the study method. The first paragraph will discuss the chosen study design and the second paragraph will discuss the study population. After that, the way of collecting the data and the way of analysing the data will be discussed in paragraph 3.3 respectively paragraph 3.4. This chapter ends with discussing the ethical consideration.

3.1 STUDY DESIGN

This study had the aim to get insight in the attitudes of the different professionals towards the use of socially assistive robots in the care for the elderly and the determinants that influence these attitudes. The study design that fits the best to the aim of this study is an explorative qualitative study design. The study is an explorative study, because the attitudes of the professionals and the determinants that influence these attitudes have not yet been properly examined. As result, it is unknown what the attitudes of the different professionals are and to what extent the determinants influence these attitudes. Because qualitative data in terms of experiences and opinions will provide the most useful information about the attitudes of the professionals and the determinants that influence these attitudes, this study is a qualitative study (43). (44)

In order to gain the experiences and opinions of the individual professionals, semi-structured interviews were conducted. The semi-structured interviews gives both the researcher and the respondent a lot of freedom, but at the same time this method ensures that all the pre-defined interview questions of the interview script will be discussed in order to collect all the necessary information (45). The researcher has the freedom to decide to adjust the order of asking the pre-defined questions of the interview script, the wording of the questions and the topics to examine in greater depth and the respondent has the freedom to answer the researcher's questions and can tell everything he or she wants (45). The interviews are one-to-one interviews, because this study is focussed on the individual's attitudes, experiences and opinions and the one-to-one interviews provide this kind of information (46).

3.2 STUDY POPULATION

The study population in this study consist of at least twelve respondents from one elderly care organisation, located in the region Twente. These respondents were collected via a contact person of the external supervisor. This contact person is working in this elderly care organisation in Twente.

Because this study examined the attitudes of the different professionals involved in the use of the socially assistive robot, the twelve respondents had at least three different professions, e.g. nurse, manager and IT staff. There are no hard criteria formulated for the number of respondents per profession, because prior to the study it was unknown how many professionals were available per profession and how many of these professionals met the inclusion criterium. Therefore, the number of respondents per profession depends on the availability of the different professionals in the organisation.

To select the respondents, one inclusion criterium and one exclusion criterium were formulated. The respondents were included in this study if they are involved in the use of socially assistive robots in the care for the elderly. The respondents could be involved in three ways, namely because 1) the respondent is a member of the workgroup 'healthcare technology' who is responsible for the implementation process of the socially assistive robot, 2) the respondent is working in the department were the socially assistive robot is implemented or 3) the respondent is involved in every other way in the use of socially assistive robots. The respondents were excluded if they did not speak the Dutch language, because the interviews were conducted in Dutch.

During this study, it was not feasible to include twelve respondents in the elderly care organisation in region Twente. Only eleven respondents in this elderly care organisation were willing to participate in this study and met the inclusion criterium. In order to get at least the intended twelve respondents, one respondent from another elderly care organisation is involved. This respondent is working for an elderly care organisation in the region Achterhoek and is collected via the social network of the researcher. The details of the included respondents in this study will be discussed in the paragraph 4.1 'Characteristics of the study population' in the chapter 'Results'.

3.3 DATA COLLECTION

The data in this study is collected by conducting semi-structured interviews with twelve respondents. The way in which the respondents were collected will be discussed in the next section. After that, the informed consent form will be discussed. Lastly, the interviews, audio recording and interview script will be discussed.

3.3.1 COLLECTING THE RESPONDENTS

As discussed in the previous paragraph, the most respondents in this study were collected via the contact person of the external supervisor and one respondent was collected via the social network of the researcher. The respondents that were collected via the contact person were informed and asked to participate in this study in two ways. Four of the respondents were informed per e-mail about this study by the contact person, because they are working in other departments or locations than the contact person. After they received an e-mail of the contact person with information about this study, the researcher contacted them per e-mail. This e-mail included information about the study, the question if the respondent is willing to participate and the question to schedule an appointment to conduct the interview. The appointments were scheduled per e-mail with these respondents and the appointments took place at the respondent's preferred location.

The other six respondents were informed verbally by the contact person, because they are working in the same department as the contact person. The interviews with these six respondents were scheduled with the contact person, because the contact person will be present in the department as an extra nurse during the interviews. She will take over the care of the respondent's clients when the interview with the respondent is conducted. For practical and logistical reasons are the interviews with these respondents scheduled one after the other in one part of the day in the department where the respondents work. As result of this approach, the burden for the respondents were as minimal as possible, because they could participate in this study during their working hours in their own department and the contact person substitutes them during the interviews.

The respondent that was collected via the researcher was informed per e-mail about this study and was asked to participate in this study in the same e-mail. After this respondent replied that he was willing to participate, an appointment was scheduled to conduct the interview. The interview took place at the location were the respondent works.

3.3.2 INFORMED CONSENT FORM

Although the respondents were informed about the study by e-mail or verbally beforehand, the respondents were also informed about the study at the start of the interview. This was done by using the informed consent form. The respondent was informed verbally by the researcher about the content of the informed consent form and the respondent had the possibility to read the informed consent form. The form includes the aim of the study, the interview procedure including the audio recording, the confidentiality of the data, the voluntariness of participating in the study and the possibility to stop participating in the study at any moment. The informed consent form is added in appendix B. This informed consent form had to be signed by the respondent and researcher before the interview started and all included respondents signed this informed consent form.

3.3.3 Interviews, audio recording and interview script

After signing the informed consent form and before asking the interview questions, the researcher started the audio recording. The interviews were recorded with the 'Voicerecorder' app on the laptop and the smartphone of the researcher. Both devices were protected with a password to guarantee the safety of the audio recordings. To guarantee the anonymity of the respondents, the audio recordings are stored under the name 'interview' and a number, for example 'interview 1', 'interview 2' and 'interview 3'. Each interview was recorded with two devices to prevent mistakes which could result in the loss of an audio recording, incorrect audio recordings or inaudible audio recordings. (47) The best recording was used for the data-analysis, which will be discussed in more detail in paragraph 3.4 'Data analysis'. All audio recordings are deleted from both devices after completing this study.

The researcher started asking the interview questions after the audio recordings had started. The interviews required 30 to 50 minutes per respondent, which was comparable to most interviews in the healthcare sector (48). An interview script was used to guide the discussion with the respondent to the topics that are relevant for the respondent, see appendix C. The interview script was prepared prior to the interviews. The open-ended questions in the interview script consist of questions related to the personal characteristics of the respondent and questions related to the experiences and opinions of the respondents related to the use of socially assistive robots. The questions of the personal characteristics include questions as 'what is your age?' and 'what is your function in this organisation?'. These questions were used to start each interview with, because these questions are easily to answer for the respondents which helps to keep the respondents comfortable and to build trust. (48) Besides, the questions of the personal characteristics are relevant for this study to get insight into the study population and to understand the effects of the moderators on the attitudes of the respondents, as discussed in paragraph 2.2 'Model and professionals in the organisation' of the chapter 'Theoretical framework'. The characteristics of the respondents will be discussed in paragraph 4.1 'Characteristics of the study population' and the effect of the moderators on the attitudes of the respondents will be discussed in paragraph 4.5 'Effects of the moderators'. The questions related to the experiences and opinions of the respondents regarding to the use of socially assistive robots are based on the determinants as listed in table 1. These questions were formulated in a way that these determinants will be discussed by the respondents. For example, the determinant complexity was discussed by the respondents when asking the question 'is the social robot easy to use for professionals and the elderly?'. And the determinants self-efficacy and knowledge were discussed when asking the question 'do you think your colleagues and the elderly have sufficient skills and knowledge to use the robot properly?'. The order of the questions related to the experiences and opinions of the respondents differ per interview, because this order was based on the input of the respondent. But in general, all topics of the interview script were discussed with the respondents. The researcher asked where necessary additional questions to better understand what the respondent means. This approach was allowed due to the chosen method of conducting semi-structured interviews. (43,45)

3.4 Data analysis

The data analysis started with transcribing the records by using the programme AmberScript. The best recording of the two recordings is uploaded in AmberScript. This programme converts the audio recording into a verbatim transcript (49). A verbatim transcript means that every spoken word is converted into text, including fillers as 'hm' and 'uh' and repeated words as 'yes yes yes' and 'no no no' (50). The researcher had to check the transcript, because the transcript of AmberScript still contain errors. This check is also be done in AmberScript, because the audio recording was connected to the text in the transcript. The researcher listened the audio and adjusted the transcript were necessary. In the same time, the researcher cleaned the transcripts by removing the fillers and repeated words, because they impede the readability of the transcripts and were not of relevance to interpret the data (51). Besides, the researcher replaces all names of peoples and organisations for the letters W, X, Y and Z in order to guarantee the anonymity of the respondents. An overview of the meanings of these four letters is given in appendix D, even as the transcripts. After checking the transcripts, the transcripts are exported to a Word-file. All transcripts are named in the same way as the audio recordings with the addition of the word

'transcript' in the name, to keep both files linked together and to guarantee the anonymity of the respondents. The Word-files of the transcripts were used to import the transcripts in the programme Atlas.ti version 8.1, which is the programme that was used to encode the transcripts.

To encode the transcripts in Atlas.ti, a deductive approach was used. This means that the labels and themes used for coding are based on the theoretical framework (46). In this study, the labels were the determinants mentioned in table 1 and the themes were the characteristics of the robot, the 'characteristics of the individual and the characteristics of the professional in the organisation. In addition to the determinants that were used as labels, two new labels were added, namely the labels attitude of the professional and the personal characteristics. The label attitude of the professional was included in the code manager, but not in table 1, because it is the dependent variable in this study and table 1 contains only the independent variables. The label attitude of the professional was used to identify the statements of the respondents that are directly linked to their attitudes. The label personal characteristics was used to identify the respondent's age, gender, function in the organisation and experiences with healthcare technology, robots in general and socially assistive robots.

The transcripts are encoded one by one. The researcher read the transcript and encoded the fragments that belong to one of the labels. In order to structure the encoding phase, a codebook was made in a Word-file, see appendix E. This codebook included a column with the name of the determinant, a column with the definition of the determinant and a column with short fragments of the transcripts which illustrates for what kind of fragments the codes was used for. The last column was helpful to use the same labels for the same kind of fragments in other transcripts and was updated with new fragments with each transcript. The consequence of this approach was that fragments could have been missed in the first transcripts while they are encoded in the last transcripts on basis of the codebook. Therefore, the researcher has chosen to re-read all transcripts to check whether all fragments are encoded based on the codebook and where necessary adjustments have been made.

After encoding the interviews, the researcher started to analyse the data. In Atlas.ti, reports were made of each label in order to get a good overview of all coded fragments and corresponding respondents for each label. From these reports, the summary tables were made of the personal characteristics of the respondents (table 2), the attitudes of the respondents (table 3) and which determinants from table 1 were discussed by the respondents (table 4). These summary tables can be found in the chapter 'Results' and will be discussed in more detail in that chapter. Not all determinants from table 1 will be discussed in detail, because not all determinants were discussed by every respondent. Only the determinants mentioned by six or more respondents will be discussed in more detail. It was decided to set the threshold for six or more respondents, because a determinant was then discussed by at least half of the respondents. For these respondents, the determinant is important enough to discuss and it is expected that these determinants also have the most influence on the attitudes of the professionals. To discuss these determinants in more depth, the reports of each determinant are used again. This is because the report included the fragments and they will be used to summarize the main quotations of the respondents. Some quotations of the respondents will be included in the result section. Because the interviews were conducted in Dutch, these quotations are translated to English. All the results of the analysis will be discussed in chapter 'Results'.

3.5 Ethical consideration

During this study, the Medical Research Involving Human Subjects Act (WMO) is considered. A study is subject to the WMO if it met the following two criteria: 1) it concerns medical scientific research, and 2) participants are subject to procedures or are required to follow rules of behaviour. (52) A study is defined as a medical scientific research if it has the aim to find answers to a question in the field of illness and health, e.g. aetiology, pathogenesis, diagnosis, treatment and prevention. (52) This study did not meet this criterium, because this study was not intended to contribute to medical knowledge in the field of illness and health. This study was focused on attitudes of the different professionals towards the use of socially assistive robots in the care for the elderly, and therefore, it did not contribute directly to the field of illness and disease. This study did also not

meet the second criteria. The respondents were asked to answer the questions of the researcher, but they were not imposed to perform actions or to change their behaviour. Therefore, there was not an infringement of the physical and/or psychological integrity of the subject and thus this study did not meet the second criterium. (52) Thus, this study did not meet the two criteria of the WMO and did not need permission of the Medical Research Ethics Committee (MREC). Despite that, permission of the ethical committee of the faculty 'Behavioural, Management and Social Sciences' was asked, because this study involved human respondents. Permission for this research is given under request number: 190492.

4. RESULTS

This chapter discuss the results of the analysis of the interviews. Paragraph 4.1 gives an overview of the characteristics of the study population. Paragraph 4.2 discuss the attitudes of the respondents towards the use of socially assistive robots and paragraph 4.3 discuss the determinants that could influence the attitudes. Paragraph 4.4 will discuss the difference between the professions and the last paragraph (paragraph 4.5) discuss the effects of the moderators on the relation between the determinants and the attitudes.

4.1 CHARACTERISTICS OF THE STUDY POPULATION

As discussed in paragraph 3.2 'Study population', eleven respondents (respondents 1-10, 12) of an elderly care organisation in region Twente and one respondent (respondent 11) in an elderly care organisation in region Achterhoek are included in this study. The characteristics of these twelve respondents are given in table 2.

