MASTERTHESIS

Values to be considered when implementing mHealth at psychiatric hospital for clinical treatment.

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Abstract

The use of biosensor technology to monitor health conditions has led to the development of a technological intervention in the mental health care called 'Sense-IT!'. This yet to be developed technology aims to improve emotional awareness at patients who suffer from personality disorder, specifically borderline personality disorder. Before the Sense-IT! will be implemented at a psychiatric hospital it is important to know what the therapists expect from this technology and what values they indicate as important when they are using the Sense-IT!. These arguments have led to the following research question; *'Which needs and values are of interest according to therapists when they are going to use the yet to be developed technology in their treatment?'*

To answer this question two studies have been performed. The first one is to validate the previous study (Beekes, 2014) by qualitative design and the second study expands by adding a quantitative account on the topic by a card sort technique which gains more insight at the values. Study one consisted of nine transcripts that were analyzed by the means of content analysis. Study two consisted of five therapists which were asked to perform a card sort technique.

Results from study 1 showed that there are four values that have to be taken into account while implementing the Sense-IT!; *awareness of feelings and emotions, Improvement of the current treatment*, *personalization of use* and *promote autonomy.* Results from study 2 showed seven clusters; *physiologic parameters, technical aspects Sense-IT!, needed from organization for implementing Sense-IT!, risks that can occur during implementation of the technology, target group for technology, what must the Sense-IT! improve and external characteristics and requirements of Sense-IT!*. When the first study is compared with the study of Beekes (2014) results showed that 3 out of 4 values were the same. Where the first study showed important values for implementing technology the second study showed factors. When looked at the CeHRes Roadmap it can be hypothesized that study 1 focused more on the values and study 2 on the user requirements. This implies that with the same data, values and user requirements could be researched.

It is recommended that the values and user requirements are taken into account during the next stage of the CeHRes Roadmap, the design stage. During this stage a prototype is designed what can be evaluated among the patients. It is also important to make sure that the values are taken into account at the different therapeutic programs. Literature showed no clear evidence on an appropriate number of respondents for executing a card sort technique, which means that further research is necessary. Finally, it is recommended to organize a meeting including an expert to talk about ethical question while using technology and to present the implementation plan for the Sense-IT!

Preface

Initiator for this research is Scelta and University of Twente. Scelta is an expertise treatment center for personality disorders and a subsidiary of GGNet. Scelta delivers care in the specialized mental health within the field of personality disorders. Sceltas vision about care is based on four values; freedom of choice, collaboration with the patient and other organizations, right intensity at the right time and expertise center. This last value represents the fact that Scelta wants to continuously improve their care based on current scientific research. Scelta is working nationwide but their three main departments are located in Apeldoorn. Two of these departments are clinical and the third one is part-time therapy. The first one is called 'program 1'. During this program, patients who have problems with emotion regulation are treated with dialectical behavior therapy. The second clinical program is called 'program 2'. This program focusses by the means of shemetherapy on obtaining more insight in behavior and feelings. The third program is called the 'driedaagsedeeltijd'. This part time program focusses on learning skills and stimulates social integration.

Scelta and the University of Twente started a collaboration for multiple years to investigate the Sense-IT! project. In the past, multiple master students of the University of Twente investigated various research questions during this process. PhD student and licensed health psychologist. Y. Derks supervises these students during their research. I would like to thank Westerhof, Prof. Dr. G.J. and Y. Derks, MSc for their supervision and inspiration during this research process.

