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Touch screen acceptance among patients and employees of the clinic Rheumatology and Clinical Immunology

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Abstract

At the clinic Rheumatology and Clinical Immunology of the MST Enschede, information about the out patients, e.g. the quality of life of the patient, is collected in advance of the consultation. The data is collected via touch screen technology. The rheumatology clinic liked to know what attitudes of patients and employees regarding the touch screens are.
The goal of this study was to gain more insight in the process of acceptance of the touch screens used by patients and employees of the rheumatology outpatient clinic of the 'Medisch Spectrum Twente'. A literature study was conducted to find models and theories concerning the process of acceptance. Used models to explain the results of this study were: (1) the domestication theory, (2) the theory of planned behaviour, (3) the theory of reasoned action, (4) the technology acceptance model and (5) the extended Triandis Model.
Two studies were conducted: one study among patients via the focus group method (n=9), studying patient acceptance of the touch screens; one study among employees of the rheumatology outpatient clinic (n=7) studying patient and employee acceptance of the touch screens via the semi-structured interview method. Research questions that were answered were:
(1) What are the attitudes of patients toward the touch screens, (2) what were experiences of employees with patients' attitudes toward the touch screens? and (3) what are the attitudes of employees toward the touch screens.

The results of study 1 and 2 showed that, in general, patients enjoyed working with the touch screens. The results of study 1 showed that patients liked working with the touch screens and that they were willing to work with the touch screens when: (1) the touch screen technology would be used as an opportunity to improve their treatment, (2) when they would receive information about the results of the questionnaires and the touch screen project and when the touch screens are facilitated well concerning (3) privacy and (4) guidance. The results of study 2 showed that, concerning patients, there were no major differences between the results of study 1 and study 2. Employees experienced that patients were willing to cooperate when they got help when using the touch screens for the first time.
Regarding attitudes of employees concerning touch screens, doctor's assistants liked to be informed about the goals of the touch screens and about how the touch screens work. Nurse practitioners liked to have a host hired. Rheumatologists wanted the touch screens to be useful both for themselves as well as for the patients.
The results lead to four different models explaining the results of the two studies. The results regarding patients were divided in user and non-user of the touch screens. The extended Triandis model was used to create a model explaining usage of touch screens. The technology acceptance model was used to create a model explaining intention to usage of touch screens for non-users with experience using computers as well as non-users with no experience with computers. The technology acceptance model and the theory of planned behaviour were used to explain usage of touch screens of the employees.

It was recommended (1) to recruit a host who can guide and help the patients; (2) that the touch screens should be used to improve the interpersonal contact between patient and doctor/nurse; (3) to offer the patients some privacy when they are using the touch screens and to develop a protocol for the privacy of the data; (4) to assure that the touch screens are always operational. The importance of these recommendations were grounded by the domestication theory.

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Introduction

At the clinic Rheumatology and Clinical Immunology of the MST Enschede, information about the out patients, e.g. the quality of life of the patient, is collected in advance of the consultation. This data is used for scientific research until now, but is intended to be used in the consultations. The data is collected via touch screen technology. Electronic data collection compensates for the possible physical limitations of patients and facilitates fast data networking. Therefore the information can be used immediately during the consultation. The data is collected via the Rheumatology Online Monitor Application (ROMA). ROMA is not being used by all patients at this time, only when requested by the doctor. The primary focus of ROMA in the current situation is usage for research. At the moment participating hospitals are: Medisch Spectrum Twente Enschede, Isala Klinieken Zwolle, 2 Steden Tilburg and Ziekenhuisgroep Twente (Almelo, Hengelo and Goor). In the future ROMA should be used by rheumatology clinics in the east of the Netherlands. By that time ROMA should be accepted by patients as well as employees of the hospitals.

The rheumatology outpatient clinic liked to know under which conditions patients were willing to accept the technology. It seemed that patients and employees have to get used to the technology. But these were speculations, because the rheumatology outpatient clinic never studied the subject systematically before.

Concerning patients, it was hard to measure to which extent patients accept the touch screens. Patients do not come often at the clinic. Before they return, months have past. But, do patients like working with the system? To which extent do they accept the touch screens? The rheumatology outpatient clinic could not answer these questions.

For the employees the use of touch screen technology has consequences as well. Their job content has changed, for example the doctor's assistants have to guide the patients through the system in addition to their other tasks. Some employees seem to like ROMA; others do not seem to like the technology at all. The rheumatology outpatient clinic did not know what exact reasons are for liking or disliking the technology.

This study answers questions about the acceptance of the touch screens by patients and employees. Advantages and disadvantages of the touch screens were revealed and conditions in which patient are and are not willing to cooperate were unravelled.

This study is not only important for the rheumatology outpatient clinic to gain insight in the subject, but it has scientific value as well. First of all, many studies studied the benefits of touch screens for patients, e.g. Greenwood, Hakim, Carson and Doyle (2006), or compared touch screens to pen-and-paper questionnaires, e.g. Weber et al. (2003), Velikova et al. (1999). Only few studied the acceptance of touch screens by patients, e.g. Newell, Girgis, Sanson-Fisher and Stewart (1997), Buxton, White and Osoba (1998), Allenby, Matthews, Beresford and McLachlan (2002) and Bischoff-Ferrari, Vondechend, Bellamy and Theiler (2005).

Second, what is different about this research, compared to the few studies that studied the acceptance of touch screens by patients, is that not only patients are being studied, but employees of the rheumatology outpatient clinic as well.

Last, a large part of the patients of the clinic Rheumatology and Clinical Immunology are elderly people. The Dutch population is growing older and older (CBS, 2009). In 1950 only 8 percent of the Dutch population was older than 65 years old, in 2009 this amount has increased to 15 percent of the Dutch population (CBS, 2009). It is estimated that this percentage will grow until 2030 (CBS, 2009). The amount of the elderly people that needs care will increase with 34 percent in the coming years (Nationaal Ouderen Fonds, 2009).

When the population is growing older, less younger people can account for the care of the elderly. A possible solution is the usage of ICT in health care. Therefore it is important to understand under which conditions elderly people are willing to accept new technologies.

To find out under which conditions patients and employees wanted to cooperate, two studies were conducted: one among patients and one among employees. The goal of the studies was to explore in a structured way under which conditions patients and employees want to work with the touch screen technology. This study helped the rheumatology outpatient clinic to find out which wishes and demands patients and employees have.

The first chapter describes the theories used in this study. It discusses the total process of acceptance, use and effect and the theories and models that are useful for this study. The second chapter describes the method and results of the first study, while the third chapter describes the method and results of the second study. The discussion can be found in chapter four and the recommendations in chapter five. The interview questions can be found in the appendices.

1   Acceptance of technology

Under which conditions are patients and employees willing to cooperate? To answer that question let's take a look at the role of user acceptance.

User acceptance is defined by Dillon and Morris (1996) as *"the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support."* Lack of user acceptance is an important obstruction to the success of new ICT projects (Dillon and Morris, 1996). User acceptance is therefore the most important predictor to the success or failure of the touch screens. Thus, it is important to find out whether patients and employees of the rheumatology outpatient clinic are willing to accept the touch screens or not. To find out to which extent patients and employees are accepting the touch screens, the total process of acceptance and use of ICT within the rheumatology outpatient clinic has to be studied (Bouwman, van den Hoof, van de Wijngaert and van Dijk, 2005).

The total process of acceptance, use and effects of ICT in a user context is depicted in figure 1:
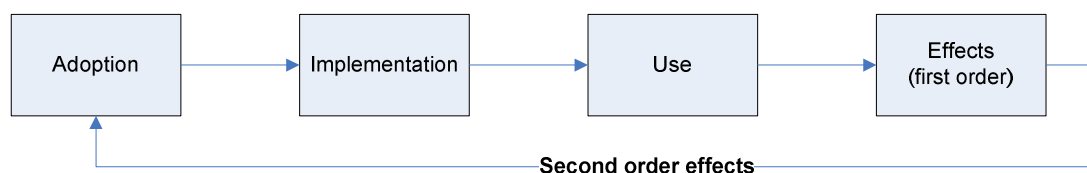

Figure 1. The total process of acceptance, use and effects of ICT (Bouwman et al. 2005)

The first stage shown in figure 1 is the adoption stage: the stage in which the technology is adopted by the organization. The second stage is the implementation stage, in which the technology is being implemented within the organization. The third stage is the usage stage. This is the stage in which the technology is accepted and is actually used by users. The fourth stage concerns the effects. There are two sorts of effects, namely first order effects, e.g. when customers tend to use the technology different than the developers would have thought of, and second order effects, namely when the developers change the technology to the different way users use the technology.

In the currently available models and theories of technology appropriation by users, the emphasis is either on the acceptance/adoption of technology or on its usage (Van Dijk, Peters and Ebbers, 2008). According to Van Dijk et al. (2008) theories concerning the whole process of acceptance are uncommon. Therefore in this chapter different theories and models are described per stage of the total process of acceptance.

Stage 1: Adoption

The adoption stage contains the interaction of the organization, in this case the rheumatology outpatient clinic, with it's environment: exploring the market for available ICT applications, collecting information and comparing applications (Bouwman et al. 2005). This stage is not further discussed because the technology is already adopted by the rheumatology outpatient clinic.

Stage 2: Implementation

The implementation stage lies also on the organizational level, but the involvement of the individual user is in this stage also important, because the individual user shapes the project (Bouwman, 2005). The underlying theory of this stage is the domestication theory (Silverstone and Haddon, 1996). The focus of the domestication theory is on implementation and in particular on appropriation by users in their local environment (Frissen and van Lieshout, 2006). Domestication refers to the capacity of individuals, households or other institutions to bring new technologies and services into their own culture (Frissen and van Lieshout, 2006). Thus in this case, how the touch screens are used at the clinic and whether the touch screens are accepted there. The theory makes a distinction between the role of the user in the design stage of an innovation, and the appropriation of a technology by users in the stage of acceptance and use (Silverstone and Haddon, 1996). These concepts are explained below.

First, the role of the user in the design stage is explained. Usually new technologies are designed from the point of view of the idealized user or an idea about how, when and by whom the technology will be used (Frissen and van Lieshout, 2006). Often the technical potential of a technology determines its design. Therefore the user who is already interested in new technology is viewed as the ideal user (Frissen and van Lieshout, 2006). Due to the diffusion of innovations theory of Rogers (1995), the assumption is that the rest of the population will follow in time.