TABLE 2: CHARACTERISTICS OF THE RESPONDENTS (N=12)

		Respondents											
Characteristics		1	2	3	4	5	6	7	8	9	10	11	12
Gender	Male		X		X							X	X
	Female	X		X		X	X	X	X	X	X		
Age	<20									X			
	20-29					X							X
	30-39			X			X					X	
	40-49	X	X					X					
	≥50				X				X		X		
Level of education	Mbo	X				X	X	X	X	X	X		
	Hbo			X	X								X
	University degree		X									X	
Function	VIG-nurse	X				X	X		X				
	Mbo-v nurse							X		X	X		
	Hbo-v nurse			X									X
	IT process and quality director				X								
	Chief Operating Officer		X										
	Technical physician											X	
Experience with the type of socially assistive robot	Pepper	X	X	X	X	X	X	X	X	X	X		
	Tessa		X	X	X							X	X
	Other											X	
Years of experience with the socially assistive robot	From the start of the implementation (< 1 year)	X				X	X	X	X	X	X	X	X
	Before the start of the implementation (>1 year)			X	X								
	Unknown*		X										
Experience with health technology, e.g. domotica and eHealth	Yes	X	X	X	X			X	X	X	X	X	X
	No					X	X						
Experience with robots in general, e.g. robot vacuum cleaner	Yes		X	X						X			
	No					X	X	X			X		X
	Unknown*	X			X				X			X	

**Not discussed in the interview with the respondent.*

As table 2 shows, respondents have varying experiences with robots in general, such as the robot vacuum cleaner or robot lawnmower. Most of the respondents have experience with healthcare technology in general, such as the nurse call system, electronic patient record and eHealth. Although two VIG-nurses (respondent 5 and 6) stated that they have no experience with healthcare technology as is visible in table 2, it is likely that they do have experience with it. This assumption can be made, because colleague VIG-nurses and mbo-v nurses working in the same department do use the nurse call system and the electronic patient record, so it is expected that these two VIG-nurses will also use it.

All respondents have experience with at least one type of socially assistive robots. Both organisations have started pilots with socially assistive robots in the past year. The organisation in the region Twente has started a pilot with the socially assistive robot Pepper in the rehabilitation department and the socially assistive robot Tessa in the home care. The organisation in the region Achterhoek has started a pilot with the socially assistive robot Tessa in the home care and in a psychogeriatric department. This organisation is already using the socially assistive robot Paro for a longer period.

Because the interview questions about the experience with socially assistive robots were very general, the questions during the interview were easily specified to the type of robot(s) where the respondent had experience with. The interviews with the VIG-nurses and mbo-v nurses (respondent 1, 5-10) were mainly about Pepper, because they all worked in the rehabilitation department where Pepper is used. The interview with one hbo-v nurse (respondent 12) was mainly about Tessa, because this nurse works in the home care where Tessa is used. The interview with the technical physician (respondent 11) was also mainly about Tessa, but also about his experience with other socially assistive robots such as Paro. The interviews with the other three respondents (respondents 2-4) were about both Pepper and Tessa, because they had experience with both robots. As a result, the respondents' attitudes towards the use of socially assistive robots and the determinants that influence their attitudes are based on their experience with a specific type of robot. The attitudes of the respondents will be described in the next paragraph, paragraph 4.2 'Attitudes towards the use of socially assistive robots'. The following paragraph, paragraph 4.3 'The influence of the determinants', will discuss the determinants that influence the attitudes of the respondents.

4.2 Attitude towards the use of socially assistive robots

This paragraph answers the research question 'What are the attitudes of the different professionals towards the use of socially assistive robots?'. In this paragraph, the attitudes of the respondents will be discussed, without going into detail about the determinants that influence the attitudes. The influence of the different determinants on the attitudes will be discussed in the next paragraph.

The attitudes of the respondents can be divided in two categories, namely the respondents with a positive and open attitude and the respondents with a wait-and-see attitude. Table 3 shows an overview of the attitudes of the respondents.

TABLE 3: ATTITUDE OF THE RESPONDENTS TOWARDS THE USE OF SOCIALLY ASSISTIVE ROBOTS

	Respondents	1	2	3	4	5	6	7	8	9	10	11	12
Attitude	Positive and open attitude	X	X	X	X					X		X	X
	Wait-and-see attitude					X	X	X	X		X		

Seven respondents (respondent 1-4, 9, 11 and 12) have a positive and open attitude towards the use of socially assistive robots. Statements of these respondents are for example *"I don't know what the future brings, but I am open to it. … Keep it coming."* (respondent 1), *"Yes, I am always enthusiastic about new things. It must be logical, and it must fit, but yes, I think it's important to look at."* (respondent 3) and *"I think it is very nice, because of the independence of the client and to learn the clients how to use the technology."* (respondent 9).

Five respondents have a wait-and-see attitude towards the use of the socially assistive robot. *"I'll believe it, when I see it"* (respondents 5, 6 and 10), *"see which way the wind blows"* (respondent 7) and *"if you have to work with it, you have to"* (respondent 5) are some of the statements of these respondents. Respondents 6 and 10 do not only have a wait-and-see attitude, but they have at the same time a positive attitude towards the use of the socially assistive robot. As respondent 6 said: *"I must first see it and then see what it does and what it can help us. But I am open to it."*. And respondent 10 stated: *"I am open to it. And on the other hand, sometimes I am first a little sceptical about that. But I am open to it. I want to see the usefulness and the results."*. In contrast, respondent 8 have an attitude between wait-and-see and negative, because *"it's just a program that Pepper perform. But for me, it could be done without the whole doll. If there was a large touchscreen, it would have been good too."* and *"I will work with it, but I guess I don't have that gene"*.

In this paragraph became clear that the respondents had different attitudes towards the use of socially assistive robots. The next paragraph gives an overview table of the determinants that are discussed per respondent. The determinants that are discussed by at least the half of the respondents, will be discussed in more detail in the same paragraph.

4.3 The influence of the determinants on the attitudes

This paragraph discusses the influence of the determinants as listed in table 1 on the attitudes of the respondents. By discussing these determinants, the research questions *"To what extent do the characteristics of the socially assistive robots, respectively the personal characteristics and the professional characteristics influence the attitude of the professional towards the use of socially assistive robots?"* will be answered.

The table below (table 4Table 4) gives an overview of the determinants that are discussed with the respondents. In this table became visible that almost all determinants where discussed with six or more of the respondents. Only the determinant procedural clarity was not discussed with six or more of the respondents, but with three respondents (respondent 1, 2, 4). These three respondents expressed that there was no policy or protocol about the use of socially assistive robots in the organisation. As a result, the researcher has decided to stop asking the question that belongs to this determinant to the other respondents. The consequence is that the influence of this determinant on the attitude cannot be clarified and therefore, this determinant will not be discussed further. All other determinants will be discussed in the remaining part of this paragraph.

TABLE 4: OVERVIEW DETERMINANTS

Determinant	Respondents												
Characteristics of the socially assistive robot	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*N=*
Compatibility	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Observability	X	X	X	X		X	X	X	X	X	X	X	*11*
Procedural clarity	X	X		X									*3*
Characteristics of the individual													
Complexity	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Knowledge					X	X	X	X	X	X			*6*
Personal benefits / drawbacks	X		X		X	X	X	X					*6*
Self-efficacy			X		X	X	X	X		X	X	X	*8*
Characteristics of the professional in the organisation													
Awareness of content of innovation	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Client cooperation	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Client satisfaction	X	X	X		X	X	X	X	X	X	X	X	*11*
Coordinator/leadership	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Descriptive norm	X	X	X	X	X	X	X	X	X	X	X	X	*12*

Information accessible about the use of the innovation	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Professional obligation	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Relevance for client	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Social support	X		X		X	X	X	X	X	X	X	X	*10*
Subjective norm	X	X	X	X	X	X	X	X	X	X	X	X	*12*
Time available	X				X	X	X	X	X	X	X	X	*9*

4.3.1 CHARACTERISTICS OF THE SOCIALLY ASSISTIVE ROBOT

Two of the three determinants of the category group characteristics of the socially assistive robot are discussed by most of the respondents. The determinant compatibility is discussed by all respondents and the determinant observability by eleven respondents.

COMPATIBILITY

The compatibility is the degree to which the use of socially assistive robots is compatible with the values and needs of the professional and the working method in place (17,38). This determinant was experienced as positive by the respondents and will therefore also have a positive effect on the attitudes of the respondents. The respondents (respondents 1-6, 8) appreciate that the organisation is open to innovations and that the teams of healthcare professionals themselves can take the initiative to use the socially assistive robots and to determine the functions of the robot. In addition, they (respondents 1, 3, 4, 6, 8, 12) like the fact that the organisation provides all the necessary resources and materials to optimise the use of the robot.

The implementation of the robot is also experienced as positive by the respondents (respondents 3, 5, 6, 8, 10-12), because the robot does not threaten their jobs (respondent 3), the use of the socially assistive robot is not an obligation (respondents 11, 12), and because the respondents have the time to learn how to use the socially assistive robot in their own pace (respondents 5, 6, 8, 10).

All respondents perceive the socially assistive robot as an addition to healthcare and not as a substitute for healthcare professionals. As respondent 7 describes the opinion of several respondents (respondents 4, 5, 6, 8, 10): *"I can't imagine that such a robot would suddenly take over the ADL... It's still human work".* (respondent 7). Respondent 3 adds to this: *"a robot can take over tasks from us so that we can provide more care, yes, more warm care or however you like to call it. But if a robot throws away the garbage, I don't have to that. ... I can spend more time with the elderly. ...and that's also true for Pepper."* Only respondents 5 and 8 think that the socially assistive robot in its current state does not yet have any added value, and respondent 5 thinks that the robot does not fit in with her work. As an explanation, she states that she is experiencing enough work now and that the socially assistive robot will be added as an extra task.

For the future function of the socially assistive robot Pepper, there will be a collaboration with other disciplines, such as physiotherapy, occupational therapy and speech therapy. The respondents (respondents 1, 2, 3, 7, 8, 9, 12) do not expect any problems with this, because they are already working together now, and it is easy to discuss with each other because it is a self-managing organisation.

OBSERVABILITY

The observability is the degree to which the outcomes of the socially assistive robots are visible to others. (17,38) Currently, Pepper has a reception function in the rehabilitation department where visitors can ask Pepper where a client is located. Respondent 1 experiences that Pepper's current position reduces the workload, but it is still not the desired result. Other respondents (2, 7, 8, 10) also mentioned that the robot did not yet have the desired result in its current function, because use by visitors has decreased compared to the beginning (respondent 2) and visitors still ask the staff where a client is located (respondent 7, 8, 10). However, respondent 10 sees that visitors are trying out the robot. Respondents 3, 6, 7, 9 also observed that clients are experimenting with the

robot, including clients from whom they did not have expected it. Respondent 7 described this with the following example*: "There is also a man who talks, he can't really talk at all, but he sits in front of the robot.... I think you don't dare to say that to me, but you will sit in front of such a robot. ...I find that very interesting.*" A possible explanation for respondents like this example is given by respondent 3: *"What I see a lot is that they react very well to this, because there are no emotions involved. This is because it is not a threat.".* The respondents also experienced problems with Pepper during the period that Pepper is being implemented in the department. One of the problems was that the robot did not understand the client and vice versa. As a solution, footsteps were placed on the floor where the client had to stand in order to be able to hear Pepper, and the robot was then also able to hear the client. In addition, Pepper did not understand the dialect of the region very well (respondents 7, 8, 9), but this was also solved (respondents 7, 8).

Respondents 2, 11 and 12 have seen that Tessa has a positive influence on the client. The client's mood has improved, the independence of the client has increased, and the client is more active. Respondent 11 also found that the robot was not a success by every client. The example given by this respondent is: *"If someone suffers from depressive symptoms, then you shouldn't really want to start because ... Suddenly a voice comes out of nowhere, those eyes that start to blink. Yes, I'm being watched, there's no camera in it, but then you stimulate that idea.".* Respondent 12 experienced that too many text fragments, too extensive text fragments, repeatedly the same text fragments and repeating them too often resulted in that the client didn't respond to them anymore. A good balance between the text fragments and the client is therefore necessary.

As the above observations with Pepper and Tessa show, the respondents had both positive and negative experiences with socially assistive robots. Therefore, the effect of this determinant on the attitude is twofold and it depends on the observations of the respondent, in which way this determinant influences the attitude. To clarify, negatively observations will negatively influence the attitudes and positive observations will positively influence the attitudes.

4.3.2 Characteristics of the individual

Complexity

The complexity is the degree to which the individual perceive the socially assistive robot as easy to use (38). Most of the respondents with a positive attitude (respondent 1-4, 11, 12) and two respondents with a wait-and-see attitude (respondent 7, 8) expect that the socially assistive robot is easy to use for both the healthcare professionals as the clients, but it will depend on *"how digitally skilled an individual is."* (respondent 2). In general, the technology should be intuitive like Facebook and iPads, because most people can handle that kind of apps and devices (respondent 2 and 4). The other four respondents (respondents 5, 6, 9, 10) do not know how complex the socially assistive robot will be experienced by their colleagues and clients, because it will depends on how it will look like (respondent 5, 10) and how complex the use will be for client with disabilities, like half-sided paralysis due to a brain haemorrhage (respondent 6, 9). As respondent 9 explained: *"…especially because it is quite a small screen. ... I think they can read it, but making a clear sentence is difficult because the hand coordination of one or both hands is disturbed. It is then more difficult to touch the right buttons."* (respondent 9). Three of these four respondents had a wait-and-see attitude and one had a positive attitude. Because the majority of the respondents who expect that the socially assistive robots are easy to use have a positive attitude and the majority of the respondents who expect that the socially assistive robots are complex to use have a wait-and-see attitude, the more the respondent expect that the socially assistive is easy to use, the more the respondent has a positive and open attitude. Thus, the complexity has a positive effect on the attitudes.

Knowledge

This determinant is about the degree to which the individual user has the knowledge needed to use the socially assistive robot (38). This determinant is discussed with all the respondents with a wait-and-see attitude (respondents 5-8, 10) and one respondent with a positive attitude (respondent 9). The knowledge of respondents seems to have an influence on the attitudes of the respondents, because the respondents with a wait-and-see

attitude expressed that they do not have enough knowledge about Pepper, while respondent 9 expressed that she has more knowledge about Pepper than her colleagues, because she attends some meetings about Pepper. The respondents with a wait-and-see attitude like to have more knowledge before they will start using the socially assistive robot. As respondent 10 explained: *"I think that this is certainly necessary if Pepper is used in the living room or for therapeutic purposes. That we should certainly have a more knowledge about this as well.".*

The effect of this determinant on the attitude is that the respondents currently have not enough knowledge about the robot and may therefore still have a wait-and-see attitude. When they have more knowledge about the robot, their attitude could change positively. As a result, this determinant has a positive influence on the attitudes of the respondents.