Index

Introduction 5

Implementing mHealth 6

Emotional awareness 8

Dysfunctional emotional awareness 9

Detecting emotional awareness 10

What is already known 11

Method 12

Study 1 12

Study 2 13

Results 16

Study 1 16

Awareness of feelings and emotions 16

Improvement of current treatment 17

Personalization of use 18

Improvement of autonomy 19

Study 2 20

Cluster analysis 20

Conclusion 26

Discussion 27

Recommendations 32

Literature 35

Appendix 1. Interview format study 1 37

Appendix 2. Network model of factors resulting from study 1(Dutch) 39

Appendix 3. Protocol for card sorting technique (Dutch) 40

Appendix 4. Factors before card sorting with card numbers (Dutch) 41

Appendix 5. Categories after standardizing (Dutch) 42

Appendix 6. Dendrogram using Centroid Linkage (Dutch) 43

Introduction

In our current society, technology is found everywhere around us. It makes our lives more efficient and effective. We use technology on a daily basis. However, using technology for monitoring health conditions in the mental health care is not that common. Nevertheless, there are high expectations when it comes to the use of technology in mental health care. It is expected that technology makes mental health care more (cost)efficient which seems essential to the future of the mental health care. This study investigates by using secondary data analysis and a card sort technique which values are important for therapist when mHealth technology is implemented at a psychiatric hospital with the aim to implement the yet to be technology the Sense-IT! as good as possible.

When information and communication technology meets health care, the literature refers to eHealth. eHealth is defined as 'The use of informative and communicative technologies, internet-technology to improve the health and healthcare (van Gemert-Pijnen, Peters & Ossebaard (2013)'. The 'e' in eHealth refers to the use of electronics in the health setting. eHealth improves cost efficient working, quality of care, transparency and empowerment (van Gemert-Pijnen, Peters & Ossebaard, 2013). When it comes to the application of eHealth in care practice a distinction between overlapping spheres of eLogistics, ePublic Health and eCare is used (Figure 1). Logistics refer to procedures that support the primary process such as Quality control and Administration (van Gemert-Pijnen, Peters & Ossebaard, 2013). Public Health focuses on prevention and education in public spheres. Care denotes the primary process of cure and care and may be subdivided into; Diagnostics, Therapy and Care such as remote monitoring. This study can be categorized within the research field of remote monitoring. Remote monitoring will be further explained in the next paragraph.

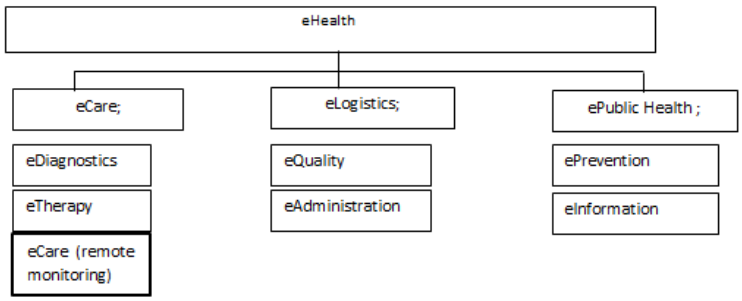

Figure 1. *Differentiation in eHealth* (Krijgsman & Klein Wolterink,2012).

Remote monitoring is defined as the monitoring of a health condition of a patient by measuring and interpreting vital body signals (Krijgsman & Klein Wolterink, 2012). Remote monitoring allows patients to perform a routine test with for example a mobile device, which sends data to a healthcare professional in real-time. When a person uses a smartphone with the goal to improve his or her health it is an example of what is called mHealth. mHealth is defined as 'the practice of

eHealth, assisted by smartphones which captures, analyses, processes, and transmits health-based information from sensors and other biomedical systems (Adibi, 2015). These biomedical systems are used to process, analyzing, registering and interpreting information and are usually attached to the user's body. mHealth offers patients the opportunity to obtain care in their own environment and increases the accessibility of the mental health care (Vollenbroek-Hutten, 2009). This results in empowered patients and health costs are reduced while the quality level improves. A form of mHealth is biosensor technology. Biosensor technology is based on specific biological recognition elements in combination with a transducer for signal processing (Luong, Male & Glennon, 2008). The integration of mHealth more specifically biosensor technology, in order to monitor health conditions of patients has led to the development of a new innovating technological intervention in the mental health care called Sense-IT!. This technological intervention uses biosensors to track emotional arousal with the aim to improve emotional awareness, which is discussed in more detail in the section 'emotional awareness'. The aim of this project is to implement the Sense-IT! technology at a psychiatric hospital. Before this technology can be implemented it is important to gain insight in the values which should be taken into account during the implementation thereof (van Gemert-Pijnen, Peters & Ossebaard, 2013). In the next paragraph different theories are explained which provide support during the implementation of a technological intervention.