Second, the appropriation of a technology by users is explained. The definition of appropriation is (Frissen and van Lieshout, 2006): *"the incorporation of an innovation in everyday life."* The appropriation of a technology can be explained by the technology appropriation model (Carol, Howard, Vetere, Peck and Murphy, 2002). The technology appropriation model, depicted in figure 2, explains the variables ('technology-as-designed' and 'technology-in-use') through the process of appropriation.
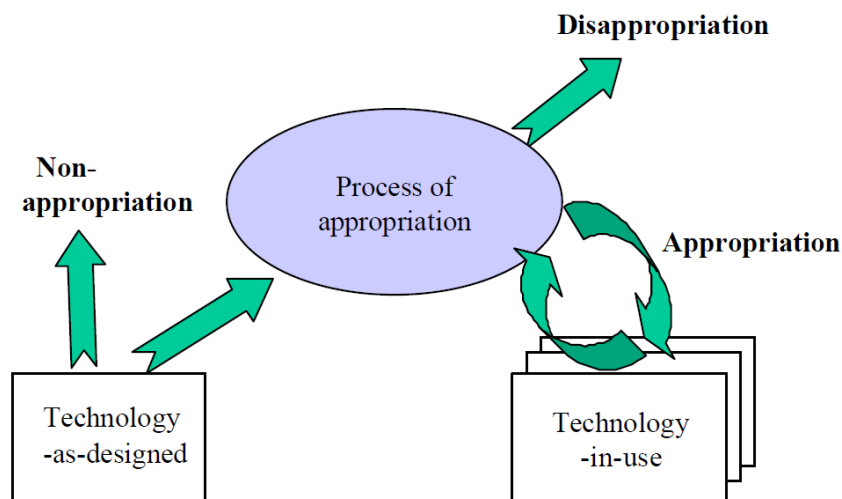

Figure 2. The process of appropriation (Carol et al. 2002)

'Technology-as-designed' refers to how the technology is designed and supplied to the users. (Frissen and van Lieshout, 2006)
'Technology-in-use' describes the way how users use the technology and refers to the appropriation process, how the technology is evaluated, adapted and embedded in everyday life (Carol et al. 2002). According to the process of appropriation, the technology can be adapted and integrated in everyday life (appropriation), but it can also be rejected by users (disappropriation). Non-appropriation can also

Figure 2 depicts that when the technology-in-use is different than the technology-as-designed, this can lead to problems for the rheumatology outpatient clinic: it can lead to rejection of the technology (disappropriation). That is, employees and/or patients showing no interest in the technology (non-appropriation). Thus, it is important for the rheumatology outpatient clinic to listen to the patients and employees concerning use. Thus, to find out how employees and patients use the touch screens to increase the acceptance.

Stage 3: Use

How and whether an ICT application is used, is determined by the sum of its use by the various individual users (Bouwman et al. 2005), thus the individual users either use or do not use an application and therefore the organization as a whole (Bouwman et al. 2005) either does or does not use the application. In this stage with the individual user is meant: the employee as well as the patient. The individual employee can determine the use of a technology of the organization and the individual patient determines the use of the group of end-users.
This section does not only contain theories concerning use, but also theories concerning user acceptance. Before users start using the technology, they have to accept the technology first.

General theories and models concerning the acceptance of technology that are used in this study are the theory of reasoned action (TRA) and the theory of planned behaviour (TPB). TRA defines relationships between beliefs, attitudes, norms, intentions and behaviour. According to Fishbein and Ajzen (1980), an individual's behaviour (in this case accepting or resisting information technology) is determined by one's intention to perform the behaviour. This intention is influenced by the individual's own attitude and the subjective norm (the 'social pressure' a patient can feel to use the touch screens or not). For example, a patient is afraid to use computers. Therefore his attitude towards computers is negative. When the patient does not feel the social norm, the patient probably shall not use computers. When the patient does feel the pressure of the subjective norm, the patient may try the touch screens even when he/she is afraid to use computers.
An extension of TRA is the theory of planned behaviour. (Ajzen, 1991; Madden, Allen and Ajzen,1992; Taylor and Todd, 1995; Dillon and Morris, 1996). TPB adds a third variable to TRA, namely perceived behavioral control. Not all behavior is voluntary, therefore this variable was added to the model by Ajzen (1991). The central factor in the theory of planned behavior is the individual's intention to perform a certain behavior (Azjen, 1991). Intentions are assumed to capture the motivational factors that influence that certain behavior, that is the indications of how hard people are willing to try or amount of effort they are planning to exert to perform the behavior (Ajzen, 1991). Ajzen (1991) mentions the general rule in this case: *"the stronger the intention to engage in a behavior, the more likely should be its performance."* But not in every case an individual has volitional control, thus can decide at will to perform the behavior. For example in this case the employees, who do not have a choice using or not using the touch screens.
The technology acceptance model (TAM), depicted in figure 3, applies TPB to situations concerning technology (Lee, Lee and Lee, 2006; Teo, Lim and Lay,1999; Karahanna and Straub, 1999; Taylor and Todd, 1995; Heerink, Kröse, Evers and Wielinga, 2008). TAM predicts information technology acceptance and diagnoses design problems before users

have experience with a technology. Variables explaining usage within TAM are ease of use and perceived usefulness.
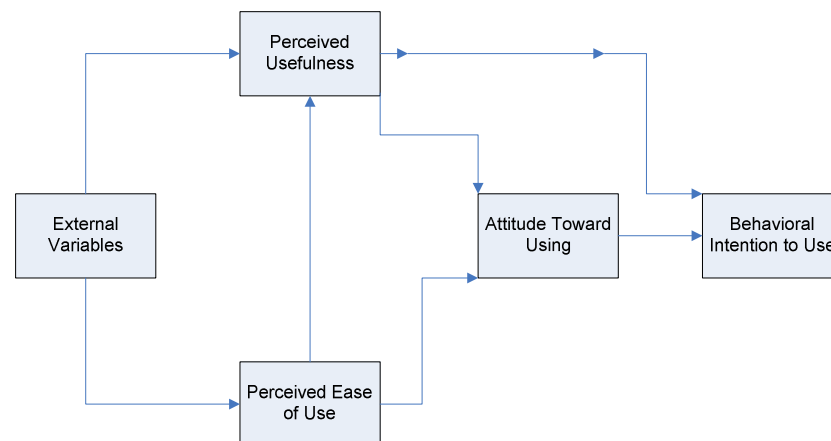
Figure 3. Technology Acceptance Model (Lee et al. 2006)

Figure 3 depicts that external variables, e.g. perceived enjoyment, anxiety and social norm (Lee et al. 2006), influence perceived usefulness and perceived ease of use. Perceived ease of use influences perceived usefulness as well. If people perceive a technology as 'easy to use', people tend to perceive the technology more often as useful. Perceived ease of use and perceived usefulness both influence attitude towards using. If a technology is perceived easy to use and useful, attitude towards using positively influences the behavioural intention to use and the actual system use and otherwise. Perceived usefulness influences behavioural intention to use directly as well. If people perceive a technology as useful, they intend to use it whether their attitude is positive or not. For example, a person does not like a new technology but using it saves him a lot of time. Therefore he finds the technology very useful and intends to use it anyway.

If there is an intention to use the technology, this can eventually lead to actual system use. A theory explaining use is the extended Triandis model (Triandis, 1980; Cheung, Chang and Lai, 2000). According to Triandis (1980) the probability of performing certain behaviour is determined by several factors, namely the habit of performing the behaviour, facilitating conditions and intention. It can be used to study intention to use of technology on the individual level.

Figure 4. The extended Triandis model (Cheung et al. 2000)

Cheung et al. (2000) extended the initial Triandis model to technology adoption, as depicted in figure 4. Cheung et al. (2000) aim to understand the actual usage of the technology. Figure 4 depicts that current usage is influenced by social factors, affect, complexity, near-term consequences, long-term consequences and facilitating conditions. Social factors (e.g. the social norm) influence affect of the technology. Complexity influences near-term consequences and long-term consequences. Near-term and long-term consequences seem to be related to the variable perceived usefulness of TAM. Last, complexity influences affect as well. If people perceive a technology as complex, the attitude toward the technology can become more negative. This effect occurs in TAM as well. Therefore complexity seems to refer to perceived ease of use of TAM.

Acceptance and usage of touch screens

The acceptance and usage of touch screens are not widely studied. A few studies are summarized here to get insight in the subject.

Newell et al. (1997) studied the accessibility to medical oncology patients of a touch screen computer survey. Their results showed that medical oncology patients highly accepted the touch screen computer survey, which they found stunning given the participants' median age of 62 and their general lack of computer experience.

Buxton et al. (1998) studied the ease and acceptability of using a touch-sensitive video monitor to complete a questionnaire. Furthermore they tried to identify groups of patients who may need extra assistance and tried to find technical or programming problems. Their results showed that the majority of patients rated all aspects of the touch-sensitive video monitor as very easy to use and that they were willing to answer the questionnaire again in the future.

Allenby et al. (2002) studied the acceptability and feasibility of computer touch screen technology as a method for patients to report psychosocial functioning in an ambulatory cancer clinic. Their results showed that patients find the use of computer touch screen technology an acceptable and efficient method for obtaining self-reported information on quality of life, cancer needs and psychological distress.

Bischoff-Ferrari et al. (2005) studied, among other things, patient acceptance of the computer touch screen version of the WOMAC 3.1 osteoarthritis index. Their results showed that the majority of subjects found the computer format easy to use, compared to earlier use of paper format.

The results of the studies of Newell et al. (1997), Buxton et al. (1998), Allenby et al. (2002) and Bischoff-Ferrari et al. (2005) showed that patients would be willing to use the touch screen technology, that they find the technology easy to use and that they are willing to accept the touch screen technology.

Clinical experience

Earlier clinical experience, gathered from earlier conducted theses of students, seems to support the predictions that possible conditions under which patients would not be willing to participate are: no difference in quality of treatment, no good privacy, no good facilitation, computer anxiety and no guidance. Clinical experience also showed that possible conditions under which patients would be willing to participate are faster processing of data, better treatment, enjoyment to use computers, good privacy, easy to use, guidance and courses.

Stage 4: Effects

Effects are found at the individual level, because the use of ICT has impact on the user's work, information supply and communication. Effects are also found at the organizational

level, because it affects organizational structures and processes and there are consequences how the interaction between organization and patients is happening.

As stated before, first order effects occur when customers tend to use the technology different than the developers would have thought of. First order effects could be, for example, that patients have discovered that they can access the Internet with the touch screens and use the touch screens to surf on the Internet searching for information about their disease while waiting in the waiting room. On forehand, it is not known what effects could be. Therefore it is very important to observe the effects of a technology, because differences in usage between how it is meant and how it is actually used can lead to non-acceptance of the technology and eventually to failure of the project. Second order effects occur when the developers change the technology to the way users use the technology. This is highly recommended to let a project become a success.