PERSONAL BENEFITS / DRAWBACKS

The personal benefits are the advantages that the robot has for the user themselves (38). Experiencing personal benefits of the robot seems to have a positive effect on the attitudes of the respondents, because only two respondents with a positive attitude have mentioned a personal benefit. Both respondents (respondents 1 and 3) have mentioned the advantage of having more time for other tasks when the robot is taking over from them. As described by respondent 1: "*That you have a bit more time to pay more attention to a client, because the robot tells them when they have therapy. I don't have to walk to the note and search for it anymore. Then I have time to do other things with a client."*

In contrast to the positive effect of personal advantages on attitudes, the personal drawbacks seem to have a negative effect on the attitudes of the respondents. The personal drawbacks are the disadvantages that the robot has for the user themselves (38). The personal drawbacks were only mentioned by four respondents (respondents 5-8) with a wait-and-see attitude. One of them (respondent 5) expects to get more work if the socially assistive robot is introduced to her work. Another respondent (respondent 6) is afraid of making mistakes with privacy-sensitive information when she starts using the robot. The third (respondent 7) finds it a disadvantage if she must learn to use the robot during her work and the last respondent (respondent 8) finds the robot annoying when she has a meeting in the meeting room nearby the robot.

SELF-EFFICACY

The self-efficacy is the degree to which the individual believes he or she is able to use the socially assistive robot (38). This determinant was found to be positive by the respondents with whom it was discussed (respondents 3, 5-8, 10-12), and therefore it seems to have a positive effect on the attitudes of the respondents. Although some of the respondents (respondents 5, 6) indicate that they are not yet skilled enough to use the socially assistive robot, most of the respondents (respondent 5-8) indicate that they are skilled enough to learn how to work with the robot. In addition, some of the respondents (respondents 5, 8, 10, 12) think they are skilled enough to estimate which clients can or cannot use the robot, but the respondents (respondents 3, 6, 10, 12) indicate that it is mainly a matter of experimenting. Respondent 3 gives the following example: *"You are talking about the client will probably respond very well to the robot. But we didn't do that very often, because you don't know. ... So, don't speculate too much about it, but just give it a try and do it carefully."*

4.3.3 CHARACTERISTICS OF THE PROFESSIONAL IN THE ORGANISATION

AWARENESS OF CONTENT OF INNOVATION

The awareness of the content of the innovation is about the degree to which the professional has learned about the content of the socially assistive robot (38). All respondents are aware of the current function of Pepper or Tessa. The difference between the respondents with the positive and open attitude and the respondents with the wait-and-see attitude is in the area in which they are thinking about future opportunities of the socially assistive robots. Some of the respondents with a wait-and-see attitude (respondent 5-8, 10) expressed that they are not aware of all opportunities that Pepper could do. If they give examples of what Pepper could do, they give as an example that Pepper will be used to give reminders or to do exercises with the elderly. These are

opportunities that the robot will be performing in the department soon. In contrast, some respondents with a positive and open attitude (respondents 1-4) think in terms of greater future opportunities for the socially assistive robots. Respondents 1 and 3 gave examples of opportunities for socially assistive robots in the wound care and during night shifts. Related to the wound care, the example is: *"Look, if I have to treat a wound and at the same time I can tell Pepper to report that the wound is red, etc. and he reports that directly, then I don't have to do anything with that afterwards. It saves me a lot of time."* (respondent 3). The example of an opportunity for socially assistive robots during the night shifts is: *"Give someone the reminder "Go to bed, go to sleep". Instead of having to enter a room like this again, having to disturb someone again, Pepper is standing there and says: "Go to sleep well", because the person wants to get out of bed and is not allowed to do so."* (respondent 1). Some of the respondents (respondents 3, 7) state that the advantage of the robot is that the robot always remains neutral in its tone. As respondent 7 explains: *"People are sometimes reluctant towards me when they have an aphasia and cannot speak or interpret the words well. .... then I'm going to correct 'oh you mean...'.... I think that such a robot might be safer, because it just remains neutral and has no opinion. And if you make a mistake, well then you don't make a large mistake, because there is nobody who will remember that."*.

Because the respondents with the positive attitude think in terms of greater opportunities, they are more aware of the opportunities of the socially assistive robot than the respondents with the wait-and-see attitude. So, the more the respondents are aware of the opportunities of socially assistive robots, the more positive their attitude is. This determinant therefore has a positive effect on the attitude of the respondents.

CLIENT COOPERATION

The client cooperation is the degree to which the respondent expects that clients cooperate with the socially assistive robot (38). Most respondents (respondents 1-4, 6, 8, 10-12) indicate that the clients are involved in the use of socially assistive robots, because clients and their relatives are the most important stakeholders in the use of the robot in the department. The clients are involved, for example, during co-creation sessions in which the client tests a new function of the robot. In addition, clients are informed about the robot's current function and the robot's possible future functions.

The willingness of the clients to work with the robot varies. According to the respondents (respondents 1, 2, 6-11), this is partly due to the different interests and (digital) skills of the clients. Disabilities as a result of diseases also affect if the client can or cannot use the robot. Respondent 6 gives an example of such clients: *"Some clients... have had a stroke and have hemiparesis, they wouldn't be able to use it."*. Three respondents (respondents 4, 5, 9) indicated that the client is not obliged to use the robot if they do not like it, because of the client-centred approach. However, a few respondents (respondents 1, 6, 7) observed that clients used the robot, including those from whom they had not expected it. Respondent 1 gives the following example: *"Another lady I didn't expect it from: "Oh no, I like to do it.". … She had the robot in front of her and I was just wondering how well she used it. She rarely saw a television screen so to speak. And then a robot, she did it so well and that's nice to see."*.

Based on the examples above, most respondents consider that clients are involved in the use of socially assistive robots and some respondents are surprised how well the clients can use the robot. Because the respondents find the involvement of clients important and they like that clients are using the robot, this determinant seems to have a positive influence on the attitudes of the respondents.

CLIENT SATISFACTION

The client satisfaction is the degree to which the respondent expects that clients are satisfied with the use of socially assistive robots (38). According to most respondents (respondents 1-3, 6-8, 10, 11), the degree to which the clients are satisfied with the use of socially assistive robots varies. Some clients perceive the robot as frightening (respondent 3, 8, 10) and others perceive the robot as inhuman (respondent 8, 12). Some of the clients were hesitant and had to get used to it (respondents 6, 7, 11, 12), like one of the users of Tessa: *"This client was a bit sceptical in the beginning, because she knows that she is in the early stages of dementia. Initially,*

she said something like "I don't need it". But since Tessa is there, she likes it very much and she no longer can miss it." (respondent 12). And other clients are satisfied with the use of socially assistive robots (respondent 1, 2, 7, 9, 11). Because of the differences in client satisfaction and the differences in the respondents' attitudes, it is difficult to assess to what extent the client satisfaction influences the respondents' attitudes.

COORDINATOR/LEADERSHIP

The determinant coordinator is about the presence of one or more persons responsible for the coordination and implementation of socially assistive robots in the organisation (38). The elderly care organisation in region Twente has several people who are responsible for the coordination and implementation of the socially assistive robots. Most of these people are healthcare professionals and together they form the workgroup 'healthcare technology'. Two of the members are respondent 1 and 3. They are responsible for the implementation of Pepper in the rehabilitation department. Besides, respondent 3 was the initiator in the implementation of socially assistive robots in the organisation. Another member is respondent 12 who is responsible for the implementation of Tessa in the home care. Respondent 4 is closely related to this workgroup, because he is the technical coordinator of healthcare technology. In contrast to the organisation in Twente, the organisation in the Achterhoek has only one coordinator. This coordinator is respondent 11.

This determinant has an influence on respondents with a wait-and-see attitude. Most respondents with a wait-and-see attitude (5, 7-10) stated that their coordinator is currently doing most of the tasks related to the robot. As a result, these people do not have to do much with the robot yet, which strengthens their wait-and-see attitude. This is illustrated by the next example: *"I think X absolutely likes it. It' s totally her thing. I always say I'm glad you're doing it. I want to work with it, but I don't have much to do with it myself. No, I'm not afraid of it, but I don't need to have a relation with it. It will not be my friend, so to speak." (respondent 8)*. Although the coordinators try to spread their enthusiasm (respondents 1, 2) and the other respondents also seem to appreciate this (respondents 8, 10), this does not help enough to motivate the respondents to use the robot. Because they don't have to do much with the robot themselves, they keep a wait-and-see attitude and thus, the determinant coordinator negatively influence the attitudes of the respondents with a wait-and-see attitude.

DESCRIPTIVE NORM

The descriptive norm is about the attitude of colleagues towards the use of socially assistive robots (38). All the respondents observed that the attitudes of their colleagues towards the use of socially assistive robots differ, but they are comparable to the positive and wait-and-see attitude of the respondents themselves. The description of respondent 3 summarize the descriptions of the other respondents well, namely: *"You have three types of colleagues. People who are very enthusiastic and it is all going too slowly. And then you have a group of people running behind and saying 'well, this is indeed interesting and fun. And we'll see.'. And you have people who say, 'I will see it' and 'well, no, I'm not running so fast'."*. The respondents mentioned different reasons for the sceptical and wait-and-see attitude of their colleagues. One of the mentioned reasons is that the robot is something new and unknown (respondents 1, 6, 7, 9, 10 and 11). Another reason is that the socially assistive robot is inhuman (respondents 1, 4, 7) and cannot give warm, human, care (respondents 1, 2, 4, 5, 9, 10). The respondents with the positive attitudes and the wait-and-see attitudes observed the behaviour of their colleagues in the same way and they expressed the same arguments for the attitudes of their colleagues. None of the respondents expressed that the attitudes of their colleagues will influence their own attitudes. As result, the effect of this determinant on the attitudes of the respondents is unclear.

INFORMATION ACCESSIBLE ABOUT THE USE OF THE INNOVATION

This determinant is about the accessibility of information about the use of the socially assistive robot. (38) According to respondents 1-4, the organisation in region Twente do not have a formal document which contains information about the use of socially assistive robots. As result, the respondents must get the information from their colleagues and the knowledge carriers 'healthcare technology'. According to most respondents (respondents 1-3, 6, 8-10, 12), the best way to share knowledge is during team meetings. Other options are the

annual 'woonzorg'-congress (respondents 2 and 3) and a separate moment to practice with the robot outside regular working hours (respondent 7).

In contrast to Twentse elderly care organisation, the Achterhoekse elderly care organisation create a manual for the use of the socially assistive robot. This document contains *"by which aspects do I absolutely not use it or at which aspects do I stop with it?"* (respondent 11). The roadmap will help nurses to check if the socially assistive robot will be useful for their client, before they ask respondent 11 for getting the robot. But this organisation also does not want to have a *"too long, didn't read document, because not all nurses will read that."* (respondent 11). Therefore, this respondent will also share his knowledge with his colleagues and the clients during meetings.

Because none of the respondents discussed that they missed a formal document with information about socially assistive robots, and they all discussed different ways to share and gain enough knowledge about socially assistive robots, the effect of this determinant on the attitudes is unclear.

PROFESSIONAL OBLIGATION

The professional obligation is about the degree to which the socially assistive robot fits in with the tasks for which the professional feels responsible when doing his/her work (38). Some respondents (respondents 3, 6, 8-10) felt that the socially assistive robot fits in their work routines. In contrast, another respondent (respondent 5) felt that the robot did not fit in her work, because she already experienced a lot of work, and *"than Pepper is also added, you know"* (respondent 5). Although the respondents have varying opinions about whether the robot fits into their work routines, most respondents (respondents 1-5, 10, 11) agreed that initiatives to start using socially assistive robots is the responsibility of nurses in the department, because otherwise *"you will not solve the problems they experience."* (respondent 11). Besides, most of the respondents (respondents 1, 3-9, 12) agreed that not all tasks related to the robot belong to the healthcare professional. Tasks that do not belong to the healthcare professionals are performing updates and all privacy and safety related issues, because *"each his profession"* (respondent 1, 7, 12) and "I don't think you should bother the healthcare professional with that." (respondent 4). When the respondents are asked who is supposed to do these tasks, a difference becomes visible between the respondents. Some respondents (respondents 5, 8-10) attribute the role to their coordinator, while some other respondents (respondents 1, 4, 7, 12) attribute the role to the ICT staff or the supplier of the robot. Because these two groups of respondents consist of a mix of respondents with a positive attitude and wait-and-see attitude, and all respondents are aware of their responsibilities regarding to the robot, it is unknown what influence the professional obligation has on the attitudes of the respondents.

RELEVANCE FOR CLIENT

The relevance for the client is defined as the degree to which the professional believes that the socially assistive robot is relevant for his/her client, because it achieves the client objectives as intended by the socially assistive robot. (38) This determinant has a positive effect on the attitudes of the respondents, because almost all the respondents (respondents 1-7, 9-12) expressed that the socially assistive robot has an added value in the care for the elderly in its current function and in his future functions. The most mentioned added value according to the respondents (respondents 1-3, 6, 7, 10-12) is an improvement of the independence of the client, which has a positive effect on the quality of life. In case of the reminder function of Pepper, the client can be ready on time for therapy or other appointments (respondent 1, 6, 12). This will result in more functional time for therapy and an earlier discharge to home (respondent 1). Respondent 6 explains this as follows: *"That Pepper gives a reminder of it is 9:25h and you have therapy at 9:30h. ... That the person can still think of 'oh then I have to go to the toilet first, because I will have therapy soon'. Now it is very often, they are picked up for therapy, 'yes I actually need to go to the toilet'. That's a pity about the time."*. Besides, the nurses can spend more time to warm human care, because socially assistive robots take over tasks of the nurses such as telling the therapy times to clients or telling the visitors were to find their relatives (respondents 1, 3-7, 9, 10, 12).

SOCIAL SUPPORT

The social support is about the support experienced or expected by the respondent from important social referents relating to the use of the socially assistive robot, like their colleagues or management (38). For most respondents (respondents 1, 3, 5-12), the coordinators are the ones who give them support when using the robot. The respondents can contact the coordinators for questions or help. The coordinators themselves also experienced support from the supplier of the robot (respondents 1, 3). As respondent 1 explained: *"I have the best contact with company W. ... They just ask us questions and we answer them. From 'What do you need?'. 'Well, that's what we need'. 'Well, then we're going to make that'. That's very nice.".* Because all respondents experienced support and seemed to appreciate it, this determinant seems to have a positive influence on the attitudes.