Implementing mHealth

To make sure that technology is suitable for personal use this study is based on the Human Centered Design (HCD). The HCD is a model in which needs, expectations, interests and motivation of the expected users are focus points and are being evaluated by the process of development (Gould & Lewis, 1985) . The HCD consist of four characteristics. The first one is co-design, the second one is knowing the users during development, the third one is the use of continuous feedback during development and the last one is the use of user-centered evaluation methods (van Gemert-Pijnen, Peters & Ossebaard, 2013). By being focused on these four main characteristics the HCD ensures a better adherence, job support, more safety and enhances the implementation of the technology (van Gemert-Pijnen, Peters & Ossebaard, 2013). A disadvantage of the HCD model is that it doesn't focus on personal values (van Gemert-Pijnen, Peters & Ossebaard, 2013) which is necessary for an optimal implementation of the eHealth intervention (Gemert-Pijnen, Peters & Ossebaard, 2013).

A framework that provides awareness to the importance of the values of the user during the implementation of an eHealth intervention is the CeHRes Roadmap (figure 3) (David, 1989; Davis, 1993; Gemert-Pijnen , Peters & Ossebaard, 2013). The CeHRes roadmap is a holistic based framework that combines the principles of HCD with infrastructural factors to address the values of end users in order to realize the potential of technology to innovate health care. The CeHRes Roadmap knows five

principles, which are distracted from studies of van Gemert-Pijnen, Nijland & Ossebaard et al (2011); eHealth development is a participatory development process, it creates an infrastructure for changing health and wellbeing, its development is intertwined with its implementation, it is connected with Persuasive Design Technology and its development requires continuous evaluation cycles (formative and summative). These five principles are applied during the five stages of the CeHRes roadmap (figure 2)(van Gemert-Pijnen, Nijland & Ossebaard et al. (2011). These five stages are; contextual inquiry, value specification, design, operationalization and summative evaluation.

The first stage, the contextual inquiry, aims the identification and describes the stakeholders' needs and problems, establishes who the product owner is, which regulations and conditions should be taken into account and whether or not and how, technology can contribute to minimizing problems. During the second stage, the value specification, information is gathered about the added values. Hereby the key-stakeholders indicate and prioritize the values they consider to be important to bring improvements or change through technology (van Gemert-Pijnen, Peters & Ossebaard, 2013). The aim of this study is to map the values of interest of the end-users when the Sense-IT! is implemented. This aim belongs to the second stage, value specification, of the CeHRes Roadmap.

After the first and the second stage, the outcome of the value specification and contextual inquiry will be translated into functional requirements and persuasive features for the prototypes, which is called the design stage. At the fourth stage a business model for the implementation of the eHealth intervention will be developed. During the last stage the effects of the new technology are measured during the summative evaluation. This evaluation focusses on clinical, behavioral and organizational outcomes.