The purpose of the two studies is to study which advantages and disadvantages of the touch screens are experienced or expected by patients and employees and on what conditions they do and do not want to cooperate. This data can be used to find out whether effects occur.

1.1   Research Questions

To study to which extent the technology is accepted by patients and employees, the research questions were:

RQ 1:   "What are the attitudes of patients toward the touch screens?"
1a: "Which advantages and which disadvantages are experienced or expected by patients of the clinic when information is collected via touch screen technology?"
1b: "Under which conditions are patients willing and under which conditions are patients not willing to cooperate on a regular basis?"

RQ 2:   "What were experiences of employees with patients' attitudes toward the touch screens?"
2a: "Which advantages and which disadvantages were experienced or expected by patients of the clinic when information is collected via touch screen technology?"
2b: "Under which conditions were patients willing and under which conditions were patients not willing to cooperate on a regular basis?"

RQ3:   "What are the attitudes of employees toward the touch screens?"
3a: "Which advantages and which disadvantages are experienced or expected by employees of the clinic when information is collected via touch screen technology?"
3b: "Under which conditions are employees willing and under which conditions are employees not willing to cooperate on a regular basis?"

Two studies were conducted to answer these research questions. The studies were explorative, keeping the total process of acceptance in mind. The first study was conducted via focus groups of patients and is discussed in chapter 2. The second study studied the employees of the rheumatology outpatient clinic via interviews and is discussed in chapter 3. The results of these studies are discussed in chapter 4. Qualitative research was the best method for the studies, because it aims to understand the social processes and the personal points of view of the respondents, thus to understand the process of acceptance.

2 **Study 1**

The purpose of study 1 was to study to which extent the touch screen technology was accepted by patients of the rheumatology outpatient clinic. The study was explorative, because not enough was known about the acceptance of the touch screens to do a quantitative study. Section 2.1 describes the method used in study 1. Section 2.2 describes the results of study 1. Section 2.3 summarizes the results of study 1 and answers the research questions.

2.1 Method

The main reason to choose for the focus group method was because group processes can help explore and clarify views of patients in ways that would be less easily accessible in a one to one interview. If group dynamics work well, patients can take the research in new and often unexpected directions.

Respondents

From a pool of patients with rheumatic diseases of the 'Forum Reuma Research Partners', ten participants were recruited and divided between two focus groups: one group of four participants and one group of six participants. One participant dropped out before the meetings, because his wife was ill, leaving one group of three participants. A group of three participants is actually too small, because a focus group usually has a minimum of four participants. However, the results of this group were useful, because the interaction within the group was very good. Another reason to use the results of the smaller focus group was that one of the method's goals is to find consensus between the two groups. Together, the two groups had enough participants to get an insight in how the participants think about the touch screens.

Material

First, the questions of the focus group were composed via the theory of Hansen (2006). The primary questions were the research questions of this study. To generate secondary questions, the keywords from the theory and the clinical experience were used. The theory and earlier research about touch screen acceptance showed that patients should be willing to use the technology when there would be the following advantages, namely ease of use and perceived usefulness. Consequently, possible disadvantages of the touch screen technology would be not easy to use and no perceived usefulness. Clinical experience showed that possible conditions under which patients would be not willing to participate are: no difference in quality of treatment, no good privacy, no good facilitation, computer anxiety and no guidance. Clinical experience showed that possible conditions under which patients would be willing to participate are faster processing of data, better treatment, enjoyment to use computers, good privacy, easy to use, guidance and courses. All these outcomes were marked on the questionnaire, so they could be kept in mind while interrogating the respondents and for analyzing and categorizing the results as well.
Second, the sequence of the questions was determined via the theory of Hermanowicz (2002). First of all, an introduction was read before starting the focus group meetings. During the introduction participants were asked if they had objections against recording the meetings. After the introduction some baseline questions were asked about the waiting room in general. After the baseline questions, patients were asked about the advantages of the touch screens.

The more difficult questions, the disadvantages of the touch screens and under which conditions patients do not want to work with the touch screens, were asked in the middle of the focus group meetings. After the more difficult questions, there was an easier question, namely when patients do want to cooperate. The focus group meetings ended with some positive questions, e.g. what their most ideal waiting room would be. After the last question patients were thanked for participating and they received a little incentive. The questions can be found in Appendix A.

Procedure

The meetings were at the University of Twente at three PM, because that is a good time of the day for rheuma patients. The participants received an invitation for the meeting, with a map of the University. The patients were welcomed by the two moderators. During the meetings, one of the moderators asked the questions and a second moderator took notes. The meetings were recorded via a voice recorder.

Data-analysis

After the focus group meetings, the results were categorized. First, the quantitative data were categorized via SPSS. Second, the results were qualitatively categorized (Kitzinger, 1995; Sim, 1998). A summary of the meetings was made via the recordings and the notes. The results were categorized per research question. Some answers were not given on the right moment (e.g. advantages were given when disadvantages were asked). Third, the quotes were categorized in tables, summarizing them via the research questions per focus group meeting. After categorizing the quotes, the tables with quotes of both studies were compared with each other and similarities and differences were sought.

2.2   Results

The two questioned groups were similar regarding age. The mean age of the participants of the focus group meetings (n=9) was 61, ranged from 42 to 78 and was normally distributed. Of the participants of the focus group meetings, six participants were male and three were female.
Seven participants had prior experience with working with the computer. The other two participants had no experience with working with the computer. When exploring the relation between age and experience, the mean age of the participants of the focus group meetings with computer experience (n=7) was 59 and ranged from 42 to 72, the mean age of the participants with no computer experience is 71 (n=2) and ranged from 64 to 78. Six participants had prior experience with the touch screens; three participants had no experience with the touch screens.

Advantages of touch screens

Experienced or expected advantages of the touch screens were fast and efficient production of the data.

'Snelle dataverwerking[1]'
'Touchscreens zijn handig'

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[1] All quotes are in Dutch to prevent wrong interpretations of the quotes when translating them to English.

Disadvantages of touch screens

Disadvantages that were experienced or expected by patients were: (1) tension concerning the waiting room situation, (2) privacy issues, (3) no perceived enjoyment and difficulties using computers

'Sommige mensen zijn gespannen voor het consult' (1)
'De privacygevoeligheid van het medium' (2)
'Sommige mensen zien op tegen de vragenlijst alleen in moeten vullen' (3)
'De hoge leeftijd van reumapatiënten kan een reden zijn om niet met de computers te willen werken' (3)
'Computerangst/computer analfabetisme in het algemeen, moeilijk voor mensen die moeilijk lezen' (3)

Other mentioned disadvantages were not specific for the touch screen situation. Patients mentioned disadvantages concerning the questionnaire as well: (1) interpretation of questions; (2) no discussion possibilities; (3) no room to give nuances within the answers; (4) less time than paper questionnaires; (5) missing of interpersonal contact; (6) physically to difficult.

'Hoe moeten de vragen geïnterpreteerd worden? Moet ik er over nadenken of ze snel invullen?' (1) (2)
'Beperkte antwoordmogelijkheden, geen tussenantwoorden mogelijk' (3)
'Minder tijd om over de vraag na te denken /de vraag te bespreken' [… vult de vragenlijst normaal gesproken thuis in met zijn vrouw] (4)
'Sommige mensen beantwoorden de vragen liever in een gesprek' (5)
'Ik vond het fysiek te lastig om lang achter de touch screens te zitten' (6)

Conditions patients were willing to cooperate

Conditions under which patients were willing to cooperate on a regular basis were: if the touch screen technology is used as an opportunity to improve the treatment of the patient: (1) if patients are informed about (the results of) the data collection via touch screens and (2) if patients are guided.

'Informatie verstrekken over de touchscreens' (1)
'Als de vragenlijst achteraf besproken wordt/verduidelijkt kan worden tijdens het consult' (1)
'Als ik begeleid word' (2)
'Als ik hulp/assistentie krijg tijdens het invullen' (2)

Last, respondents had no problems with coming early to the clinic to fill in the questionnaires and they had no problems with the length of the questionnaire, on condition that they get enough time to complete it.

'Ik ben bereid mee te werken als ik voldoende tijd krijg om de vragenlijsten te beantwoorden'

Conditions patients were not willing to cooperate

Conditions under which patients were not willing to cooperate on a regular basis were: (1) if the privacy of the data of the patients would not be secured; (2) if there would be no privacy in the waiting room when using the touch screens; (3) if there would be no perceived usefulness; (4) if the touch screens are replacing interpersonal contact.

'Als er geen geheimhouding van mijn gegevens is' (1)
'Als de privacy geschonden wordt: als anderen zonder toestemming gegevens van de patiënt kunnen zien/verkrijgen' (1)
'Als niet duidelijk is wie de eigenaar is van de gegevens' (1)
'Als ik niet de privacy heb in de wachtkamer zelf om de vragenlijsten in te vullen' (2)

Mentioned conditions when patients were not willing to cooperate concerning the questionnaire were: if patients are not able to express their doubts when filling in the questionnaire.

'Geen mogelijkheid nuances aan te geven, geen mogelijkheid tot toelichting, begrip vragen'

2.3 Summary of results of study 1

RQ 1: "What are the attitudes of patients toward the touch screens?"

1a: "Which advantages and which disadvantages are experienced or expected by patients of the clinic when information is collected via touch screen technology?"

In general, participants of the focus groups enjoyed working with the touch screens. Furthermore, patients found the mentioned advantages more important than the disadvantages.

Advantages for the patients were: fast and efficient production of data and ease of use. Disadvantages were tension concerning the waiting room situation, privacy issues and no perceived enjoyment and difficulties using computers.

1b: "Under which conditions were patients willing and under which conditions were patients not willing to cooperate on a regular basis?"

Conditions under which participants of the focus groups were willing to cooperate on a regular basis were: if the touch screen technology would be used as an opportunity to improve the treatment of the patient and if patients would get guidance. Patients liked to be informed about the results of the project as well. Last, patients declared that the touch screens should be facilitated well concerning guidance and privacy.

Conditions under which participants of the focus groups were not willing to cooperate on a regular basis were: if the privacy of the data of the patients would not be secured; if there would not be enough privacy in the waiting room when using the touch screens; if there would not be perceived usefulness to use the touch screens; if the touch screens would replace interpersonal contact with the medical doctors and health professionals.