SUBJECTIVE NORM

This determinant is about the influence of important others on the use of the socially assistive robot by the professional (38). Most respondents mentioned that the coordinators are the persons with the most influence on the use of socially assistive robots by respondents themselves and their colleagues. Coordinators must motivate their colleagues to use the robot (respondents 1-3, 7, 8, 10-12) and they must inform their colleagues about the socially assistive robot (respondents 6, 7, 9-11). Some respondents (respondent 7-10) mentioned the enthusiasm of their coordinator. Respondent 8 summarize the view of these four respondents: *"She expresses her enthusiasm. Yes, she is the initiator. And we all think that is beautiful. We think that's fine.".* Although respondents 7-10 like the enthusiasm of their coordinator, they are not all enthusiastic too. As respondent 7 explained the attitude of her and her colleagues: *"I do share her enthusiasm somewhere, but okay, she is very busy with that and we all wait a bit.".* Even though most of the respondents experienced and appreciated the influence of the coordinator, the respondents with the wait-and-see attitude have not yet become enthusiastic about the use of socially assistive robots. This means that the subjective norm does not seem to have any influence on the attitudes of respondents with the wait-and-see attitude at this moment in time.

TIME AVAILABLE

This determinant is about the amount of time that is available for the professional to use the socially assistive robot (38). The respondents' experiences with the available time differ. Most respondents with a wait-and-see attitudes experienced that there is not always enough time available in the department to use the socially assistive robot. An explanation is given by respondent 8: *"We work in a department that is either very busy or it is very quiet, and yes it can be that tomorrow it will be very busy again and then we really would not have had time for this.".* The respondents with the positive attitude see the robot as a tool to have more time for other tasks. As respondent 1 describes: *"Currently, we have four colleagues who are ill for a long time. When I look at the department how much work must be done.... We fill gaps with gaps. And if you have technology that can take over certain things, so that you have more rest and you need fewer staff. Because you just don't have it where you need it. I think it will be the future."*. Because the respondents with a wait-and-see attitude experienced that there is not time available to use the robot and the respondents with a positive attitudes sees the opportunities to save time by using the robot, this determinant seems to have an effect on the attitudes of the respondents. To clarify, the respondents who have a wait-and-see attitude experienced the time they must spend on the robot as something negative, while the respondents with a positive attitude experienced this as something positive.

4.3.4 SUMMARY

In the previous three paragraphs, the effects of the various determinants on the attitudes of the respondents were discussed. An overview of the effects of the determinants on the attitudes is given in table 5.

TABLE 5: OVERVIEW EFFECTS OF THE DETERMINANTS ON THE ATTITUDES OF THE RESPONDENTS

Determinant	Type of influence
Characteristics of the socially assistive robot	
Compatibility	Positive influence
Observability	Twofold
Procedural clarity	*Excluded*
Characteristics of the individual	
Complexity	Positive influence
Knowledge	Positive influence
Personal benefits / drawbacks	Twofold
Self-efficacy	Positive influence
Characteristics of the professional in the organisation	
Awareness of content of innovation	Positive influence
Client cooperation	Positive influence
Client satisfaction	Unknown
Coordinator/leadership	Negative influence (only for wait-and-see attitude)
Descriptive norm	Unknown
Information accessible about the use of the innovation	Unknown
Professional obligation	Unknown
Relevance for client	Positive influence
Social support	Positive influence
Subjective norm	No influence
Time available	Twofold

As the table shows, the different determinants that belong to the three groups of characteristics have different influences on the attitudes of the respondents. Some determinants have a positive influence, while others can have both a positive and a negative influence. From one determinant (subjective norm) became clear that it does not seem to have an influence on the attitudes. And for some of the determinants, the effect on attitudes became not clear due to the available data. The results will be discussed further in the chapter 'Discussion'.

4.4 DIFFERENCES BETWEEN PROFESSIONS

This paragraph discusses the differences found in the effects of the determinants on the attitudes between the professions. By discussing these differences, a contribution will be given to answer the research question: *"To what extent do the characteristics that influence the attitude of the professionals differ among the different professions?"*

As shown in table 2, six different professions have been included in this study. The number of respondents per profession varies between one respondent and four respondents. Because not all determinants were discussed in detail with the respondents and because the number of respondents per profession was quite small, it was not possible in this study to determine how the different determinants influence the attitudes of the different professions. As result, the research question cannot be answered.

Nevertheless, this study has found another remarkable finding that is related to this research question. There seems to be a relation between the role of the professional in the use of the socially assistive robot and their attitude. Most respondents with a positive and open attitude in the organisation have a coordinating or

facilitating role in the use of socially assistive robots (respondents 1-4, 11, 12). The other respondent with a positive and open attitude is more actively involved in the use of the social assistant robots than her colleagues, because she is going to do an assignment about the robots for her study. In contrast, the five respondents with the wait-and-see attitude are nurses in the rehabilitation and they only have a role in turning the robot on and off and make the visitors of the department aware that they could ask Pepper to find their relatives or to find the activities in the department. To conclude, the extent to which the respondents use the robot currently seems to influence their attitude.

4.5 Effects of the moderators

In this paragraph, the effects of the moderators on the attitudes of the respondents will be discussed. The moderators age, gender, previous experience, education and voluntariness of use will be discussed consecutively.

4.4.1 Age

In the theoretical framework, two assumptions were made based on the moderator age. The first assumption is that younger professionals in the organisation have a more positive attitude towards the use of socially assistive robots than the older professionals (10,39). This assumption is rejected in this study, because the ages of the respondents with a positive and open attitude and the respondents with the wait-and-see attitude differ. This can be seen in table 6.

The second assumption is that an increase in age is related to more difficulties to learn working with new technologies (10,39). This assumption is rejected. As discussed in the section about the determinant self-efficacy, most respondents with a wait-and-see attitude (respondents 5-8) find themselves skilled enough to learn how to use the robot. These are respondents with different ages. The other respondents are already using the robot and they have also different ages.

TABLE 6: MODERATOR AGE

		Positive and open attitude							Wait-and-see attitude				
		1	2	3	4	9	11	12	5	6	7	8	10
Age	<20					X							
	20-29							X	X				
	30-39			X			X			X			
	40-49	X	X								X		
	≥50				X							X	X

4.4.2 Gender

In the theoretical framework, it is assumed that males are expected to have a more positive attitude towards the use of socially assistive robots than females. (10) This assumption is confirmed, because all males in this study have a positive attitude towards three out of eight females, as can be seen in table 7.

Another assumption was that managers and IT staff are more positive than nurses, because most managers and IT staff are expected to be males and most nurses are females. (41) In this study, respondent 2 was a manager and respondent 4 was an IT professional, and both were males. The other respondents were all healthcare professionals and most of them are females. Thus, this assumption is also confirmed.

TABLE 7: MODERATOR GENDER

		Positive and open attitude							Wait-and-see attitude				
		1	2	3	4	9	11	12	5	6	7	8	10
Gender	Male		X		X		X	X					
	Female	X		X		X			X	X	X	X	X

4.4.3 PREVIOUS EXPERIENCE

One of the assumption about the previous experience is that more experience with technologies will result in a more positive attitude towards the use of socially assistive robots (10,39). This assumption cannot be confirmed, because most of the respondents had experience with the socially assistive robots since the start of the robots in the organisation and so the period in which they could gain experience with the robots is the same for most respondents. This can be found in table 8.

Because of the educational background of the IT staff, it was expected that they will have a lot of experiences with technologies which will result in positive attitudes. In this study, only two respondents had experience with socially assistive robots before the start of the robots in their organisation of whom the IT professional. The assumption that the IT staff will have more experience with socially assistive robots based on his educational background is thus confirmed.

Besides, it was expected that managers experienced the socially assistive robots from a strategic and tactical perspectives and nurses from an operational perspective (6). These expectations became true, because the manager in this study discussed, for example, the reimbursement of the socially assistive robots and not having a policy or protocol and the nurses discussed the relevance of the robot mainly from their own practical perspective and from the perspective of the client.

TABLE 8: MODERATOR EXPERIENCE

		Positive and open attitude							Wait-and-see attitude				
		1	2	3	4	9	11	12	5	6	7	8	10
Experience with the type socially assistive robot	Pepper	X	X	X	X	X			X	X	X	X	X
	Tessa		X		X		X	X					
	Other						X						
Years of experience with the socially assistive robot	From start of the implementation (< 1 year)	X				X	X	X	X	X	X	X	X
	Before start of the implementation (>1 year)			X	X								
	Unknown		X										
Experience with health technology, e.g. domotica, eHealth, socially assistive robots	Yes	X	X	X	X	X	X	X			X	X	X
	No								X	X			
Experience with robots in general	Yes		X	X		X							
	No							X	X	X	X		X
	Unknown	X			X		X					X	

4.4.4 EDUCATION

The assumption related to the moderator level of education was that persons with a higher level of education are expected to be more willing to use the technology than persons with a lower level of education. Related to the functions of the professionals in this study, the expectation was that managers, and the IT staff and nurses with a higher level of education have a more positive attitude towards the use of socially assistive robots than their colleagues with a lower level of education. This assumption can be confirmed partly, because the respondents with a wait-and-see attitude all have a mbo degree and are therefore less educated than the most respondents with a positive attitude. But in table 9 became visible that also two respondents with a mbo degree have a positive attitude through which the assumption cannot be confirmed with certainty.

Besides, people with a lower level of education were expected to have more negative feelings than people with a higher level of education. (10) This assumption can be confirmed, because the respondents with a wait-and-see attitude are in general less educated than the respondents with a positive and open attitude, and they expressed for example more personal drawbacks than the respondents with a positive and open attitude.

TABLE 9: MODERATOR LEVEL OF EDUCATION

		Positive and open attitude							Wait-and-see attitude				
		1	2	3	4	9	11	12	5	6	7	8	10
Level of education	Mbo	X				X			X	X	X	X	X
	Hbo			X	X			X					
	University degree		X				X						

4.4.5 VOLUNTARINESS OF USE

As already mentioned in the theoretical framework, the elderly care organisations involved in this study are self-managing organisations. As result, the assumption was that this moderator does not influence the attitudes of the respondents. This assumption can be confirmed, because most respondents (respondents 1-5, 10, 11) stated that the initiative to start using socially assistive robots comes from the nurses in the department. And some respondents (respondents 5, 6, 8, 10) have experienced that there is time to start using the robot at their own pace.

4.5 SUMMARY OF THE RESULTS

To summarize the results, this study found two different attitudes towards the use of socially assistive robots among the respondents. One group of respondents had a positive and open attitude and the other group of respondents had a wait-and-see attitude.

There were different determinants that could influence the attitudes of the respondents, divided in three groups of categories. All the determinants that belong to each group have a different effect on the attitude. Therefore, the groups were not considered, and the focus was only on the determinants themselves. Several determinants had a positive effect on the attitude of the respondents. These were the determinants compatibility, complexity, knowledge, self-efficacy, awareness of content of innovation, client cooperation, relevance for client and social support. Several other determinants had a twofold effect on the attitudes which means that the determinant could have both a positive effect as a negative effect. The effect will depend on the attitudes of the respondent. The determinant will have a positive effect on respondents with a positive attitude and the determinant will have a negative effect on respondents with a wait-and-see attitude. The determinants with a twofold effect are the observability, personal benefits/drawbacks and time available. One determinant (coordinator/leadership) strengthens the wait-and-see attitude of some respondents and one determinant (subjective norm) had no influence on the attitudes. The effect of the other determinants became not clear as consequence of the available data.

This study did not find an answer on the differences between the professions, because too less professionals of all the professions were involved and not all determinants were discussed in enough detail with all respondents. But this study found a relation between the role of the professional related to the use of the socially assistive robot and their attitude. Most respondents with a positive and open attitude had a coordinating or facilitating role in the organisation and most respondents with a wait-and-see attitude were working in the rehabilitation department and had only the task to turn the robot on and off and make the visitors of the department aware that they could ask Pepper to find relatives or activities.

Related to the moderators, the moderator age is in this study not of influence on the determinants and attitudes. The moderator gender could be of effect, because all males had positive attitudes towards three out of eight females. The moderator previous experience did not influence the attitudes, because most respondents gained from the same period experiences with socially assistive robots. The level of education is partly of influence, because the respondents with a wait-and-see attitudes have all a mbo degree, but the respondents with a positive attitude have a level of education that ranges from a mbo to a university degree. And none of the respondents is required by the organisation to use the robot, so there is a voluntariness of use.

5 DISCUSSION

The aim of this study was to examine to what extent determinants influence the attitudes of different professionals in an elderly care organisation towards the use of socially assistive robots in the care for the elderly. In order to understand how the determinants could influence the attitudes, this study first examined the attitudes of the different professionals. The attitudes of the professionals in this study could be divided in two groups. One group are the respondents with a positive and open attitude and the other group are the respondents with a wait-and-see attitude. Second, the study examined the effect of the determinants related to the characteristics of the socially assistive robot, characteristics of the individual and characteristics of the professional in the organisation. Some determinants were found to have a positive effect on the attitudes of the respondents. These determinants were compatibility, complexity, knowledge, self-efficacy, awareness of content of innovation, client cooperation, relevance for client and social support. Other determinants had both a positive effect as a negative effect, depending on the attitude of the respondent. The determinants with a twofold effect were observability, personal benefits/drawbacks and time available. One determinant had a negative effect on the attitudes of the respondents with a wait-and-see attitude, because it strengthened their attitudes. This determinant was coordinator / leadership. Another determinant, subjective norm, was found to have no influence on the attitude of the respondents. The effects of the other determinants did not become clear with the available data. Third, this study examined to what extent the determinants that influence the attitude differs among the different professionals. As result of the small sample size per profession, it was not possible to answer this question. However, a side-effect was found. Not the professions, but the role of the professional in the organisation seems to be related to the attitudes. This side-effect was found because all the respondents with a positive attitude were more involved in the use of the socially assistive robot in the departments than the respondents with a wait-and-see attitude. This is because most of the respondents with a positive attitude had a coordinating or facilitating role related to the use of the socially assistive robot. Lastly, this study examined to what extent five moderators influence the attitudes. The moderators age, previous experience and voluntariness of use did not influence the attitudes. The moderator gender could have an influence, because all males had positive attitudes and only three out of eight females had a positive attitude. Also, the moderator level of education could have an influence, because the respondents with a wait-and-see attitude had all a mbo degree whereas most of the respondents with a positive attitude had a hbo and university degree.