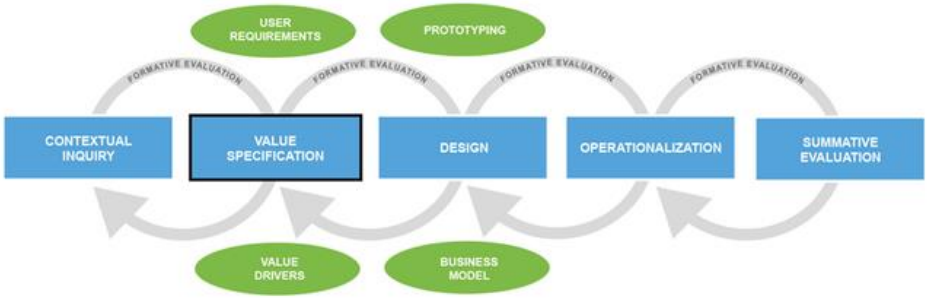

Figure 2. *The context of this study, value specification, within The CeHRes Roadmap* (van Gemert-Pijnen, Nijland, Ossebaard et al. 2011).

By researching values and using them during the implementation of the Sense-IT!, the current care will be personalized. By implementing a new personalized technology, care is more customized and efficient which results into an increased wellbeing (Bohlmeijer, Bolier, Walburg & Westerhof, 2013).

The aim of this study is to research the important values for the implementation of the Sense-IT!. Before the Sense-IT! can be implemented at a psychiatric hospital, it is important to know how this technology works. As mentioned before the Sense-IT! uses biosensor technology to track emotional arousal with the aim to increase emotional awareness. The next paragraphs explain the importance of this process and how emotional awareness can be improved.

Emotional awareness

Emotions can direct attention to key features but may harm as well particularly when they are of the wrong type (Gross, 2006). In these cases, we try to regulate our emotions (Gross,2006). Emotion regulation refers to shaping which emotions one has, in which moments and how one experiences or expresses these emotions (Gross, 1998). Among other things emotional awareness often ensures that an emotion is being regulated. Emotional awareness is defined as adapting to ever-changing social environments is contingent upon knowledge of one's owns emotions (Taylor et al, 1997).

Literature does not always agree with the way in which emotional awareness is obtained. Some literature states that during this process after the physical awareness, physiological reactions occur where others are stating that this process is more simultaneously. This order of occurrence is discussed in the following four main theories: the James and Lange theory (Lane & Nadel, 2000), the Canon and Bard theory (1927), the theory designed by Schachter & Signer (1962) and the theory of Damasio (1999).

The James and Lange theory concluded that events or stimuli give rise to certain physiological reactions such as increase muscle tension, dry mouth, heart rate et cetera (Lane & Nadel, 2000). Canon and Bard (1927) criticized this theory and stated that physiological reactions and feelings simultaneous will be processed and therefore a physiological reaction was expressed simultaneously. This statement, however, has been criticized by Schachter and Singer (1962). According to them emotions result from the physiological arousal as well as the cognitive appraisal (Schachter & Singer, 1962; Lane & Nadel, 2000). Damasio (1999) stated that first physical awareness is obtained before physiological reactions occur. It is concluded that for all the four theories, contradictory evidence exists and therefore, no theory has been proven invariably accurate (Cotton, 2006). Because no theory has been proven invariable accurate, it is difficult to choose a theoretical foundation for this study. This study follows the idea of Damasio (1999) because of the fit between the theory of Damasio and the aim of the Sense-IT! project.

The theory of Damasio (1999) describes that emotional awareness goes through a number of processes which are divided into five phases. During the first phase the engagement of the organism by an inducer of emotion, for instance, a particular object processed visually, resulting in visual representations of the object. In the second stage signals consequent to the processing of the visual

representation of the object activates neural sites that are preset to respond to particular class of inducer to which the object belongs (emotion-induction sites). During the third stage the emotion induction sites triggers a number of responses towards the body and brain sites, and unleashes a full range of body and brain responses that constitute an emotion. In the fourth stage, first-order neural maps represent changes in body state, which causes the emergence of feelings. The first four stages are physical reactions of an emotion. These physical reactions are objective reactions which express themselves both in behavior and in physiological reactions. These reactions can be observed in heart rate, blood pressure, temperature and skin conductance (Lisetti & Nasoz, 2004; Krumhansl (1997). During the last stage of emotional awareness, the pattern of neural activity at the emotion-induction sites is mapped in second-order neural structures. Hereby a psychological conscious subjective experience of the feeling emerges whereby words can be given to the neuronal pattern such as 'I am angry'.