Disadvantages concerning the questionnaire

Besides answering questions about the touch screen technology, patients also mentioned disadvantages concerning the questionnaire on the touch screens. Disadvantages concerning the questionnaire were: difficult interpretation of questions, no discussion possibilities, no room to give nuances within the answers, less time than paper questionnaires, missing of interpersonal contact and physically to difficult. Patients mentioned that when they can not express their doubts when filling in the questionnaire and when they can not give nuances in their answers, this can lead to a condition in which they do not want to cooperate anymore. The participants recommended discussing the questionnaire during the consult, which can

improve the communication between doctor and patient. The patients argued that they are willing to cooperate if they get enough time to complete the questionnaire.

2.4 Conclusion

The results showed that patients liked working with the touch screens and that they were willing to work with the touch screens when: (1) the touch screen technology would be used as an opportunity to improve their treatment, (2) when they would receive information about the results of the questionnaires and the touch screen project and (3) when the touch screens are facilitated well concerning guidance and privacy.

3 Study 2

The purpose of study 2 was to study to which extent the touch screen technology was accepted by patients and employees of the rheumatology outpatient clinic. The study was explorative, because not enough was known about the acceptance of the touch screens to do a quantitative study. Section 3.1 describes the method used in study 2. Section 3.2.1 describes the results concerning the patients, while section 3.2.2 describes the results concerning the employees. Section 3.3 summarizes the results of study 2 and answers the research questions.

3.1   Method

Employees were studied via a semi-structured interview (Hansen, 2006). They were interviewed about their prior experiences with patients that used the touch screens and about their own opinions concerning the touch screens. The reason to choose for the interview method instead of the focus group method was to provide privacy for the employees when answering their questions. The employees all knew each other and worked in hierarchical relationships. Therefore their answers could have been biased if they were obtained using a focus group meeting.

Respondents

Of each employee group, rheumatologist, resident, nurse-practitioner and doctors assistant, two employees were interviewed. These employees were randomly selected by the head of the department of the rheumatology outpatient clinic. Eventually seven employees were interviewed, because one of the two rheumatology residents did not have experience with the touch screens yet. The data of the resident was merged within the rheumatologist group.

Material

The questions of the focus group meetings were adapted to the employees. Employees were asked questions about their experiences with patients who used the touch screens. After each question about patients, the employee's own opinion about the subject was asked. At the beginning of the interview there was room for personal introductions, the goal of the interview was described, confidentiality of the interviews was assured and explained was how the interview was conducted. The participants were asked for permission to record the interview. After the introduction, employees were questioned about the advantages of the touch screens. The more difficult questions, the disadvantages of the touch screens and conditions they do not want to cooperate, were in the middle of the interview. After the more difficult questions, the employees were asked about conditions under which patients and employees were willing to cooperate and how employees would like to improve the touch screens. The questions can be found in Appendix B.

Procedure

The interviews took place at the rheumatology outpatient clinic, in a quiet room that was not accessible for other employees. The interviews were recorded via a voice recorder. After the interview the employees were thanked and they were asked if they liked a copy of the results.

Data-analysis

After the interviews the results had to be categorized. First, the data per employee group regarding opinions toward patients' acceptance of the touch screens were categorized. Second, similarities and differences were sought within the answers. Third, the data per employee group regarding employees' touch screen acceptance were categorized. Last, similarities and differences were sought within the answers.

3.2   Results

All seven participants were female and they all had experience with the touch screens. During the interview, participants were asked if they were aware of the goals of the touch screens. All employees knew at least one of the two goals: that the results were used for research. Notable is that not all employees knew that the results can also be used during the consult.

3.2.1 Employees opinions regarding patients' acceptance of touch screens

In this section experiences of employees with patients and the touch screens are reported. Employees told about the advantages and disadvantages experienced by patients and conditions under which patients did or did not want to cooperate. The results were divided per employee group.

Advantages for patients

Doctor's assistant: Experienced advantages were fast processing and ease of use for patients.

> *'Dat ze geen bergje papier voor hun neus hebben'*
> *'Het is wat simpeler om een touchscreen aan te moeten raken in plaats van te moeten schrijven'*

Nurse practitioners: They did not answer this question.

Rheumatologist: Experienced advantages were fast processing and ease of use for patients.

> *'Patiënten moeten even aan de touchscreens wennen, maar dan gaat het makkelijker dan schrijven'*
> *'Dat ze meteen klaar zijn en de vragenlijsten niet mee naar huis hoeven te nemen'*
> *'Sommige mensen komen er ook eerder voor: dan hebben ze het meteen maar gedaan'*

Disadvantages for patients

Doctor's assistant: Experienced disadvantages were that: (1) many patients feared computers; (2) patients found it difficult to register themselves into the system; (3) patients without computer experience found it difficult and scary to work with computers.

> *'Veel mensen hebben toch wel angst voor computers: Ik doe niet mee, ik vind dat niet wat!' (1)*
> *'Op zich zijn die lijsten/de techniek wel heel toegankelijk. Maar het opstarten, dat is het moeilijke. Maar dat is wel het enige wat ik ervaren heb, want dan werd ik er bij geroepen. Als ze geen hulp hadden gekregen waren ze er niet mee verder gekomen, omdat ze absoluut soms niet weten hoe ze er mee om moeten gaan. Als je er dan een beetje bij helpt (ponskaart nummer intoetsen bijvoorbeeld), dan kunnen mensen er mee verder en dan redden ze zich wel' (2)*
> *'Mensen die geen ervaring hebben met computers vinden het werken met computers eng en lastig' (3)*

Doctor's assistants experienced some disadvantages for patients concerning the questionnaires as well: (1) it took patients a lot of time to fill in the questions. Therefore patients did not always have enough time to complete the questionnaires; (2) questions were sometimes perceived as difficult.

> *'O, daar komt die vraag alweer! Die heb ik toch al beantwoord' (1)*
> *'Het is wel veel wat ze in moeten vullen' (1)*
> *'Bijvoorbeeld de VAS score. Ze moeten wel echt heel goed nadenken hoe het nu eigenlijk met ze is. Dat vinden veel mensen toch ook wel moeilijk. Maar, als patiënten 1 keer op weg zijn, dan vind ik dat ze makkelijk door kunnen gaan' (2)*

Nurse practitioners: Experienced disadvantages were that (1) the computer itself was scary and difficult to use for inexperienced and older patients; (2) some patients found it difficult to use the touch screens physically; (3) if the touch screens did not work.

> *'O mijn god, ik weet niet eens hoe een computer werkt' (1)*
> *'Oudere patiënten vinden de touchscreens vaak eng: Sommige patiënten zeggen altijd ik heb de bril niet bij me. Als ze dat 5 keer zeggen dan wordt dat wel heel erg verdacht'(1)*
> *'Sommige mensen vinden het gebruik van de touchscreens nog wel eens wat lastig (fysiek)' (2)*
> *'Als de touchscreens niet werken' (3)*

Nurse practitioners experienced that some patients got tired of all the questions asked.

> *'Patiënten worden wel moe van al die vragen die ze krijgen (ze vinden het heel veel). Ook moeten ze wel erg veel nadenken'*

Rheumatologist: Experienced disadvantages were that the touch screens did not always work.

> *'Storingen vinden ze ook vervelend'*
> *'Als ze iets eerder komen en ze […de touchscreens] liggen er weer uit'*

Rheumatologists also experienced that it took a lot of time for patients to fill in the questionnaires.

> *'De vragenlijsten zelf. Dit ligt niet aan de techniek, maar ze vinden het veel'*

There were similarities between the different groups of employees about some of the disadvantages: some patients found it difficult and scary to use the touch screens and patients found it annoying when the touch screens did not work. It was notable that the nurse-practitioners had experienced that some patients found it difficult to use the touch screens physically, while the technology should compensate for the disabilities of the patients. There were also similarities within the answers about some of the disadvantages of the questionnaires: patients did not always have enough time to fill in the questionnaires and patients found it difficult to interpret some of the questions.

Conditions when patients did want to cooperate

Doctor's assistant: Normally, patients were willing to cooperate (1). Patients mentioned that they (2) wanted to be informed and (3) wanted to get help.

> *'Als alle bezwaren van patiënten in acht worden genomen, dan wil het grootste gedeelte van de patiënten wel meewerken. En zo niet, je kunt de patiënt niet dwingen. Het kan toch zijn dat patiënten toch liever niet mee willen werken. Maar als je alle bezwaren van patiënten in acht neemt, meer kun je niet doen' (1)*
> *'Patiënten zijn over het algemeen erg bereid om mee te werken, dat valt mij echt wel op! (op de mensen met computerangst na)' (1)*

> *'Misschien dat patiënten nog beter bereid zouden zijn om mee te werken als ze geïnformeerd zouden worden via een korte informatiebrief. Dit hoeft niet door een arts meegegeven worden, omdat de bereidheid best al hoog ligt. Als het maar duidelijk op papier staat' (2)*
> *'Als patiënten (in ieder geval de eerste keer) hulp krijgen met het invullen' (3)*

<u>Nurse practitioners:</u> Patients were willing to cooperate (1). Patients mentioned that they wanted to be guided through the system (2).

> *'Patiënten zijn bereid mee te werken. Er zijn wel patiënten die beter niet mee kunnen werken, maar die worden niet gevraagd. Ouderen hebben over het algemeen geen problemen met de touchscreens en de ouderen die er wel problemen mee hebben mogen de vragenlijsten nog op papier invullen' (1)*
> *'Als patiënten begeleid worden: Als je mensen echt goed begeleid en uitlegt wat het doel is, mensen een lekker kopje koffie erbij geeft, dan wil iedereen in principe wel meewerken: dan is dat helemaal geen probleem Ook als ze bang zijn voor computers. Je moet het een beetje leuk aanpakken denk ik.'*
> *Wat is er leuker dan op 86 jarige leeftijd nog met computers te leren omgaan. Dat is toch leuk? Je moet het positief brengen' (2)*

<u>Rheumatologist:</u> Patients were willing to cooperate (1). Patients mentioned that the touch screen had to be (2) easy to use and (3) useful. Patients wanted to get guidance through the system as well (4). A mentioned condition was that the touch screens had to work all the time (5).