The respondents in this study have a positive attitude and a wait-and-see attitude. The respondents with the positive attitude are the innovators and early adopters within the organisations according to the diffusion of innovation theory of Rogers (17,18). Most of the respondents with the positive attitudes have a coordinating role in the use of socially assistive robots in the organisation. This means that they must motivate their colleagues to use the robot. According to the diffusion of innovation theory (17,18), the early majority follow the early adopters and later on, the late majority and the laggards will follow too. This means that the respondents with the wait-and-see attitude will follow the respondents with the positive attitudes. According to one of Berwick's (18) rules for an effective dissemination of the innovation in the organisation, early adopters must motivate the early majority by being visible in the department and by sharing knowledge verbally. (18) The coordinators in both organisations adhere to this rule, because most of them work in the departments where the socially assistive robots are used. They share their knowledge with colleagues in the department and they try to motivate their colleagues. But the knowledge exchange seems to be insufficient, because the respondents with the wait-and-see attitude indicate that they still have a lack of knowledge about the use of the robot. As a result, they don't want to use the robot yet. For the organisation, this means that the early adopters must share more knowledge in order to reduce the knowledge deficit among the respondents with the wait-and-see attitude, so that they will start using the robots too. By paying more attention to this, the dissemination of the socially assistive robots in the organisations can be improved.

As mentioned above, knowledge is one of the determinants that can positively influence the attitude of respondents. This is a determinant that was not specifically mentioned in earlier studies. A reason is that previous studies use fewer determinants to explain attitudes than this study. Previous studies used the TAM and UTAUT. (19–22) Both models are also included in this study, but in this study an own model and table of determinants were made based on the model of Fleuren and the MIDI (36,37). There is chosen to make an own model and table, because this own model and table is now more in line with the pilot phase of the use of the robot in the organisation. Besides, by selecting the relevant determinants of MIDI, it was possible to determine the influence of the characteristics of the socially assistive robot, the characteristics of the individual and the characteristics of the professional on the attitudes of the professionals.

Other determinants that have a positive influence on attitudes, both in this study and in previous studies, are the relevance for client (= perceived usefulness and performance expectancy), compatibility, complexity and self-efficacy. (19–22) The difference between previous studies (19–22) and this study can be found in the determinant subjective norm (= social influence) and time available (= a part of facilitating conditions). The subjective norm does not seem to have any effect on the attitudes, because respondents with the wait-and-see attitude are not yet enthusiastic about the robot, despite the experienced enthusiasm of their coordinator. This means that they did not rely on their coordinator, whereas previous studies found that individuals in the first acceptance phases relied on important persons (19–22). The facilitating conditions in the broadest meaning of the word are experienced as a positive determinant in previous studies (19–22). In this study, this determinant was split up and only the time available was included. The determinant time available had a varying effect on the attitude. On the one hand, respondents with a positive attitude experienced more time to do extra tasks by using the robot. On the other hand, respondents with the wait-and-see attitude experienced that the robot will take more time from them. The other determinants in this study were not mentioned in earlier studies, because these determinants were derived from the MIDI (36,37). It is therefore not possible to compare these determinants with previous studies.

This study also tried to determine the differences in attitudes between the professions. Due to the small study sample, this was not possible. Twelve respondents were included with six different professions. As a result, there were one to four professionals per profession. Because not every determinant was discussed in detail with the respondent, it was not possible to determine the differences between the professions. The small study sample will be discussed later as one of the main limitations of this study.

Based on the UTAUT (39), the model in this study included also the moderators. According to Venkatesh et al. (39) and Flandorfer (10), the age, gender, experience, level of education and voluntariness of use are the moderators who influence the relationship between the determinant and the attitude. In contrast to their findings, this study found that only the gender and level of education seems to influence the relationship between the determinant and attitude. A reason for the difference between the effects of moderators in this study and previous studies (10,39) may be that the study population in this study is too small to be able to see the effect of moderators clearly. Another reason is that the moderators were not discussed in detail with the respondents. As a result, the effect of the moderator is not clearly visible from the data collected.

As already discussed, this study has some limitations. But this study has also some strengths. The limitations and strengths of this study will be discussed in the next section of this chapter.

STRENGTHS AND LIMITATION

This study has a couple of strengths and limitations as results of the chosen study method. First, two strengths of this study will be discussed. After the strengths, the two most important limitations will be discussed.

This research has contributed to the understanding of the attitudes of different professionals in the elderly care organisation towards the use of socially assistive robots. Furthermore, this research has examined the influence of different determinants on attitudes. In order to do this, a qualitative study design has been chosen. This was

a suitable method, because the study was an explorative study and the attitudes and the influence of the determinants on the attitudes could be analysed well with qualitative data. Because the respondents shared their opinions and experiences about the socially assistive robots during the interview, the attitudes and the influence of the determinants on the attitudes could be clearly assessed. (43,44) The chosen study design is therefore one of the strengths of this study.

Another strength of this study is the chosen approach, i.e. to conduct semi-structured interviews with individual respondents. The advantage of semi-structured interviews is that the researcher could collect all necessary information based on the pre-defined interview question and to ask in-depth questions where necessary. In the same time, the respondent had the freedom to give answers on the questions of the researcher and to tell everything about the robots he or she likes to tell. (45) The advantage that the interviews were conducted with individual respondents was that the respondents did not have to feel inhibited in their opinions about the robot, because there were no colleagues present. This would have been the case with a focus group, for example, which could have made the respondents more reluctant. But the expectation is that the respondents were able to say everything they wanted during the interviews. As a result, most of the information was collected about the individual opinions and experiences with the socially assistive robots in this study. (46)

Nevertheless, this research also has some limitations. The most important limitation is the size of the study population. Due to the availability of the respondents, twelve respondents were included in this study. They had a total of six different professions with the result that each profession was represented by at least one respondent and a maximum of four respondents. This number is too small to achieve theoretical satisfaction per profession. In order to achieve theoretical saturation, at least eight to twelve respondents from each profession are needed (53,54). Consequently, it was not possible to find the differences in determinants and attitudes between the professions. Furthermore, the effects of some determinants could not be determined properly, because too little information was collected about these determinants or because the opinions or experiences of the respondents were very different. Consequently, the results must be interpreted carefully, and no hard conclusions can be made based on this study. In order to increase the internal and external validity of this study, follow-up research is necessary. This may be the same study in which more respondents are included in order to achieve theoretical saturation per profession or it is possible to choose to conduct a quantitative study. This will be discussed in the recommendations.

Another limitation is that this study did not formulate any inclusion or exclusion criteria about which organisation, department or socially assistive robot this study would focus on. This was not done in this study, because at the start of the study it became clear that only a few respondents were available. In order to be able to include as many respondents as possible, respondents from two different organisations were included. They were working in different departments and with different socially assistive robots, namely Pepper and Tessa. Because each organisation and department used the socially assistive robot in a different way, the experiences and opinions of the respondents varied. This made it difficult to understand how different determinants influenced the attitudes of all respondents together. When repeating this study or when doing a follow-up study, it is necessary to pay attention to, for example, one department or one type of socially assistive robot. By doing so, the results would be easier to interpret.

RECOMMENDATIONS

A recommendation related to the scientific value of this study is that a larger sample size of the study population is needed to strengthen the findings of this study. Because an organisation does not always have eight to twelve professionals per each profession, expanding this study to more organisations will be a solution to get enough respondents to reach theoretical satisfaction. It is important that the organisations are comparable, for example because they use the same type of socially assistive robot in the same type of department. Otherwise it is not possible to compare the results. Another advantage of expanding the study is that the results will be more generalizable, because the results are not based on one or two organisations, but on more different

organisations. When enough respondents can be involved, the same study method as this study can be used in order to collect more information about the experiences and opinions of the respondents about their attitudes and the determinants influencing these attitudes. In order to find causal relations between the determinants and the attitudes and to find the effects of the moderators on these relations, a quantitative study is needed because than statistical tests can be used to find the causal relations.

It is recommended that the organisations included in this study should invest in the improvement of the knowledge and skills of professionals with a wait-and-see attitude. This group of respondents are willing to use the robot, but because they experience a knowledge deficit and do not have the skills to use the robot yet, they are still hesitant. The organisation can advise the coordinators to train their colleagues about the use of the robots during team meetings. When this is done, the attitudes of respondents with a wait-and-see attitude will change positively.

CONCLUSION

To conclude this study, more research is needed to strengthen the findings. But this study found that the attitudes of the respondents varies, but in general, the respondents are willing to use the socially assistive robots in the care for the elderly. There are several determinants found that could influence the attitudes of the respondents positively. Especially the determinants knowledge and self-efficacy are important determinants for the attitudes of the respondents with a wait-and-see attitude. If these two determinants improve, the respondents with the wait-and-see attitude will be motivated to use the robot too.

6 REFERENCE LIST

1. Directorate-General for Economic and Financial Affairs. The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070). In Brussel: European Commission; [cited 2019 Feb 20]. Available from: https://ec.europa.eu/info/publications/economic-and-financial-affairs-publications_en.

2. European Commission. 2018 Ageing Report: Policy challenges for ageing societies [Internet]. 2018 [cited 2019 Feb 20]. Available from: https://ec.europa.eu/info/news/economy-finance/policy-implications-ageing-examined-new-report-2018-may-25_en

3. Abdi J, Al-Hindawi A, Ng T, Vizcaychipi MP. Scoping review on the use of socially assistive robot technology in elderly care. BMJ Open [Internet]. 2018 Feb 1 [cited 2019 Feb 4];8(2):e018815. Available from: https://bmjopen.bmj.com/content/8/2/e018815.long

4. D'Onofrio G, Fiorini L, Hoshino H, Matsumori A, Okabe Y, Tsukamoto M, et al. Assistive robots for socialization in elderly people: results pertaining to the needs of the users. Aging Clin Exp Res [Internet]. 2018 Dec 17 [cited 2019 Feb 4];1–17. Available from: http://link.springer.com/10.1007/s40520-018-1073-z

5. Hegel F, Muhl C, Wrede B, Hielscher-Fastabend M, Sagerer G. Understanding Social Robots [Internet]. [cited 2019 Feb 28]. Available from: https://aiweb.techfak.uni-bielefeld.de/files/2009 hegel ACHI.pdf

6. Turja T, Van Aerschot L, Särkikoski T, Oksanen A. Finnish healthcare professionals' attitudes towards robots: Reflections on a population sample. Nurs Open [Internet]. 2018 Jul 1 [cited 2019 Feb 28];5(3):300–9. Available from: http://doi.wiley.com/10.1002/nop2.138

7. Maalouf N, Sidaoui A, Elhajj IH, Asmar D. Robotics in Nursing: A Scoping Review. J Nurs Scholarsh [Internet]. 2018 Sep 27 [cited 2019 Feb 12];50(6):590–600. Available from: http://doi.wiley.com/10.1111/jnu.12424

8. Robinson H, MacDonald B, Broadbent E. The Role of Healthcare Robots for Older People at Home: A Review. Int J Soc Robot [Internet]. 2014 Nov 3 [cited 2019 Feb 27];6(4):575–91. Available from: http://link.springer.com/10.1007/s12369-014-0242-2

9. Broekens J, Heerink M, Rosendal H. Assistive social robots in elderly care: a review. Gerontechnology [Internet]. 2009 Apr 1 [cited 2019 Feb 28];8(2). Available from: http://gerontechnology.info/index.php/journal/article/view/1011

10. Flandorfer P. Population Ageing and Socially Assistive Robots for Elderly Persons: The Importance of Sociodemographic Factors for User Acceptance. Int J Popul Res [Internet]. 2012 Apr 22 [cited 2019 Feb 11];2012:1–13. Available from: https://www.hindawi.com/archive/2012/829835/

11. Jøranson Mnsc N, Pedersen Phd I, Marie A, Rokstad M, Phd CI. Original Study Effects on Symptoms of Agitation and Depression in Persons With Dementia Participating in Robot-Assisted Activity: A Cluster-Randomized Controlled Trial. J Am Med Dir Assoc [Internet]. 2015 [cited 2019 Apr 1];16:867–73. Available from: http://dx.doi.org/10.1016/j.jamda.2015.05.002

12. Sung H-C, Chang S-M, Chin M-Y, Lee W-L. Robot-assisted therapy for improving social interactions and activity participation among institutionalized older adults: A pilot study. Asia-Pacific Psychiatry [Internet]. 2015 Mar 1 [cited 2019 Apr 1];7(1):1–6. Available from: http://doi.wiley.com/10.1111/appy.12131

13. Robinson Msc H, Macdonald Phd B, Kerse Phd N, Broadbent Phd E, Robinson H, MacDonald B, et al. The Psychosocial Effects of a Companion Robot: A Randomized Controlled Trial. J Am Med Dir Assoc [Internet]. 2013 Sep 1 [cited 2019 Feb 28];14(9):661–7. Available from: https://www.sciencedirect.com/science/article/pii/S1525861013000972

14. Koh IS, Kang HS. Effects of Intervention Using PARO on the Cognition, Emotion, Problem Behavior, and

Social Interaction of Elderly People with Dementia. J Korean Acad Community Heal Nurs [Internet]. 2018 Sep 1 [cited 2019 Apr 1];29(3):300. Available from: https://synapse.koreamed.org/DOIx.php?id=10.12799/jkachn.2018.29.3.300

15. Frambach RT, Schillewaert N. Organizational innovation adoption: A multi-level framework of determinants and opportunities for future research. J Bus Res [Internet]. 2002;55:163–76. Available from: https://doi.org/10.1016/S0148-2963(00)00152-1

16. de Graaf MMA, Ben Allouch S, van Dijk JAGM. Long-term evaluation of a social robot in real homes. Interact Stud [Internet]. 2016 Dec 31 [cited 2019 Mar 1];17(3):461–90. Available from: http://www.jbe-platform.com/content/journals/10.1075/is.17.3.08deg

17. Rogers EM. Diffusion of preventive innovations. Addict Behav [Internet]. 2002 [cited 2019 Mar 12];27:989–93. Available from: https://ac-els-cdn-com.ezproxy2.utwente.nl/S0306460302003003/1-s2.0-S0306460302003003-main.pdf?_tid=6de90517-689c-4802-a361-c1123c01ea81&acdnat=1552380248_bac1988a11365b17c09ddb8abc0d2035