The previous paragraph describes that emotional awareness goes through five stages in order to reach emotional awareness. Hereby the appearance of each stage is (except the first stage) dependent of the appearance of the previous stages (Derks, Westerhof & Bohlmeijer, 2014) and can be compared with an industrial process, whereby a basic product goes through various stages to become a developed and finished end product (Derks, Westerhof & Bohlmeijer, 2014). But like any process there can be complications. When the emotion is not given through to a higher level of processing there is neither emotional awareness nor feeling. When the stages are not executed completely or executed in a dysfunctional way, it is referred to as dysfunctional emotional awareness (Gross, 2006)

Dysfunctional emotional awareness

Dysfunctional emotional awareness knows some negative effects. One of them is that dysfunctional emotional awareness may result into dysfunctional regulation of emotions (Gross, 2006). Examples of emotion dysregulation are unfitting emotion regulation strategies whereby the tension of the emotion gets too high (Adenzato, Todisco & Arisoto, 2012). Various disorders such as depression, anorexia nervosa, posttraumatic stress disorder (Adenzato, Todisco & Arsito, 2012) and personality disorders, in particular borderline personality disorder (Derks, Westerhof, & Bohlmeijer, 2014) are known with dysfunctional emotional awareness.

Borderline personality disorder is characterized by a pervasive pattern of instable relations, self-image and emotions (van der Molen & Perreijn, 2007). Next to these fundamentals, this personality shows impulsive and self-destructive behavior (van der Molen & Perreijn, 2007). Linehan (1993); Gratz, Bardeen, Levy, Dixon-Gordon & Tull (2014) concluded that people with borderline personality disorder are suffering from severe difficulties with regulating their emotions, which may

results in lower wellbeing and quality of life (Torrado, Ouakinin & Bacelar-Nicolau, 2013). It can be concluded from research of (Levine, Marziale & Hood, 1997) that people with borderline personality disorder show lower levels of emotional awareness.

If the above described study from Levine, Marziale & Hood (1997) and the theory from Gross (2006) are combined it can be expected that people with borderline personality disorder are having difficulties with emotional regulation because, amongst other things, of their dysfunctional emotional awareness. It is assumed based on the theories of Damasio (1999) and Gross (2006) that people with borderline personality disorder do not have a conscious subjective experience of their feelings (Derks, Westerhof & Bohlmeijer, 2014). However, they are physical aware of the neuronal patterns, stage four of Damsio (1999) and therefore having physiological reactions. By detecting these physiological reactions, it could be possible to monitor their increased emotional awareness.

Detecting emotional awareness

When people are physically aware of the neuronal patterns they are having various physiological reactions including an increased amount of sweating (Martini & Bartholomew, 2001). Critchley (2002) concluded that the amount of sweat produced by the sweat glands in the skin varies with electrodermal activity (EDA), also known as skin conductance. EDA is the proportion of the human body that causes continuous variations in electrical characteristics of the skin (Boucsein, 2012). A method to detect physiological reaction to an emotional event is by measuring the EDA (Boucsein, 2012). The measuring of EDA is increasingly used in psychology because of its low cost and easy applicability (Martini & Bartholomew, 2001). Typical examples of the use of EDA is biofeedback training. Nagai, Goldstein, Fenwick & Trimble (2004) conducted a study in which they investigated the clinical efficacy of EDA response biofeedback training in reducing seizures in adult epilepsy. Their experimental group received biofeedback by using a computer and sensors. They concluded that the biofeedback was effective in reducing seizures.