> *'Patiënten zijn behoorlijk bereid om mee te werken. Het komt bijna nooit voor dat patiënten niet mee willen werken. (1) Ze vinden het systeem makkelijk in gebruik' (2)*
> *'Over het algemeen zijn patiënten bereid mee te werken aan allerlei soorten onderzoeken. Hier verbaas ik me wel eens over' (1)*
> *'Ze heeft nog niet meegemaakt dat patiënten ineens niet meer mee willen werken' (1)*
> *'De bereidheid van de patiënt is wel groot. Sommige mensen doen niet mee, omdat ze bijv. niet willen, niet betrouwbaar zijn of omdat ze de verstandelijke vermogens niet hebben' (1)*
> *'Het moet gebruiksvriendelijk zijn. Het is nu gebruiksvriendelijk: goede grote letters, je ziet de balk hoe ver je bent met de vragenlijst' (2)*
> *'De mensen moeten het idee hebben dat de vragenlijsten in het belang zijn van hun behandeling' (3)*
> *'Ook vinden patiënten het belangrijk dat ze uitgelegd krijgen waarom ze lijsten in moeten vullen' (3)*
> *'De patiënt en de dokter ook moeten het nut er van inzien. Als ik het nut er niet van in zie, dan zullen patiënten er zeker het nut niet van in zien' (3)*
> *'Als er begeleiding is. Ik denk dat het nu ook een stukje onbekendheid is met het systeem. Ik denk dat je met begeleiding de mensen die nu twijfelen wel over de streep kunt helpen' (4)*
> *'Voorwaarde is wel dat het systeem werkt' (5)*
> *'Voorwaarde is dat het systeem het wel doet' (5)*

Rheumatologists warned that the whole procedure should not take too much time for the patients.

> *'Een andere voorwaarde is dat patiënten niet teveel vragenlijsten voor hun kiezen krijgen: ze moeten alleen invullen wat we ook echt nodig hebben. Anders wordt het al snel teveel en willen ze niet meer meewerken'*

Between the different groups of employees there were similarities within the answers about the fact that patients did want to cooperate when they got help; and about the fact that patients were willing to cooperate in general.

Conditions when patients did not want to cooperate

<u>Doctor's assistant:</u> Experienced conditions when patients did not want to cooperate were: (1) if patients were afraid of computers and (2) if patients were tired of visiting the hospital.

> *'Computer angst komt voor vanaf ongeveer 50/60 jaar en ouder: Die waren dan anti computer.*
> *Informatie helpt volgens haar niet bij computerangst, misschien dat in een uiterst geval de arts nog wel*

<u>Nurse practitioners</u>: Experienced conditions when patients did not want to cooperate were: (1) if patients did not get help; (2) when the touch screens were not working; (3) if there was no perceived usefulness to use the system; (4) if patients were scared of computers.

'Als patiënten niet voldoende begeleid worden willen ze in eerste instantie niet meewerken' (1)

'Patiënten willen niet meer meewerken als het systeem iedere keer niet werkt. Dit is vooral een probleem als patiënten eerder komen' (2)

'Mensen hebben dan zoiets van het werkt toch niet. Dan zorg ik in ieder geval dat ik de volgende keer mee ga om te zorgen dat alles opgestart wordt en dat ze dan zo kunnen beginnen. Dan gaat het wel weer' (2)

'Patiënten zien vaak het nut niet in van de vragenlijsten' (3)

'Patiënten zien vaak niet terug wat ze ingevuld hebben. Dit kan een frustratie zijn' (3)

'Als patiënten echt bang zijn voor computers. (Zenuwachtig/te ziek en dergelijk zijn geen redenen)' (4)

Concerning the questionnaires, nurse practitioners experienced the following conditions patients did not want to cooperate: (1) if patients had to fill in the questionnaires too often and (2) if questions were too personal for patients.

'Mensen worden vaak moe van de vragenlijsten' (1)

'Dan komen ze vragen alweer tegen, dan hebben ze er geen zin meer in. Eerst vullen patiënten 3, 4 keer de vragenlijsten in en dan soms wel een jaar niet. Dan vraag ik ze wel, maar dan doen ze het gewoon niet' (1)

'De vragen gaan erg op de privacy van de patiënt in: Op een gegeven moment kunnen ze het invullen hiervan zomaar ineens vervelend gaan vinden' (2)

<u>Rheumatologist</u>: Experienced conditions when patients did not want to cooperate: (1) if it took too much time for the patients to use the touch screens; (2) when the touch screens were not working; (3) if patients found it difficult to read from the touch screen; (4) if there was no perceived usefulness;

'Als ze te lang achter de computer moeten zitten. Het moet niet langer dan 5 a 10 minuten duren' (1)

'Dat die stomme touchscreens het niet altijd doen, dat is een ergernis, of dat ze er niet staan wat we de laatste tijd gehad hebben. Dan staan ze er ook echt te kijken van waar zijn ze gebleven. Het moet het wel doen, dat is de absolute voorwaarde. En als de technologie het niet doet, dan is het niet bevorderlijk voor de continuïteit, want dan moeten wij er ook weer aan denken of patiënten het wel invullen. Dan moeten wij weer vragenlijsten uit gaan delen of mensen wijzen op de mogelijkheid om de vragenlijsten via Internet in te vullen' (2)

'Als de touchscreens er niet zijn of niet werken, dat wordt echt uiterst demotiverend gevonden. Dat is echt de doodsteek voor zo'n soort systeem. Patiënten denken dan ook, en dat snap ik ook, dat is blijkbaar dan niet meer nodig. Ik zou net zo denken' (2)

'Sommige patiënten zijn slechte lezers. Die hebben een hekel eraan. Misschien toch een beetje functioneel analfabeet zegmaar' (3)

'Oudere mensen vinden het systeem nog wel eens moeilijk. Het is voor hun een andere manier van lezen dat ze gewend zijn, sommige vinden dat moeilijk. Maar trekken er dan echt de tijd voor uit, dat vind ik wel leuk die gaan er dan echt voor zitten, en anderen die laten het, anderen laten het hun partner doen' (3)

'Mensen vinden het niet altijd nuttig om de vragenlijsten in te vullen' (4)

'Vaak vragenlijsten invullen vinden mensen sowieso vervelend. Dan zeggen mensen, dat heb ik vorige keer toch al ingevuld dat het zo goed gaat. En dan moet je ze uitleggen dat we dat ook graag willen weten, dat dat ook belangrijk is' (4)

'Patiënten willen we graag inzicht krijgen in waarom ze iets doen. Ik denk niet dat patiënten dat gauw zullen zeggen, maar ik denk dat dat wel een voorwaarde is' (4)

Between the different groups of employees there was consensus about when patients did not want to cooperate: if patients were scared of computers; when the touch screens were not working; if there was no perceived usefulness for the patients to use the touch screen. Important to mention is that the answers on this question were very diverse between the three groups. It was notable, that the doctor's assistants were giving less and different answers than the nurse-practitioners and the rheumatologists.

Conditions employees did want to cooperate if they were patients

Doctor's assistant: If they were patients, they did want to cooperate if there was enough privacy.

'Als er genoeg privacy is dan wil ze wel meewerken als ze patiënt was'

Nurse practitioners: If they were patients, they did want to cooperate when the touch screens were operational.

'Ik zou wel mee willen werken. Als de touchscreens het maar doen'

Rheumatologist: If they were patients, they did want to cooperate if the touch screens were operational all the time.

'Voorwaarde is dat het systeem werkt'

There was consensus between the groups of employees about that they would cooperate when they were patients if the touch screen was working all the time.

Conditions employees did not want to cooperate if they were patients

Doctor's assistant: If they were patients, they did not want to cooperate (1) if they were not informed about the results and (2) if there was not enough privacy in the waiting room.

'Ik zou een duidelijke uitleg willen hebben, ik bedoel, ik kon de boodschap niet goed overbrengen. Ik vond dat echt een minpunt van mezelf. Ik heb wel gevraagd wat ik dan kan zeggen, maar ik zou graag meer handvatten en uitleg willen hebben waarom en hoe stap voor stap. Het hoe en waarom. Ik vind dat ze zich hier wel heel snel laten overhalen om dan mee te doen. Als ik zelf patiënt zou zijn, zou ik precies willen weten wat daarmee ging gebeuren (qua doel) en dat dan stap voor stap' (1)
'Bij onvoldoende (fysieke) privacy' (2)
'Als er geen privacy was. (fysieke privacy op de polikliniek)' (2)

Nurse practitioners: If they were patients, they did not want to cooperate when the touch screens were not operational.

'Als de touchscreens niet operationeel zijn. Ik ben zelf nogal een pietje-precies en ik vind kwaliteit erg belangrijk. Als ik dan op de polikliniek kom en ik kom daar extra een kwartier eerder en ze zijn dan niet operationeel. Een keer dan denk ik, dat kan een keer gebeuren, de tweede keer begin ik al wit aan te lopen en de derde keer denk ik stik lekker met je vragenlijsten als ik mijn behandeling maar krijg. Maar dat zou voor haar de enige reden zijn om ze niet meer in te vullen. Ze vindt het zelf erg belangrijk dat de touchscreens weer operationeel worden'

Rheumatologist: If they were patients, they did not want to cooperate when the touch screens were not operational.

'Ik ben nogal ongeduldig dus als het systeem technisch vaak hapert dan denk ik dat ik af zou haken. Dat gebeurt bij onze computers nog wel eens. Ik denk dat ik dan zoiets zou hebben van het is goed geweest'

Concerning the questionnaires, rheumatologists answered that they did not want to cooperate if they were patients, (1) if it took too much time to fill in the questionnaires and (2) if there was no perceived usefulness using the touch screens.

'Als het ellenlange vragenlijsten zijn. Het moet een beetje een handzaam formaat hebben' (1)
'Ik zou het zelf vervelend vinden als ik zoveel vragenlijsten in zou moeten vullen' (1)
'Als de vragenlijsten niets met de behandeling uit te staan hebben' (2)
'Ik zou zelf niet meer mee willen werken als ik mee zou doen en dat er nooit verandering zou zijn. Als het dus geen verandering weer geeft' (2)

There was consensus about the perceived usefulness: both rheumatologists wanted the touch screens to be useful, although they stated it both differently (information vs. perceived usefulness).

3.2.2 Employees' acceptance of the touch screens

In this section an overview is given of the employees' own experiences with the touch screens. They told about the advantages and disadvantages and conditions when they did or did not want to cooperate. The results were divided per employee group.

Advantages for employees

Doctor's assistant: Advantages for employees were that it organized all data.

'Voordelen van het systeem vind ik dat het opgeslagen wordt en daardoor niet zoek kan raken. Je hebt altijd een naslagwerk. En het is een opgeruimd geheel'

Nurse practitioners: Advantages for employees were that (1) the system was easy to use and the fast processing saved time; (2) hospitals should always innovate; (3) the data was always ready to use; (4) more patients filled in the questionnaires.