18. Berwick DM. Disseminating Innovations in Health Care. JAMA [Internet]. 2003 Apr 16 [cited 2019 Jan 28];289(15):1969. Available from: http://jama.jamanetwork.com/article.aspx?doi=10.1001/jama.289.15.1969

19. de Graaf MMA, Ben Allouch S, van Dijk JAGM. Why Would I Use This in My Home? A Model of Domestic Social Robot Acceptance. Human–Computer Interact [Internet]. 2019 Mar 4 [cited 2019 Feb 11];34(2):115–73. Available from: https://www.tandfonline.com/doi/full/10.1080/07370024.2017.1312406

20. Alaiad A, Zhou L. The determinants of home healthcare robots adoption: An empirical investigation. Int J Med Inform [Internet]. 2014 Nov 1 [cited 2019 Feb 18];83(11):825–40. Available from: https://www.sciencedirect.com/science/article/pii/S1386505614001385

21. Rantanen T, Lehto P, Vuorinen P, Coco K. The adoption of care robots in home care-A survey on the attitudes of Finnish home care personnel. J Clin Nurs [Internet]. 2018 May 1 [cited 2019 Feb 19];27(9–10):1846–59. Available from: http://doi.wiley.com/10.1111/jocn.14355

22. de Graaf MMA, Ben Allouch S. Exploring influencing variables for the acceptance of social robots. Rob Auton Syst [Internet]. 2013 Dec 1 [cited 2019 Feb 11];61(12):1476–86. Available from: https://www.sciencedirect.com/science/article/pii/S0921889013001334?via%3Dihub

23. Petrakaki D, Klecun E, Cornford T. Changes in healthcare professional work afforded by technology: The introduction of a national electronic patient record in an English hospital. Organization [Internet]. 2016 [cited 2019 Mar 12];23(2):206–26. Available from: https://journals.sagepub.com/doi/pdf/10.1177/1350508414545907

24. Broadbent E, Stafford · R, Macdonald · B, Macdonald B. Acceptance of Healthcare Robots for the Older Population: Review and Future Directions. Int J Soc Robot [Internet]. 2009 [cited 2019 Mar 8];1:319–30. Available from: https://link-springer-com.ezproxy2.utwente.nl/content/pdf/10.1007%2Fs12369-009-0030-6.pdf

25. Kachouie R, Sedighadeli S, Khosla R, Chu M-T. Socially Assistive Robots in Elderly Care: A Mixed-Method Systematic Literature Review. Int J Hum Comput Interact [Internet]. 2014 May 4 [cited 2019 Apr 1];30(5):369–93. Available from: http://www.tandfonline.com/doi/abs/10.1080/10447318.2013.873278

26. SoftBank Robotics. Pepper the humanoid robot [Internet]. [cited 2019 Jun 28]. Available from: https://www.softbankrobotics.com/emea/en/pepper

27. Pedersen I, Reid S, Aspevig K. Developing social robots for aging populations: A literature review of recent academic sources. Sociol Compass. 2018;12(6):1–10.

28. Vercelli A, Rainero I, Ciferri L, Boido M, Pirri F. Robots in Elderly Care. Sci J Digit Cult. 2017;2(2):37–50.

29. Robotzorg. Tessa, sociale robot [Internet]. [cited 2019 Jun 24]. Available from: https://www.robotzorg.nl/product/tessa-sociale-robot/

30. Bemelmans RM, Jan Gelderblom G, Jonker P, de Witte L, Gelderblom GJ, Jonker P, et al. Socially Assistive Robots in Elderly Care: A Systematic Review into Effects and Effectiveness. J Am Med Dir Assoc [Internet]. 2012 Feb 1 [cited 2019 Feb 11];13(2):114-120.e1. Available from: https://www.sciencedirect.com/science/article/pii/S1525861010003476?via%3Dihub

31. Banks MR, Willoughby LM, Banks WA. Animal-Assisted Therapy and Loneliness in Nursing Homes: Use of Robotic versus Living Dogs. J Am Med Dir Assoc [Internet]. 2008 Mar 1 [cited 2019 Feb 28];9(3):173–7. Available from: https://www-sciencedirect-com.ezproxy2.utwente.nl/science/article/pii/S1525861007005166

32. Shibata T, Wada K. Robot Therapy: A New Approach for Mental Healthcare of the Elderly – A Mini-Review. Gerontology [Internet]. 2011 [cited 2019 Feb 28];57:378–86. Available from: https://www.karger.com/Article/Pdf/319015

33. Khosla R, Nguyen K, Chu M-T. Human Robot Engagement and Acceptability in Residential Aged Care. 2017 Jun 3 [cited 2019 Apr 1];33(6):510–22. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=hihc20

34. Louie W-YG, McColl D, Nejat G. Acceptance and Attitudes Toward a Human-like Socially Assistive Robot by Older Adults. Assist Technol [Internet]. 2014 Jul 3 [cited 2019 Feb 4];26(3):140–50. Available from: http://www.tandfonline.com/doi/abs/10.1080/10400435.2013.869703

35. Bedaf S, Marti P, Amirabdollahian F, Luc De Witte &, De Witte L. A multi-perspective evaluation of a service robot for seniors: the voice of different stakeholders. Disabil Rehabil Assist Technol [Internet]. 2018 Aug 18 [cited 2019 Feb 4];13(6):592–9. Available from: https://www.tandfonline.com/doi/full/10.1080/17483107.2017.1358300

36. Fleuren MAH, Paulussen TGWM, Van Dommelen P, Van Buuren S. Towards a measurement instrument for determinants of innovations. Int J Qual Heal Care [Internet]. 2014 Oct 1 [cited 2019 Mar 28];26(5):501–10. Available from: https://academic.oup.com/intqhc/article-lookup/doi/10.1093/intqhc/mzu060

37. Fleuren M, Wiefferink K, Paulussen T. Determinants of innovation within health care organizations: Literature review and Delphi study. Int J Qual Heal Care [Internet]. 2004 Apr 1 [cited 2019 Jan 28];16(2):107–23. Available from: https://academic.oup.com/intqhc/article-lookup/doi/10.1093/intqhc/mzh030

38. Fleuren MAH, Paulussen TGWM, Dommelen P Van, Buuren S Van. Measurement Instrument for Determinants of Innovations (MIDI). Leiden; 2014.

39. Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: Toward a unified view. MIS Q. 2003;27(3):425–78.

40. Venkatesh V, Davis FD. A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Manage Sci [Internet]. 2000 Feb [cited 2019 Mar 1];46(2):186–204. Available from: http://pubsonline.informs.org/doi/abs/10.1287/mnsc.46.2.186.11926

41. Centraal Bureau voor de Statistiek. Een op vijf leerlingen gezondheid of welzijn is man [Internet]. 2018 [cited 2019 Jun 18]. Available from: https://www.cbs.nl/nl-nl/nieuws/2018/11/een-op-vijf-leerlingen-gezondheid-of-welzijn-is-man

42. Nijhof E. Zelfsturende team in de ouderenzorg [Internet]. Utrecht; 2013 [cited 2019 Jun 18]. Available from: https://www.zorgvoorbeter.nl/docs/PVZ/vindplaats/verbeteren doe je zo/zelfsturende-teams-thuiszorg.pdf

43. DiCicco-Bloom B, Crabtree BF. The qualitative research interview. Med Educ [Internet]. 2006 Apr 1 [cited 2019 Jul 10];40(4):314–21. Available from: http://doi.wiley.com/10.1111/j.1365-2929.2006.02418.x

44. Baarda B. Dit is onderzoek! Second edi. Noordhoff Uitgevers; 2014.

45. Corbetta P. The Qualitative Interview. In: Social Research: Theory, Methods and Techniques [Internet]. London: SAGE Publications; 2003 [cited 2019 Jul 11]. p. 264–86. Available from: https://dx.doi.org/10.4135/9781849209922

46. Ryan F, Coughlan M, Cronin P. Interviewing in qualitative research: The one-to-one interview. Int J Ther Rehabil [Internet]. 2009 Jun [cited 2019 Jul 11];16(6):309–14. Available from: http://www.magonlinelibrary.com/doi/10.12968/ijtr.2009.16.6.42433

47. Hennink M, Weber MB. Quality issues of court reporters and transcriptionists for qualitative research. Qual Health Res [Internet]. 2013 May [cited 2019 Jul 11];23(5):700–10. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23512435

48. Gill P, Stewart K, Treasure E, Chadwick B. Methods of data collection in qualitative research: interviews and focus groups. Br Dent J [Internet]. 2008 Mar 22 [cited 2019 Jul 15];204(6):291–5. Available from: http://www.nature.com/articles/bdj.2008.192

49. Donders T. Wat is transcriptie? Woordelijk vs. Letterlijk transcriberen [Internet]. 2018 [cited 2019 Jul 11]. Available from: https://www.amberscript.com/nl/blog/wat-is-transcriptie-woordelijk-vs-letterlijk-transcriberen

50. Lapadat JC. Problematizing transcription: Purpose, paradigm and quality. Int J Soc Res Methodol [Internet]. 2000 [cited 2019 Jul 11];3(3):203–19. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=tsrm20

51. Stuckey H. The first step in Data Analysis: Transcribing and managing qualitative research data. J Soc Heal Diabetes [Internet]. 2014 Jun 20 [cited 2019 Jul 11];02(01):006–8. Available from: http://www.thieme-connect.de/DOI/DOI?10.4103/2321-0656.120254

52. Central Committee on Research Involving Human Subjects. Your research: Is it subject to the WMO or not? [Internet]. [cited 2019 Apr 15]. Available from: https://english.ccmo.nl/investigators/legal-framework-for-medical-scientific-research/your-research-is-it-subject-to-the-wmo-or-not

53. Guest G, Bunce A, Johnson L. How Many Interviews Are Enough? An Experiment with Data Saturation and Variability and a good number of journals in the. Field methods [Internet]. 2006 [cited 2019 Apr 1];18(1):59–82. Available from: https://journals-sagepub-com.ezproxy2.utwente.nl/doi/pdf/10.1177/1525822X05279903

54. Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. Qual Quant [Internet]. 2018 Jul 14 [cited 2019 Apr 1];52(4):1893–907. Available from: http://link.springer.com/10.1007/s11135-017-0574-8

55. Lexico Dictionaries. Attitude [Internet]. [cited 2019 Jul 16]. Available from: https://www.lexico.com/en/definition/attitude

APPENDIX A – DETERMINANTS OF MIDI

This appendix contains the 29 determinants of the MIDI and the related concepts in TAM and UTAUT.

Determinant	Definition	Related concepts
Characteristics of the socially assistive robot		
Procedural clarity	Extent to which the innovation is described in clear steps / procedures. (38)	
Correctness	Degree to which the innovation is based on factually correct knowledge. (38)	
Completeness	Degree to which the activities described in the innovation are complete. (38)	
Complexity	Degree to which implementation of the innovation is complex. (38)	TAM: perceived ease of use (40) UTAUT: effort expectancy (39)
Compatibility	Degree to which the innovation is compatible with the values and needs of the user and the working method in place. (17,38)	UTAUT: Facilitating conditions (39)
Observability	Degree to which the outcomes of an innovation are visible to others. (17,38)	
Relevance for client	Degree to which the user believes the innovation is relevant for his/her client. (38)	TAM: perceived usefulness (40) UTAUT: performance expectancy (39)
Characteristics of the professional in the organisation		
Personal benefits/drawbacks	Degree to which using the innovation has advantages or disadvantages for the users themselves. (38)	
Outcome expectations	Perceived probability and importance of achieving the client objectives as intended by the innovation. (38)	TAM: perceived usefulness (40) UTAUT: performance expectancy (39)
Professional obligation	Degree to which the innovation fits in with the tasks for which the user feels responsible when doing his/her work. (38)	
Client satisfaction	Degree to which the user expects clients to be satisfied with the innovation. (38)	
Client cooperation	Degree to which the user expects clients to cooperate with the innovation. (38)	
Social support	Support experienced or expected by the user from important social referents relating to the use of the innovation (e.g. from colleagues, other professionals they work with, heads of department or management). (38)	
Descriptive norm	Colleagues' observed behaviour; degree to which colleagues use the innovation. (38)	
Subjective norm	The influence of important others on the use of the innovation. (38)	UTAUT: social influence (39)

Self-efficacy	Degree to which the user believes he or she is able to implement the activities involved in the innovation. (38)	
Knowledge	Degree to which the user has the knowledge needed to use the innovation. (38)	
Awareness of content of innovation	Degree to which the user has learnt about the content of the innovation. (38)	
Characteristics within the organisation culture		
Formal ratification by management	Formal ratification of the innovation by management (e.g. by including the use of the innovation in policy documents). (38)	
Replacement when staff leave	Replacement of staff leaving the organisation. (38)	Facilitating conditions
Staff capacity	Adequate staffing in the department or in the organisation where the innovation is being used. (38)	Facilitating conditions
Financial resources	Availability of financial resources needed to use the innovation. (38)	Facilitating conditions
Material resources and facilities	Presence of materials and other resources or facilities necessary for the use of the innovation as intended (e.g. equipment, materials or space). (38)	Facilitating conditions
Time available	The amount of time that is available for the user to use the innovation. (38)	Facilitating conditions
Coordinator/leadership	The presence of one or more persons responsible for coordinating the implementation of the innovation in the organisation. (38)	
Unsettled organisation	Degree to which there are other changes in progress (organisational or otherwise) that represent obstacles to the process of implementing the innovation. (e.g. re-organisations, mergers, cuts, staffing changes or the simultaneous implementation of different innovations). (38)	
Information accessible about use of the innovation	Accessibility of information about the use of the innovation. (38)	
Performance feedback	Feedback to the user about progress with the innovation process. (38)	
Characteristics of the socio-political context		
Legislation and regulations	Degree to which the innovation fits in with existing legislation and regulations established by the competent authorities (e.g. financial structures, substantive legislation and supervision from the Dutch Healthcare Inspectorate or the Dutch Care Authority).	