A way to measure EDA effectively is by using sensors. Research states that it is important to investigate were the most effective place is to measure the electrodermal activity. The human body exists of two types of sweat glands. The first one, exocrine is the type that reacts on warmth and the second one, apocrine, reacts on emotional tension (Wilke, Martin, Terstegen & Biel, 2009). To make sure that the emotional tension is measured it is important to locate the sensor at a place on the body that consist of apocrine sweat glance. This apocrine sweat glance is among other locations located at the armpit, fingers, the palm of your hand and the inner wrist (Wilke, Martin, Terstegen & Biel, 2009). In order to find the ideal place for a sensor, comfort has to be taken into account as well (Kuiper et al, 2011). Because the armpits and the palm of the hand are not comfortable places to measure skin conductance for a longer period of time (Boucsein, 1992) and index fingers are used a

lot during a normal day, a viable alternative seems to be the inner wrist. Although a disadvantage of measuring at the inner wrist is that it contains only 20 % of apocrine sweat glands Poh, Swenson & Picard (2010) concluded that this not a problem because the results follow the same pattern when the skin conductance is measured at areas consisting of a higher percentage of apocrine glands. Using a bracelet or watch shaped sensor, the person is able to move free while using it in their own environment (Kuipers et al, 2011) while it is usable for a longer period of time and it is not striking (Poh, Swenson & Picard, 2010). Next to these important characteristics of the technology it is important to map other important characteristics about the mHealth intervention.

What is already known

Previous qualitative research by Beekes (2014) stated that there are four values that need to be considered when implementing the Sense-IT!; Improve quality of life, optimization of current treatment, provide custom care and increasing or maintaining the autonomy of the patient. The research of Beekes (2014) knew a qualitative design, whereby it is possible that the results were biased by a framework. Therefore, it is recommended to perform a secondary data analysis based on the data of Beekes (2014). Next to the secondary data analysis, a quantitative design, in the shape of a card sort technique, is added to gain more insight in the values.

The study starts with investigating the values of the therapist since the Sense-IT! will be implemented at the work setting of the therapists. It is important to know whether the Sense-IT! gets enough support from the therapists before it is used by the end-users. Therefore, the aim of this research is to identify needs and values from therapists to make sure that the new Sense-IT! technology will be implemented in the current treatment as good as possible. The main question asked in this study is;

'Which values are of interest according to therapists when they are going to use the yet to be developed technology in their treatment?'

This question will be answered by two different studies which will be explained at the method section.

Method

The aim of this research is to answer the research question and to provide an accurate overview of the values found during the research. For this purpose, this research is divided in two studies. The first one is a secondary data analysis and based on the data of Beekes (2014). Study 2 expands by adding a quantitative account on the topic by a card sort technique which gains more insight at the values.

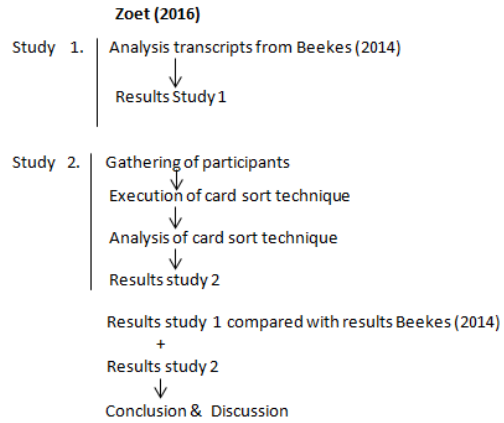

Figure 4. *Schematic representation of procedure study 1 and 2.*

Study 1

Design. Study 1 is a validation study. It uses a qualitative design. This study is based on data previously collected by Beekes (2014) and follows the same procedures for analyzing the data. Its main purpose is to repeat and hereby validate the previous research. Qualitative research is defined as a multimethod, involving an interpretative, naturalistic approach to its subject matter (Baarda, de Goede & Teunissen, 1996). The initial decision to use a qualitative approach is best suited to explore the values of the user of the Sense-IT! and to get a more detailed picture of what the users and end user seek and need from the Sense-IT!.