'Eerder moest ik zelf de vragenlijsten invoeren, nu doet de patiënt dat zelf' (1)
'Het voordeel ligt toch vooral bij de zorgverlener. Het scheelt ons veel tijd' (1)
'Ik vind ook dat je als ziekenhuis met je tijd mee moet gaan, dus dat je eigenlijk niet achter kunt blijven. Ik vind het daarom een voordeel dat je als polikliniek hieraan mee werkt' (2)
'En ik vind het een groot voordeel dat je direct gegevens paraat hebt in je onderzoekskamer' (3)
'Voor- en nadelen voor haarzelf vindt ze dat ze ter plekke de vragenlijsten kan laten invullen. Dit vergroot de kans dat de vragenlijsten ingevuld worden. Thuis vergeten patiënten het vaak' (4)

Rheumatologists: Advantages for employees were that direct processing of data lead to less errors and it saved time.

'Voordelen van onze kant zijn dat de data direct verwerkt wordt. Dat je het niet meer zelf hoeft in te voeren, en daardoor minder fouten en een grote tijdswinst'
'De snelheid, dat de resultaten meteen in het systeem zitten'

Disadvantages for employees

Doctor's assistant: (1) When helping the patients, the work posture was not ideal; (2) the systems did not always work; (3) the data could be affected due to electronic errors.

'Wat ze er wel vervelend aan vond, was dat ze de hele tijd achter de patiënt moesten staan in plaats van zitten. Dit was niet een goede werkhouding. Ik heb wel eens gezegd ik moet eigenlijk een stoeltje

<u>Nurse practitioners:</u> It took them a lot of time to motivate and help the patients to use the touch screens. Therefore the consults took more time.

<u>Rheumatologists:</u> They did not experience disadvantages.

Conditions when employees wanted to cooperate

<u>Doctor's assistant:</u> They did want to cooperate if they were informed about the goals of the touch screens and about how the touch screens work.

<u>Nurse practitioners:</u> They did want to cooperate if someone else guided the patients.

<u>Rheumatologists:</u> They did want to cooperate if the touch screens are perceived as useful.

3.3   Summary of results of study 2

RQ 2: "What were experiences of employees with patients' attitudes toward the touch screens?"

2a: "Which advantages and which disadvantages were experienced or expected by patients of the clinic when information is collected via touch screen technology?"

Advantages for the patients reported by employees were: fast and efficient production of data and ease of use.

Employees mentioned that disadvantages for patients were that some patients found it difficult and scary to use the touch screens and that patients found it a disadvantage when the touch screens did not work.

2b: "Under which conditions were patients willing and under which conditions were patients not willing to cooperate on a regular basis?"

Employees believed that patients were willing to cooperate, but that they liked to get help/guidance.

Employees mentioned that patients did not want to cooperate if patients were scared of computers, when the touch screens were not working and if there was no perceived usefulness to use the touch screens.

Disadvantages concerning the questionnaire

Besides answering questions about the touch screen technology, employees also mentioned disadvantages concerning the questionnaire on the touch screens. Employees mentioned that disadvantages for patients concerning the questionnaires were that patients did not always have enough time to fill in the questionnaires and that patients found it difficult to interpret the questions. Allenby et al. (2002) found a similar result. Approximately 10 percent of the participants in their study were somehow confused about fulfilling their task. Some of the comments indicated difficulties with the wording of the used questionnaire and that they sometimes did not know how to respond. Patients got discouraged when the length of the questionnaire was too long. This is not similar with the answers of study 1 in which patients stated that they are willing to cooperate if they get enough time to complete the questionnaire. It was notable that the nurse-practitioners had experienced that some patients found it difficult to use the touch screens physically, while the technology should compensate for the disabilities of the patients. In study 1 one patient had difficulties with using the touch screens as well. This was due to other physical conditions than rheumatic disease.

RQ3: "What are the attitudes of employees toward the touch screens?"

3a: "Which advantages and which disadvantages are experienced or expected by employees of the clinic when information is collected via touch screen technology?"

Advantages for employees themselves were fast and efficient production of data (that it orders all data, saving of time, that the data is always ready to use, less faults, increased chance that patients fill in the questionnaires).

Disadvantages according to doctors assistant and nurse practitioners were the work posture when helping the patients, that the touch screen did not always work and that the data could be affected due to electronic errors, and that it took a lot of time to motivate and help the patients to use the touch screens. Rheumatologists did not perceive disadvantages.

3b: "Under which conditions employees are willing and under which conditions employees are not willing to cooperate on a regular basis?"

Doctor's assistants wanted to cooperate when they would receive information about the goals of the touch screens and information about how they the touch screens work. Nurse practitioners wanted to cooperate if there would be a host to guide the patients instead of themselves. Rheumatologists wanted to cooperate if there would be perceived usefulness for them as well as for patients. Employees did not answer when they did not want to cooperate.

3.4   Conclusion

Employees experienced that patients were willing to cooperate when they got help when using the touch screens for the first time. Furthermore, there were no major differences between the results of study 1 and study 2.

There were differences in the answers under which conditions employees were willing to cooperate. Doctor's assistants liked to be informed about the goals of the touch screens and about how the touch screens work. Nurse practitioners liked to have a host hired. Rheumatologists wanted the touch screens to be useful either for themselves as for the patients.

4 Discussion

In this chapter the results are discussed: section 4.1 discusses study 1 and section 4.2 discusses study 2.

4.1 Study 1

The goal of this study was to explore, in a structured way, what conditions are for patients and employees to work with the touch screen technology. The results showed that in general patients enjoyed working with the touch screens and found them easy to use. The results also showed that patients were willing to use the technology and that the acceptance of the technology is high. These findings are consistent with findings of the other touch screen studies (Newell et al. 1997; Buxton et al. 1998; Allenby et al. 2002; Bishoff-Ferrari et al. 2004).

However, there was also room for some improvements. First of all, patients stated that they liked to have guidance when using the touch screens. This is consistent with the study of Newell et al. (1997) where 20 percent of all participants stated that they needed help when using the touch screen. The results of the study of Buxton et al. (1998) showed that in their study, in which patients got guidance when using the touch screens, only 2 percent of the patients perceived the technology as 'somewhat difficult'. The respondents of the study of Buxton et al. (1998) were similar regarding to age and computer experience.

Second, patients stated that they liked to be informed about the results of using the touch screens. This is consistent with the results of Newell et al. (1997), where 96 percent of the participants stated that they liked to receive a summary of their results from their doctor.

Third, some patients had concerns regarding the privacy when using the touch screens and about the privacy of their data. This finding is consistent with earlier clinical experience. However, the other studies did not study the variable privacy. Therefore they did not find that privacy issues are very important for patients.

Last, the technology was not always operational, which confused patients and caused a stop in usage of the technology.

The results of patients who already used the technology are depicted in figure 5. Variables that were important for predicting usage of users were: affect, enjoyment, facilitating conditions, perceived usefulness and ease of use. The used model for the experienced users is the extended Triandis model of Cheung et al. (2000). TAM could also have been used to explain the intention to usage of the users. The extended Triandis model was chosen, because it explains current usage of the touch screens in stead of intention to use. Furthermore, all variables fitted in the extended Triandis model, except the variable social factors. No evidence was found for the relationship between social factors and affect. This is consistent with findings of Cheung et al. (2000). They did not find support for the expectation that social factors influence affect as well. In stead of social factors, the variable perceived enjoyment was added to the model. The results of study 1 showed that perceived enjoyment was a better predictor for affect. If patients enjoyed working with the touch screens, their affect was more positive. The definition of perceived enjoyment is:

> *"The extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system usage." (Teo et al. 1999)*

Heerink et al. (2008) also found proof for the relationship between perceived enjoyment and affect in technology models. They added perceived enjoyment to TAM.
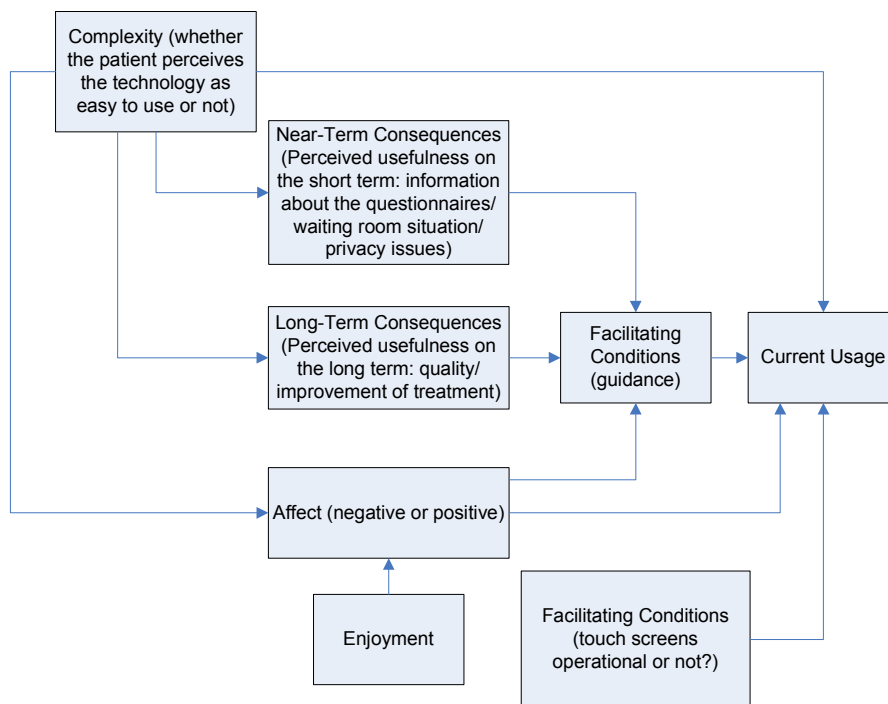

Figure 5. Research model users touch screen technology (n=6)

The model shows that complexity influences near term and long term consequences, affect and usage. The model shows that complexity influences near term and long term consequences, affect and usage. If patients think that the technology is not easy to use, this leads to non-usage. Second, this influences near-term consequences: the perceived usefulness on the short term. With perceived influence on the short term is meant: whether patients believe that the usage of touch screens is (useful/not useful), whether the patients are tensed (in the waiting room) and for privacy issues (whether the privacy in the waiting room is secured or not and whether the privacy of the data is secured). If patients do not perceive the usefulness of the touch screens, they will not use them. Third, long-term consequences: the perceived usefulness on the long term. If patients have the idea that the touch screens are no improvement for the treatment, then they will not use the touch screens (anymore). Complexity also influences affect. If patients think that the technology is easy, they are more likely to like the technology and vice versa. Affect is also influenced by enjoyment. The results show that guidance, one of the facilitating conditions, influences the current usage via all these results. It does not matter of which gender patients are, what their age is or which experience they have: if the guidance is good, then almost all patients are willing to work with the touch screens. Even when there is negative affect or when patients think the technology is complex. As mentioned before, this is consistent with findings of Buxton et al. (1998). Current usage is also influenced by facilitating conditions, like the results of the employee study showed. When the touch screens are not operational, then they can not be used.