APPENDIX B – INFORMED CONSENT FORM

This appendix includes the informed consent form which had to be signed by the respondents before the start of the interview. This informed consent form is used for two studies simultaneously. For this reason, the information consent form contains information of this study and the other study. This study is named in this form as 'Sociale robots en de veranderingen in het werken binnen de gezondheidszorg (Social robots and change in healthcare work)' and the name of the related researcher is Marije Schutte. The other study is named as 'De veilige implementatie van sociale zorgrobots in verpleeg/verzorgingshuizen. (The safe implementation of companion robots in elderly care homes)' and the name of the related researcher is X.

INFORMED CONSENT FORMULIER

Naam van het onderzoeksproject:

1. Sociale robots en de veranderingen in het werken binnen de gezondheidszorg (Social robots and change in healthcare work)
2. De veilige implementatie van sociale zorgrobots in verpleeg/verzorgingshuizen. (The safe implementation of companion robots in elderly care homes).

Doel van het onderzoek

Het onderzoek 'sociale robots en de veranderingen in het werken binnen de gezondheidszorg' wordt geleid door Marije Schutte. Het doel van dit onderzoek is inzicht krijgen in de ervaringen van verpleegkundigen/verzorgenden en managers met betrekking tot het gebruik van sociale robots in de zorg voor de ouderen die in een verpleeg -/verzorgingshuis wonen.

Het onderzoek 'de veilige implementatie van sociale zorgrobots in verpleeg-/verzorgingshuizen' wordt geleid door X. Het doel van dit onderzoek is inzicht krijgen in de ervaringen en beleidskennis van ouderenzorg professionals met betrekking tot het gebruik van sociale robots in de zorg voor de ouderen die in een verpleeg-/verzorgingshuis wonen.

U bent van harte uitgenodigd om deel te nemen aan beide onderzoeken.

Gang van zaken tijdens het onderzoek

U neemt deel aan een interview waarin vragen aan u zullen worden gesteld over uw beleidskennis over en ervaringen met het gebruik van sociale robots in uw organisatie. Een voorbeeld van een typische vraag die u zal worden gesteld: "Welke voor- en nadelen heeft de sociale robot voor u, uw collega's en de ouderen?".

U dient tenminste 16 jaar te zijn om deel te nemen aan dit onderzoek. Tevens bent u werkzaam binnen de langdurige ouderenzorg als bijvoorbeeld een verzorgende, verpleegkundige of in een ondersteunende functie (bijv. manager, ICT, inkoop, etc.). Ook heeft u ervaring met het gebruik van de sociale robots (of verkrijgt u dit binnenkort) in de zorg voor de ouderen.

Tijdens het interview zal, aan de hand van een topic list, worden ingegaan op het gebruik van en de regelgeving omtrent de sociale robots in uw organisatie en uw ervaringen met de sociale robots. Van het interview zal een audio-opname worden gemaakt, zodat het gesprek later ad-verbum (woord voor woord) kan worden uitgewerkt. Dit transcript wordt vervolgens gebruikt in het verdere onderzoek.

Potentiële risico's en ongemakken

Er zijn geen fysieke, juridische of economische risico's verbonden aan uw deelname aan deze studie. U hoeft geen vragen te beantwoorden die u niet wilt beantwoorden. Uw deelname is vrijwillig en u kunt uw deelname op elk gewenst moment stoppen.

Vergoeding
U ontvangt voor deelname aan dit onderzoek geen vergoeding. Door deel te nemen aan dit onderzoek zult u meer inzicht krijgen in uw ervaringen met het gebruik van de sociale robot in uw organisatie. Het bredere doel van dit onderzoek is: inzicht krijgen in de factoren die de ervaringen van de verpleegkundigen, verzorgenden en de ondersteunende professionals (bijv. managers, ICT, inkoop, etc.) met het gebruik van de sociale robots in de zorg voor de ouderen beïnvloeden en reguleren.

Vertrouwelijkheid van gegevens
Uw privacy is en blijft maximaal beschermd. Er wordt op geen enkele wijze vertrouwelijke informatie of persoonsgegevens van of over u naar buiten gebracht, waardoor iemand u zal kunnen herkennen.

Voordat onze onderzoeksgegevens naar buiten gebracht worden, worden uw gegevens **anoniem** gemaakt. Enkele eenvoudige voorbeelden hiervan:

- uw naam wordt vervangen door een anonieme, op zichzelf betekenisloos, getal. Bijvoorbeeld respondent 1, respondent 2, etc.
- namen van anderen en de organisatie worden veranderd in een anonieme, op zichzelf betekenisloos, letter. Bijvoorbeeld X, Y, Z, etc.
- uw leeftijd zelf wordt niet verwerkt, maar in een categorie geplaatst. Bijvoorbeeld: leeftijd tussen 18-25 jaar/ tussen 25-35 jaar etc.

In een publicatie of presentatie zullen anonieme gegevens worden gebruikt. De audio-opnamen, formulieren en andere documenten die in het kader van deze studie worden gemaakt of verzameld, worden opgeslagen op een beveiligde locatie bij de Universiteit Twente en op de beveiligde (versleutelde) computer van de onderzoeker.

Vrijwilligheid
Deelname aan dit onderzoek is geheel vrijwillig. Je kunt als deelnemer jouw medewerking aan het onderzoek te allen tijde stoppen, of weigeren dat jouw gegevens voor het onderzoek mogen worden gebruikt, zonder opgaaf van redenen.

Dit betekent dat als je voorafgaand aan het onderzoek besluit om af te zien van deelname aan dit onderzoek, dat dit op geen enkele wijze gevolgen voor jou zal hebben. Tevens kun je tot tien werkdagen (bedenktijd) na het interview alsnog de toestemming intrekken die je hebt gegeven om gebruik te maken van jouw gegevens.

In deze gevallen zullen jouw gegevens uit onze bestanden worden verwijderd en vernietigd.
Als je tijdens het onderzoek, na de bedenktijd van tien werkdagen, besluit om jouw medewerking te staken, zal dat eveneens op geen enkele wijze gevolgen voor je hebben. Echter: de gegevens die u hebt verstrekt tot aan het moment waarop uw deelname stopt, zal in het onderzoek gebruikt worden, inclusief de bescherming van uw privacy zoals hierboven beschreven. Er worden uiteraard geen nieuwe gegevens verzameld of gebruikt.

Als u besluit om te stoppen met deelname aan het onderzoek, of als u vragen of klachten heeft, of uw bezorgdheid kenbaar wilt maken, of een vorm van schade of ongemak vanwege het onderzoek, neemt u dan aub contact op met de onderzoeksleider: Marije Schutte, *e-mailadres* of X, *e-mailadres*

Toestemmings-verklaring
Met uw ondertekening van dit document geeft aan dat u minstens 16 jaar oud bent; dat u goed bent geïnformeerd over het onderzoek, de manier waarop de onderzoeksgegevens worden verzameld, gebruikt en behandeld en welke eventuele risico's u zou kunnen lopen door te participeren in dit onderzoek

Indien u vragen had, geeft u bij ondertekening aan dat u deze vragen heeft kunnen stellen en dat deze vragen helder en duidelijk zijn beantwoord. U geeft aan dat u vrijwillig akkoord gaat met uw deelname aan dit onderzoek. U ontvangt een kopie van dit ondertekende toestemmingsformulier.

Ik ga akkoord met deelname aan een onderzoeksproject geleid door Marije Schutte. Het doel van dit document is om de voorwaarden van mijn deelname aan het project vast te leggen.

1. Ik kreeg voldoende informatie over dit onderzoeksproject. Het doel van mijn deelname als een geïnterviewde in dit project is voor mij helder uitgelegd en ik weet wat dit voor mij betekent.

2. Mijn deelname als geïnterviewde in dit project is vrijwillig. Er is geen expliciete of impliciete dwang voor mij om aan dit onderzoek deel te nemen.

3. Mijn deelname houdt in dat ik word geïnterviewd door Marije Schutte en X. Het interview zal dertig tot zestig minuten duren. Ik geef de onderzoeker toestemming om tijdens het interview opnames (geluid/ beeld) te maken en schriftelijke notities te nemen. Het is mij duidelijk dat, als ik toch bezwaar heb met een of meer punten zoals hierboven benoemd, ik op elk moment mijn deelname, zonder opgaaf van reden, kan stoppen.

4. Ik heb het recht om vragen niet te beantwoorden. Als ik me tijdens het interview ongemakkelijk voel, heb ik het recht om mijn deelname aan het interview te stoppen.

5. Ik heb van de onderzoeksleider de uitdrukkelijke garantie gekregen dat de onderzoeksleider er zorg voor draagt dat ik niet ben te identificeren in door het onderzoek naar buiten gebrachte gegevens, rapporten of artikelen. Mijn privacy is gewaarborgd als deelnemer aan dit onderzoek.

6. Ik heb de garantie gekregen dat dit onderzoeksproject is beoordeeld en goedgekeurd door de ethische commissie van de BMS Ethics Committee. Voor bezwaren met betrekking tot de opzet en of uitvoering van het onderzoek kan ik me wenden tot de Secretaris van de Ethische Commissie van de faculteit Behavioural, Management and Social Sciences op de Universiteit Twente via ethicscommittee-bms@utwente.nl.

7. Ik heb dit formulier gelezen en begrepen. Al mijn vragen zijn naar mijn tevredenheid beantwoord en ik ben vrijwillig akkoord met deelname aan dit onderzoek.

8. Ik heb een kopie ontvangen van dit toestemmingsformulier dat ook ondertekend is door de interviewer.

_____	_____	_____
Naam deelnemer	Handtekening	Datum
_____	_____	_____
Naam Onderzoeker 1	Handtekening	Datum
_____	_____	_____
Naam Onderzoeker 2	Handtekening	Datum

APPENDIX C – INTERVIEW SCRIPT

This appendix consists of the interview script that is used during the interviews with the respondents. The interview script is in Dutch, because the interviews were held in Dutch.

The interviews with the respondents were for two studies simultaneously. That is why the interview script contains questions for this study as well as for the other study. The letter S in the most left column in the tables refer to the questions who were important for this study. The letter A refer to the important questions for the other study.

Persoonlijke vragen:

SA	1.	Hoe oud bent u?	
SA	2.	Welke functie heeft u? Wat houdt deze functie in?	• Hoeveel uur werkt u? • Is het een leidinggevende functie? Zo ja, aan hoeveel mensen geeft u leiding?
SA	3.	Welke opleiding heeft u gevolgd?	• Op welk niveau heeft u de opleiding gevolgd? • Hoe verhoudt de studie zich tot uw huidige werk?
SA	4.	Hoelang werkt u al in de ouderenzorg?	• Hoelang in deze organisatie en deze functie?

Ervaring met robots:

SA	5.	Heeft u eerder met zorgtechnologie in de ouderenzorg gewerkt?	• Zo ja, welke technologieën heeft u gebruikt en voor hoelang? *Bijv. eHealth, domotica en zorgrobots?*
SA	6.	Heeft u ervaring met robots in het algemeen?	• Met wat voor robots heeft u al ervaring? • Hoelang werkt u er al mee?
SA	7.	Heeft u ervaring met sociale robots in de zorg voor ouderen?	• Hoelang werkt u er al mee? • Welk soort robots gebruikt u? • Met welk doel gebruikt u de sociale robot? • Heeft u ervaring met sociale robots opgedaan in andere organisaties? • Hoelang worden de sociale robots al in deze organisatie gebruikt? • Op welke manier bent u betrokken bij het gebruik van de robots in de organisatie?
SA	8.	Met welk doel heeft de organisatie de sociale robot in gebruik genomen?	• Is dit doel gedurende de tijd veranderd? • Is het gebruik van de robot als aanvulling op de zorg of ter vervanging van iets of iemand? • In hoeverre geloof u dat de robot in staat is het doel van de organisatie te bereiken? Is dit al bereikt? • Ziet u nog andere doelen waarvoor de robot gebruikt kan worden? • Was het voor u duidelijk waarom en met welk doel de robot in gebruik werd genomen?

			• Welke informatie was vanuit uw organisatie beschikbaar?
SA	9.	Wanneer wordt de robot gebruikt in uw werk?	• Hoe vaak wordt de robot gebruikt? • Op welke moment of tijdstip van de dag wordt de robot gebruikt? • Wie beslist dat de robot gebruikt wordt?
SA	10.	Sprekend vanuit uw positie, welke impact hebben de robots op de kwaliteit van leven van de ouderen?	• Welke impact hebben de robots op: - De fysieke en psychische gezondheid van ouderen - Zelfstandigheid - Sociale relaties - Deelname aan activiteiten? • Weet u nog andere aspecten te benoemen die beïnvloed worden?
A	11.	Sprekend vanuit uw verzorgende positie, hoe kunnen de robots impact hebben op de kwaliteit van zorg?	• Hoe ziet u deze impact terug tijdens uw werk? Voorbeelden? • Hoe denkt u dat ouderen dit ervaren? En managers/verzorgenden?
SA	12.	In welke ruimten worden de robots gebruikt? Waarom?	• Worden de robots hier voor collectief of individueel gebruik gebruikt? • Waarom is er gekozen om de robot voor collectief/individueel gebruik toe te passen?
SA	13.	Welke taken en functies voeren de robots uit? Voorbeelden?	• Voeren alle robots dezelfde taken uit voor alle ouderen? Waarom wel of niet? • Hoe en door wie wordt er beslist welke taken een robot uitvoert voor een oudere?
S	14.	Welke professionals gebruik de robots?	• Waarom gebruiken deze professionals de robot? • Voor welke taken gebruiken zij de robot? • Hoe gebruiken zij de robots? • Wordt er samengewerkt? • Hoe ervaart u de samenwerking?
S	15.	Zijn de ouderen tevreden over het gebruik van de robots?	• Zijn ze bereid om de robots te gebruiken? Waarom wel of niet? • Zien zij de robot als meerwaarde? Waarom wel of niet? • Welke voordelen/nadelen heeft de robot voor hun?
SA	16.	Zijn u en uw collega's tevreden over het gebruik van de robots?	• Zijn ze bereid om de robot te gebruiken? Waarom wel of niet? • Zien zij de robot als meerwaarde? Waarom wel of niet? • Past het gebruik van de robot in uw werkzaamheden? Waarom wel of niet? • Welke voordelen/nadelen heeft de robot voor hun? • Wat denkt u dat de grootste uitdagingen zijn betreffend het gebruik van de robot? • Ziet u uitdagingen voor andere betrokkenen? Bijv. de ouderen of managers?
SA	17.	Is de sociale robot makkelijk te gebruiken door de professionals en ouderen?	• Wat maakt het makkelijk of moeilijk? Waar komt dit door? *Bijv. leeftijd gebruikers*

SA	18.	Beschikken uw collega's en de ouderen naar uw idee over voldoende vaardigheden en kennis om de robot op de goede manier te gebruiken?	
S	19.	Welke personen ondersteunen u bij het gebruik van de robot?	• Op welke manier ondersteunen zij u? • Welke invloed heeft deze ondersteuning op het gebruik van de robot?
S	20.	Worden er vanuit de organisatie middelen beschikbaar gesteld om de robot te gebruiken? *Bijv. financiën, ICT, materiaal, etc.*	• Welke middelen worden geleverd? • Welke geleverde middelen ervaart u als prettig? • Welke middelen mist u?
S	21.	Is er tijd en personeel beschikbaar om de robot te gebruiken?	• Wat ervaart u als prettig qua beschikbare tijd en personeel? • Wat mist u qua beschikbare tijd en personeel?
S	22.	Zijn er veranderingen in de organisatie bezig die het gebruik kunnen beïnvloeden?	• Welke invloed verwacht u dat dit gaat hebben op het gebruik?