The results of patients who did not use the technology yet are depicted in figure 6 and 7.
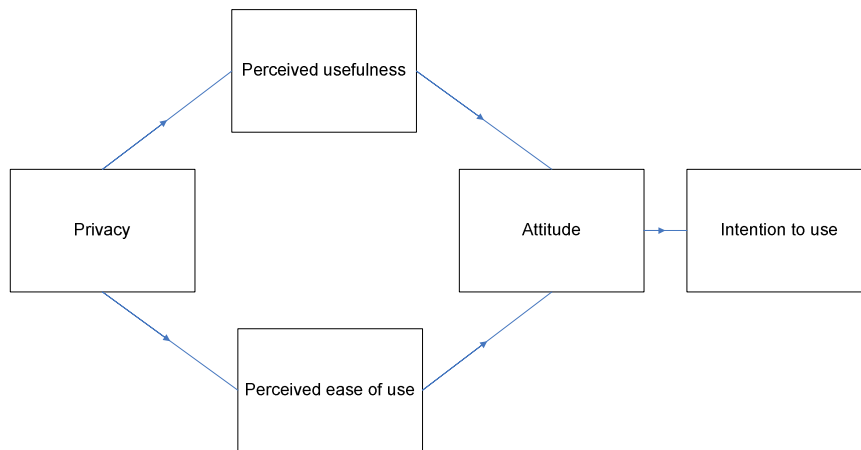
Figure 6. Non-user who had computer experience (n=1)

The results of the non-user who had computer experience, showed that the patient's perceived usefulness and the perceived ease of use was influenced by privacy. This patient was concerned about his/her privacy. This is depicted in figure 6.
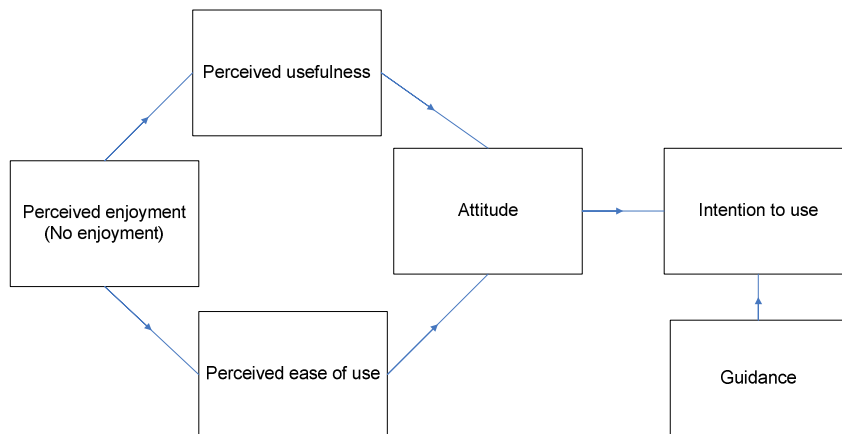
Figure 7. Non-users with no computer experience (n=2)

The results of the non-users without computer experience were influenced by the variable "perceived enjoyment. Both non-users did not enjoy using computer technology. Therefore they both perceived the technology as not useful and not easy to use and they both showed negative affect towards the technology. Nevertheless, they both stated that if they got help then they had the intention to use the technology. This is depicted in figure 7.

Limitations of study 1 were: dependence on the memory of the respondent, possible volunteer bias, group think and the weakness of interpretation. First of all, the answers of the respondents depended of the memory of the respondent. Most participants had worked with the touch screens before, but not recently. Therefore their memories about working with the touch screens could have been biased.
Second, the respondents participated voluntarily in the study via an announcement on the patient forum. Most participants did participate before in one of the student theses and stated that they liked to participate in studies concerning their disease. This could have caused volunteer bias.
Third, groups can also suffer from 'group think'. Group think may have occurred in the second focus group meeting, where one participant influenced all other participants concerning the subject privacy. To overcome the limitation of group think, both focus groups served as

control groups for each other: The first focus group only mentioned privacy shortly and therefore compensated for the results concerning privacy of the second focus group.
The last limitation was the weakness of interpretation. The translation from quotes to a model is difficult. Therefore quotes were added to the results and the results were discussed thoroughly.

An advantage of study 1 was that the focus groups worked out very well. This was due to the fact that the focus groups were very heterogeneous: the groups contained younger people, older people, users as well as non users, respondents with computer fear, respondent who liked computers etc. There was also great interaction, which generated much valuable information.

4.2   Study 2

The goal of this study was to explore experiences of employees with patients' attitudes towards the touch screens (section 4.2.1) and to explore attitudes of the employees themselves towards the touch screens (section 4.2.2).

4.2.1 Experiences with patients

The models concerning patients, as discussed in the previous section, were based on the results of study 1. The results of study 2 were used as a control group for the results of study 1.

There were no major differences in the answers of study 1 and study 2. A difference between study 1 and study 2 was that employees stated that patients got discouraged when the length of the questionnaire was too long. This is not similar with the answers of study 1, in which patients stated that they were willing to cooperate if they got enough time to complete the questionnaire.
Additional to the results of study 1, one of the employees stated that patients had problems when entering their patient identification number, which is necessary to register themselves. This is consistent with the results of Buxton et al. (1998). In their study 68 percent of the participants of the study had difficulties registering themselves via their patient identification numbers.

4.2.2 Attitudes towards touch screens of employees

The results of study 2 showed that the advantages mentioned by employees are consistent with the intended advantages of the touch screen technology, namely fast and efficient production of data and decreasing the possibility of errors (e.g. mentioned by Allenby et al. (2002) and Greenwood et al. (2006)).The results showed that there is only consensus in the answers concerning the advantages of the touch screens. Doctors' assistants wanted to be informed, nurse practitioners wanted a host recruited and rheumatologists wanted the technology to be useful.
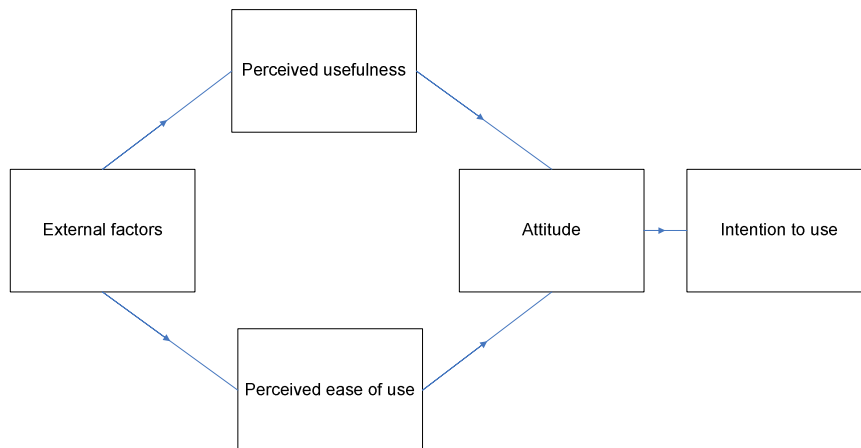
Figure 8. Touchscreen acceptance of employees (n=7)

The mentioned variables by employees concerning technology acceptance were ease of use and perceived usefulness, as depicted in figure 8. The results did not show which external factors influenced perceived usefulness and perceived ease of use. This was due to the fact that the questions of the interviews were too much adapted to the patients, leaving less room for other answers by employees because of the semi-closed questions. No other studies were found studying touch screen acceptance by employees. Therefore there was no input to generate variables to measure acceptance of employees. Therefore the variables of the patient study were used. Another explanation could be that the questions were too much amplified on voluntary usage in stead of mandatory usage. Employees did not answer when they did not want to cooperate. Maybe this is due to the fact that they did not have a choice other than to work with the touch screens. As stated before at the theory chapter in the section about TPB: *"Not in every case an individual has volitional control, thus can decide at will to perform the behavior. For example in this case the employees, who do not have a choice using or not using the touch screens."* Mandatory usage requires a different theory to explain the behavior. A theory that measures behavioral control, which is not measured via the technology acceptance model. A model that could have been used is the UTAUT model (Venkatesh, 2003). The UTAUT model is a model that is often used to study acceptance of technology in an organizational context (Venkatesh, 2003). Variables that are used to explain technology acceptance via UTAUT are performance expectancy, effort expectancy, performance expectancy and social influence. The variables performance expectancy and social influence represent behavioural control in this model.

Performance expectancy: The expectations a person has when using technology. E.g. when I use the new technology, the chances that I get promoted are much higher or when I don't use the Internet, I have to fear my job.
Effort expectancy: The expected effort one expects the new technology will take to learn. E.g. It does take much time to learn, because I do not have experience with computers.
Social influence: The influence the social environment has on a person. E.g. a person may think that every one in his/her environment uses the Internet and experiences therefore some kind of pressure that he/she has to use the Internet as well.
Facilitating conditions: If the new technology is facilitated or not. E.g. in this case the touch screens are facilitated.

Last, the study did not give an indication that employees were not satisfied about working with the touch screens. This can be due to the fact that employees did not work with the touch screens the previous year. It is recommended to integrate the employees in a follow-up study, when the touch screens are working again.

Limitations of study 1 were the dependence on the limited memory of the respondent because of the fact that the touch screens were not operational and the weakness of interpretation.
The touch screens were not operational when the employees were studied. Therefore the employees spoke about previous experiences and not about experiences in the present time. Most participants and employees had worked with the touch screens before, but not recently. There is a chance that their opinions have changed in time. Therefore their memories about working with the touch screens could have been biased.
Last, the weakness of interpretation. As stated before in section 4.1, the translation from quotes to a model is difficult. Therefore quotes were also added to the results of study 2 and the results were discussed thoroughly.

5 Recommendations

The domestication theory explained that it is important to listen to the user when implementing a technology: when the technology-as-designed is different than the technology-in-use, the patient is likely to reject or patients showing no interest in the technology (Carol et al. 2002). Study 1 and study 2 generated a profile of the users of the touch screens and showed what conditions were in which they did want to cooperate (appropriation) and did not want to cooperate (dis-appropriation). The clinic rheumatology can use this profile to re-implement the technology (second order effects) by the wishes and demands of the patients (first order effects).