Beleid

SA	23.	Op welke manier zijn de sociale robots in gebruik genomen in deze organisatie? Meer vertellen? *Bijv. implementatieplan? Projectgroep? Pilot?*	• Is er een beleid of protocol binnen de organisatie die gaat om het gebruik van de robot? • Wat staat er inhoudelijk in dit beleid? Voorbeelden van regels? • Zijn u en uw collega's tevreden over dit beleid? Waarom wel of niet?
A	24.	Hoe hebben jullie de ouderen verteld over de robot en de toepassing ervan?	• Kunt u beschrijven hoe dat in zijn werk ging? *Bijv. bijeenkomst, papier* • Zijn ouderen op de hoogte van de toepassingsregels? • Dienen ouderen actie(s) te ondernemen met betrekking tot de in acht neming van deze regels? *Verwijs naar: toestemming voor gebruik* • Vinden ouderen zulke regels belangrijk?
A	25.	Welke aspecten van het werken met de robot vindt u het belangrijkste? *Voorbeelden van aspecten zijn: fysieke en psychische veiligheid, kennis hebben van de technologie, de controle behouden over de robot en het veilig omgaan met persoonlijke informatie.*	• Vindt u nog andere aspecten belangrijk? • Wat is in uw positie het belangrijkste wat betreft het gebruik van de robot in uw werk? Vinden uw collega's dit ook belangrijk?

A	26.	Kunt u voorbeelden noemen hoe dit verpleeghuis een omgeving ontwikkeld waarin ouderen en medewerkers zo min mogelijk schade van de robot ervaren? *Dit met betrekking tot de voorgaande genoemde aspecten; fysieke en*	• Wat doet de organisatie om zo'n veilige omgeving te creëren? *Verwijs naar: ontvangen trainingen veilig gebruik en toepassing van de robot? Veiligheidsrichtlijnen?*

		psychische veiligheid, kennis hebben van de technologie, de controle behouden over de robot, het veilig omgaan met persoonlijke informatie en -invullen; eventuele aspecten genoemd door de respondent-.	• Bent u van mening dat deze aanpak voldoende is? Zo niet, heeft u ideeën over hoe de veiligheid beter gewaarborgd kan worden?' • Denkt u dat uw collega's gemotiveerd zijn om een veilige omgeving met betrekking tot de robots te creëren? • Hoe zou u zich voelen wanneer het veilige gebruik van de robots de verantwoordelijkheid werd van uw/het verzorgingsteam? • Denkt u dat managers/verzorgenden een rol kunnen spelen in het waarborgen van het veilige gebruik van de robot? • Denkt u dat ouderen zelf een rol kunnen spelen in het waarborgen van het veilige gebruik van de robot? Hoe? • Denkt u dat de robot schade aan kan richten bij ouderen of uzelf? • Wat verstaat u onder een schadelijke situatie? • Weet u of er al onveilige situaties met betrekking tot de robot voorgekomen zijn? Zo ja, kunt u mij hier meer over vertellen? *Bijv. wat is er gebeurd, oorzaak, etc.*
A	27.	Bent u op de hoogte van regels die van toepassing zijn mochten schadelijke situaties voorkomen?	• Zijn er regels die aangeven wie verantwoordelijk is voor het creëren van de schadelijke situatie? • Zijn er regels die bepalen wie financieel verantwoordelijk is voor de kosten aangericht door de schadelijke situatie?
A	28.	Bent u bekend met de ethische kwesties die in de maatschappij circuleren over het gebruik van de robot in de ouderenzorg? *Verwijs naar:* *(minder zorg verricht door mensen, verlies van banen, afhankelijk van de robot worden, beheersing van ouderen over de robot)*	• Hoe voelt u zich over deze ethische kwesties? *Verwijs naar: vinden ze deze kwesties realistisch?* • Hoe denkt u dat ouderen en managers/verzorgenden zich hier over voelen en dit ervaren? • Zijn er regels die van toepassing zijn op deze ethische kwesties? Kunt u hiervan voorbeelden geven?

APPENDIX D - TRANSCRIPTS

Because of the length of the transcripts, the transcripts are not included in this document. Instead of that, the transcripts can be found in the document 'Transcripten Socially assistive robots van Marije Schutte' on the attached USB-stick.

The following letters are used in the transcripts to anonymise the respondents and organisations:

- The letter W was used for external organisations;
- the letter X for a name of a person;
- the letter Y for a department in the elderly care organisation;
- the letter Z for the name of the elderly care organisation.

APPENDIX E – CODEBOOK

This appendix consists of the codebook used for the encoding the transcripts. The right-hand column is in Dutch, because this simplified the encoding of the Dutch transcripts.

Label	Definition	When this code is used (in Dutch)
Theme: Remaining labels		
Attitude of the professional	A settled way of thinking or feeling about the use of the socially assistive robot by the professional in the elderly care organisation. (55)	De respondent drukt zijn eigen houding t.o.v. robots uit, bijvoorbeeld: - Als het zo is, dan is het zo - Afwachtende houding - ik sta er open voor - ik ben sceptisch - eerst zien, dan geloven - angsten - de robot hebben we nodig - de robot is een aanvulling op de zorg, geen vervanging van zorg.
Personal characteristics	The characteristics that identify a respondent, including their experience with health technology and (socially assistive) robots.	De respondent vertelt iets over zijn leeftijd, geslacht, opleidingsniveau, functie in de organisatie en zijn ervaring met zorgtechnologie, robots in het algemeen en socially assistive robot. Ook het aantal jaar ervaring met het gebruiken van socially assistive robots valt hier onder.
Theme: Characteristics of the socially assistive robot		
Procedural clarity	Extent to which the use of the socially assistive robot is described in clear steps / procedures. (38)	Het gebruik van de sociale robot is vastgelegd in een stappenplan, een werkdocument of een protocol. De professionals kunnen een lijstje gebruiken voor welke cliënt de robot wel/niet werkt.
Compatibility **(UTAUT: Facilitating conditions** (39)**)**	Degree to which the use of the socially assistive robot is compatible with the values and needs of the professional and the working method in place. (17,38)	***Working method***: De organisatie staat open voor innovaties, geeft de professionals de ruimte om met ideeën te komen, is ondersteunend voor initiatieven in de zorg, cliënt staat voorop, vooruitstrevend, wel/geen verplichting opleggen om de robot te gebruiken. Betrokkenheid van andere disciplines, zoals de fysio. En de samenwerking met deze disciplines. ***Values & needs***: Rationeel denken en eigen verstand gebruiken, de robot past wel/niet binnen de huidige werkzaamheden in de organisatie De robot is een aanvulling op de zorg en geen vervanging. Alle mogelijkheden zijn er om met de robot te kunnen werken en worden gefaciliteerd vanuit de organisatie.
Observability	Degree to which the outcomes of the socially	De reactie van de cliënten en bezoekers op de robot.

	assistive robots are visible to others. (17,38)	De cliënten en bezoekers maken wel/niet gebruik van de robot. Kwaliteit van leven is zichtbaar verbeterd of de kwaliteit van zorg is zichtbaar verbeterd. Er is wel/geen werkdruk vermindering zichtbaar door het gebruik van de robot. De respondent geeft aan hoe vaak de robot op dit moment gebruikt wordt.
Theme: Characteristics of the individual		
Personal benefits	Degree to which using the use of the socially assistive robot has advantages for the individual user themselves. (38)	Benefits: De voordelen die de respondent ervaart door het gebruiken van de robot.
Personal drawbacks	Degree to which using the use of the socially assistive robot has disadvantages for the individual user themselves. (38)	Drawbacks: De nadelen die de respondent ervaart door het gebruiken van de robot.
Self-efficacy	Degree to which the individual believes he or she is able to use the socially assistive robot. (38)	De vaardigheden en skills van de respondent om de robot te kunnen gebruiken of in te schatten voor wie de robot wel/niet geschikt is (bijv. door eigen verstand te gebruiken, rationeel te denken, logisch nadenken)
Knowledge	Degree to which the individual user has the knowledge needed to use the socially assistive robot. (38)	De respondent heeft zelf wel/geen kennis om in te kunnen schatten of de robot door een client gebruikt kan worden of niet en heeft wel/geen kennis over de robot.
Complexity **(TAM: perceived ease of use** (40) **UTAUT: effort expectancy** (39)**)**	Degree to which the individual perceive the socially assistive robot as ease of use. (38)	Moeilijk of makkelijk te gebruiken door de respondent zelf, maar ook door collega's en cliënten.
Theme: Characteristics of the professional in the organisation		
Relevance for client **(TAM: perceived usefulness** (40) **UTAUT: performance expectancy** (39)**)**	Degree to which the professional believes the socially assistive robot is relevant for his/her client, because it achieves the client objectives as intended by the socially assistive robot. (38)	De robot heeft het doel om de kwaliteit van leven of kwaliteit van zorg te verbeteren. Door het gebruik van de robot kunnen de zorgverleners meer persoonlijke aandacht geven aan de client wat beter is voor hun. De respondent heeft het idee dat de robot van meerwaarde is voor de zorg aan de cliënt of voor de cliënt om bepaalde redenen die vermeld worden. Het doel waarvoor de robot in gebruik werd genomen.
Professional obligation	Degree to which the socially assistive robot fits in with the tasks for which the professional feels	De respondent voelt zich verantwoordelijk om de robot te gebruiken, cliënten en bezoekers te wijzen op de robot, om de robot aan- en

	responsible when doing his/her work. (38)	uit te zetten, op te laden, te programmeren (of juist niet), meedenken over nieuwe mogelijkheden, updates uitvoeren etc. Het gebruik van de sociale robots heeft geen prioriteit voor de respondent, en past dus nog niet in hun taken. De robot past wel in hun taken en verantwoordelijkheden. De respondent is betrokken bij het gebruik of gebruikt de robot nog eigenlijk niet.
Client satisfaction	Degree to which the professional expects clients to be satisfied with the use of the socially assistive robot. (38)	De tevredenheid van de cliënten. De cliënten zijn heel blij met de robot en kunnen niet meer zonder, of vinden het helemaal niks en willen het niet gebruiken. Gerelateerd aan de cliënten valt ook de tevredenheid van de familie.
Client cooperation	Degree to which the professional expects clients to cooperate with the socially assistive robot. (38)	De bereid van de cliënten om de robot te gebruiken, bijvoorbeeld dat cliënten ervoor zitten en ertegen praten. Of er helemaal niks mee te maken willen hebben.
Social support	Support experienced or expected by the professional from important social referents relating to the use of the socially assistive robot (e.g. from colleagues, other professionals they work with, heads of department or management, clients and relatives of clients). (38)	De respondent voelt steun van een of meerdere collega's om de robot te gebruiken. Zij kunnen bij deze persoon terecht met vragen en problemen. Of ze verwachten dat ze bij deze persoon terecht kunnen. Of de respondent geeft juist zelf de steun aan collega's.
Subjective norm (UTAUT: social influence (39)**)**	The influence of important others in or outside the elderly care organisation on the use of the socially assistive robot by the professional. (38)	De invloed die een belangrijk persoon (X) heeft op haar collega's. De invloed van de externe organisatie op het gebruik van de robot, doordat er goed contact is, is er ook veel mogelijk. De kennis van de belangrijke personen worden overgedragen op collega's, zodat zij geënthousiasmeerd worden.
Coordinator/leadership	The presence of one or more persons responsible for coordinating the implementation of the socially assistive robot in the organisation. (38)	De aanwezigheid van zorgtechnologie werkgroep en kennisdragers zorgtechnologie (Knowledge carriers healthcare technology) De manier waarop de coördinator zijn/haar rolt invult, dus collega's motiveren, meenemen etc.
Descriptive norm	Colleagues' observed behaviour; degree to which colleagues use the socially assistive robot according . (38)	De respondent beschrijft hoe de houding van zijn/haar collega's in t.o.v. de robot, in hoeverre zij de robot wel/niet gebruiken en waarom, in hoeverre collega's bereid zijn om scholing te volgen, meer kennis erover te krijgen en zich erin te verdiepen etc.

Information accessible about the use of the innovation	Accessibility of information about the use of the socially assistive robot. (38)	De respondent vertelt over de wijze waarop zij meer informatie wil krijgen over het gebruik van de robots en de manieren waarop zij deze kennis heeft of kan/wil krijgen over het gebruik van de sociale robots, zoals door een training, woonzorgcongres, teamoverleg
Awareness of content of innovation	Degree to which the professional has learnt about the content of the socially assistive robot. (38)	De respondent is zich bewust van de mogelijkheden van de robot en de eventuele mogelijkheden van de robot voor in de toekomst (op de huiskamer, of nog andere functies). De respondent weet wel/niet wat een robot allemaal wel of niet zou kunnen. Wel/niet bewust van zijn dat privacy en veiligheid geregeld moet zijn rondom de robot. Collectief/individueel gebruik van robots.
Time available (UTAUT: Facilitating conditions (39)**)**	The amount of time that is available for the professional to use the socially assistive robot. (38)	De respondent beschrijft in hoeverre zij ervaart dat er wel of geen voldoende tijd beschikbaar is om de robot te gebruiken.