First of all, it is recommended to recruit a host who can guide and help the patients, for example with questions about the technology and the questionnaires. This host could be a volunteer, for example a pensioner or a student, but it could be a digital agent as well. Research with elderly computer users has shown that elderly people accept agents as a conversational partner on health and health behaviour and have given high ratings on issues like trust and friendliness (Heerink et al. 2008).

Second, the touch screens should be used to improve the interpersonal contact between patient and doctor/nurse. Recommended is that the doctor or nurse practitioner should inform patients more about why they should participate and use the touch screens in terms of goals and usefulness of usage. They should inform the patient during the consult as well about the progress and results, e.g. by giving them a verbal summary or information sheet of their results.

Third, it is also recommended to offer the patients some privacy when they are using the touch screens and to develop a protocol for the privacy of the data. When there is already a protocol, this should be communicated to the patients. This is very important, because the results of study 1 showed that privacy is very important for patients.

Last, the rheumatology outpatient clinic should assure that the touch screens are always operational.

Future work could focus on a larger, more heterogeneous group of patients of the rheumatology outpatient clinic; on observing the patients while working with the touch screens at the rheumatology outpatient clinic and letting them fill in a questionnaire measuring acceptance after using the touch screens; and on the process of acceptance of the touch screens in other hospitals than the rheumatology outpatient clinic.

Second, another focus of future work could be studying the length and the content of the questionnaires. Both studies showed that patients have issues with the questionnaires themselves. When patients are not satisfied about the questionnaires, that issue can affect the acceptance of the touch screens. Therefore it can be important to get more insight in this subject.

Last, it is recommended to continue the employee study when the touch screens are operational again. The study could be conducted via an observation method instead of via interviews, because this method gives better insight in the actual situation and does not scare employees either. The model used could be the UTAUT model, because this model is used frequently in organizational contexts. It is also recommended to separate the employees from the patients, thus making it the only scope of the study.

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Appendices

Appendix A.   Questions study 1

Research Questions
RQ 1a. Perceived advantages touch screen technology
RQ 1b. Perceived disadvantages touch screen technology
RQ 2a. Conditions under which the patient is willing to cooperate on a regular basis
RQ 2b. Conditions under which the patient isn't willing to cooperate on a regular basis
In advance all the participants fill in a questionnaire with all the research questions. In this way participants can already think about the answers, it avoids that opinions of silent participants are not heard and it avoids group think

Topics	Questions	Keywords
Introduction	** *Mijn naam is Tineke Klamer, vierdejaars student Communicatiewetenschap aan de Universiteit Twente. Zoals u uit de oproep wellicht begrepen had,ben ik op dit moment bezig met mijn afstudeerproject waarin ik onderzoek doe naar wat u van de dataverzameling met behulp van computers vindt. Daarom ben ik op zoek naar patiënten die mee willen doen met een groepsgesprek. De bedoeling van het groepsgesprek is een overzicht te krijgen van wat u vindt van de dataverzameling, zodat we de dataverzameling optimaal aan uw wensen aan kunnen passen. Vragen die ik u zal stellen hebben te maken met de eerder ingevulde vragenlijst, namelijk wat u voordelen en wat u nadelen vindt van dataverzameling met behulp van computers en onder welke omstandigheden u bereid bent om met de computers te werken? Ik stel u eerst een aantal algemene vragen, zodat we een beetje aan elkaar kunnen wennen. Het groepsgesprek werkt als volgt: ik stel een vraag, daarna beantwoord iedere deelnemer de vraag en hebben andere deelnemers de mogelijkheid om op het antwoord te reageren. Nadat alle deelnemers de vraag beantwoord hebben en hun reactie hebben gegeven, gaan we door naar de volgende vraag. Mocht je een vraag niet willen beantwoorden, dan is dat geen probleem. Verder is het erg belangrijk om de vraag naar de andere deelnemers toe te beantwoorden en niet naar de gespreksleider. Na de eerste vragen demonstreer ik in het kort het systeem en daarna begint het echte gesprek. Het gesprek wordt, zoals eerder genoemd, gefilmd. Dit heeft als enig doel om het gesprek op te nemen, zodat ik dingen terug kan zoeken na de tijd (bijvoorbeeld, wie zei ook alweer wat) en om me te helpen met het verwerken van de resultaten. Heeft er nog iemand vragen voordat we beginnen?** Primary questions: 1. "What is present in the waiting room?" 2. "What is your opinion about the furniture of the waiting room? 3a. "How do you feel usually when you are waiting in the waiting room?" 4. "Are you familiar with the touch screens in the waiting room?" 5a. "Have you used the touch screens in the waiting room?" Secondary questions: 3b. `Why are you feeling in a particular way when waiting in the waiting room?' 5b. 'Why did/did not you use the touch screens in the waiting room?' 5c. 'What was your opinion about the touch screens in the waiting room?'	Deelnemers het doel van het onderzoek uitleggen, de procedure uitleggen, wijzen op hun rechten. Ease the participants, baseline measurement, and measurement percentage users-non-users.
Short demonstration of the touch screen technology		
Advantages touch screen technology	*All participants mention a perceived advantage of the touch screen technology and explain why this is a perceived advantage. The other respondents respond on this statement* Primary question; 6a. "Which advantages do you perceive while using the touch screen technology?" Secondary questions: 6b. 'Why do you perceive this as advantages?' 6c. 'Do all the participants perceive this as an advantage?'	Faster processing of data, better treatment, ease of use, perceived usefulness, good facilitation, enjoyment using computers.

Dis-advantages touch screen technology	** All participants mention a perceived disadvantage of the touch screen technology and explain why this is a perceived disadvantage. The other respondents respond on this statement ** Primary question; 7a. "Which disadvantages do you perceive while using the touch screen technology?" Secondary questions; 7b. 'Why do you perceive this as advantages?' 7c. 'Do all the participants perceive this as an advantage?'	Not easy to use, no perceived usefulness, privacy issues[2], computer anxiety.
Conditions willing and not willing to participate	*All participants mention a condition under which they are not willing to work with the touch screen technology and explain why. The other respondents respond on this statement ** Primary question: 8a. "Under which conditions aren't you willing to cooperate on a regular basis?" Secondary questions; 8b. 'Why aren't you willing to cooperate under these conditions?' 8c. Who or what can make you cooperate on a regular basis? 8d. For example if the doctor asks you to cooperate, would you do that? 8e. For example, if someone helps you with the system, are you willing to cooperate then? 8e. Another example, if you are offered a course, in which is explained how to use the system, are you willing to cooperate then? 8f. Other examples could be: If the system is made easier to use are you willing to cooperate? If your privacy is secured (e.g. Make fences between the touchscreens), are you willing to participate then? 8g. 'Why are you willing to participate under this conditions?' 8h. 'What is the opinion of the other participants?'	No difference in quality of treatment, no good privacy, not easy to use, no guidance.
Conditions willing to participate	** All participants mention a condition under which they are willing to work with the touch screen technology and explain why. The other respondents respond on this statement ** Primary question; 9a. "Concluding: Under which conditions are you willing to cooperate on a regular basis?" Secondary questions; 9b. Why are you willing to participate on this conditions? 9c. 'What is the opinion of the other participants?'	Faster processing of data, better treatment, good privacy, easy to use, guidance, courses.
End of the meeting	"10. Short conclusion" "11. Further remarks" "12. Possibility to return on certain topics "13. Ask if participants want to receive a summary of the results, give them the possibility to leave email addresses behind." "14. Positive end note" "15. Handing over box of Merci for participants"	Conclusions, remarks, return/comment on topics, final end.

Table 1. Questionnaire focus group meetings

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2   Concerning both the processing of data as well as the privacy in the hospital while using the technology

Appendix B.   Questions study 2

Introduction	<u>Baseline measurement:</u> A. Gender: B. Age: C. How long do you work at this department?: D. Do you have got experience in working with the touch screens? E. What are goals and functions of the touch screen technology and what is your opinion about that?
Advantages touch screen technology	<u>Primary question;</u> 1. "Which advantages do patients perceive while working with the touch screens?" <u>Secondary questions;</u> 2. 'Why are these are advantages for patients?' 3. 'Do all patients perceive this as an advantage?' 4. 'What do you perceive yourself as advantages of the touch screens?'
Disadvantages touch screen technology	<u>Primary questions;</u> 5. "Which disadvantages do patients perceive while working with the touch screens?' <u>Secondary questions;</u> 6. 'Why are these disadvantages for patients?' 7. 'Do all the participants perceive this as an disadvantage?' 8. 'What do you perceive yourself as disadvantages of the touch screens?'
Conditions willing and not willing to participate	<u>Primary question:</u> 9. "Under which conditions aren't patients willing to cooperate on a regular basis?" <u>Secondary questions;</u> 10. 'Why aren't patients willing to cooperate under these conditions?' 11. 'Under which conditions you wouldn't cooperate?' 12. 'Who or what can make patients cooperate on a regular basis?' 13. 'Who or what can make you cooperate on a regular basis?' 14. For example if the doctor asks patients to cooperate, would they do that? 15. For example if the doctor asks you to cooperate would you do that? 16. For example, if someone helps patients with the system, are they willing to cooperate then? 17. For example, if someone asks you to help patients with the system, are you willing to do that? 18. Another example, if you patients are offered a course, in which is explained how to use the system, are they willing to cooperate then? 19. Are you willing to cooperate if you are offered a course in which is explained how to use the system? 20. Other examples could be: If the system is made easier to use are patients willing to cooperate then? Would you be willing to cooperate then? 21. If the patient's privacy is secured (e.g. Make fences between the touchscreens), are they willing to participate then? Would you be willing to cooperate then? 22. 'What do you perceive yourself as conditions you shouldn't cooperate on a regular basis, either if you were a patient as in your work.'
Conditions willing to participate	<u>Primary question;</u> 23 "Concluding: Under which conditions are patients willing to cooperate on a regular basis?" <u>Secondary questions;</u> 24. Why are patients willing to participate on this conditions? 25. Do you want to discuss another subject/anything we did not discuss before? 26. Do you want to go back to a certain subject for additions? 27. Do you have any suggestions for us. For example, which functions do you want to add to the system/which goals should be added to the system? Etc.? 28. Thank the participant for his/her time. *After conducting the interviews, the interviewees will receive a thank you note. This thank you note conveys additional respect and it shows respect to the interviewee (Hermanowicz, 2002).*

Table 2. Questionnaire interviews