Respondents. The dataset (Beekes ,2014) consists of n=9 transcripts (3 men, 6 women). The data was acquired at the three different treatment programs from Scelta; program 1, program 2 and driedaagsedeeltijd. The gathering of the data has been previously done by Beekes (2014. The study procedures follow the procedure of Beekes (2014, p.9). Beekes (2014) established three exclusion criteria; temporary employment, working at policlinic and psych diagnostic worker. When the exclusion criteria were used n=19 respondents were left. Nine of these 19 respondents were selected by the criteria function and department by the means of purposive sampling. To make sure that the outcome is reliable and generalizable it's important to interview at least one of each of these profiles.

Procedure. The 9 respondents were interviewed by Beekes (2014) by the means of an interview format (Appendix 1). During the interviews sound recordings were made which were used to write transcripts. The nine transcripts were analyzed using the program Atlas 7.2. For practical reasons three groups consisting of three transcripts were created. This has been done to maintain structure, overview and offers the potential to determine when saturation occurs.

Analysis. The interviews were analyzed through content analysis. Content analysis is defined as a research methodology that uses a set of procedures to derive valid inferences from the text material (Krippendorff,1980). The content analysis was derived through three steps, described by Boeije (2010). The three steps are; open coding, axial coding and selective coding. Before analysis it has been chosen to analyze bottom-up, because during bottom-up analysis the analysis is less affected by bias. This implies that there was no foreknowledge about the previous outcomes of Beekes (2014).

The analysis of the data started with open coding. First all the nine interviews were read. After reading the analysis starts with the first subgroup consisting of transcript 1,2 and 3. For all the three subgroups the beginning and end of all of the fragments that consisted of a meaning were encrypted by a codename (Boeije, 2005). Hereby a fragment is described as a collection of words that share the same topic (Boeije, 2005).

After the open coding, the axial coding started. During the axial coding the three subgroups were analyzed, what results in 843 codenames. These 843 codenames were semantically compared with each other and were grouped with the same name, what resulted in 105 different codes.

Finally, during selective coding the relationships between the different 105 codes were investigated. This was done by investigating how different codes relate to each other, whereby four main values lead to main themes and subthemes. The relationship between the different 105 codes are graphically showed, in the shape of a network model, at Appendix 2.

Study 2

Design. Study 2 used a quantitative design and an expended function by using a card sort technique. A card sort can 'provide insight into users' mental models, illuminating the way that they often tacitly group, sort and label tasks and content within their own heads" (Rosenfeld & Moreville, 2002). The card sort technique was used to get more insight over the way that the values, found at study 1, should be merged. Card sorting requires that respondents sort cards into piles and then name those groups. Card sorting results typically are summarized across respondents to determine which items are being grouped together and what names are being assigned to these groups (Hinkle, 2008). There are two different types of card sorting open and closed. In this study there has been chosen to use the open version of card sorting, because it is less leading and gives a more reliable insight in the

mental models of the respondents with respect to the closed version (Hinkle, 2008). Open card sorting allows respondents to create fully free and name as many groups as they think are necessary.

Respondents. Participants consisted of 5 women. Since the unequal distribution of men and women is also seen among the employees of the target group, this is not perceived as a methodological problem. Two respondents were working at program 1, one at program 2 and two at driedaagsedeeltijd. Previous research states that no clear evidence exists on an appropriate number of respondents for this type of study to use (The usability body of knowledge, 2005). Kaufman (2006) recommends at least ten participants for a card sort technique, but cites no data for this recommendation. Paul (2007) suggest that a reasonable structure can be generated using a few as five participants of the card sort is a part of more research methods. Because the results of card sort method is discussed is combination with the results from study 1, and because of the extent of this study it has been chosen to ask five respondents to execute the card sort technique.

Procedure. Before the card sorting all the codes resulting from study 1 were printed on cards. These cards were used during the sorting. Before respondents were obtained a pilot test was executed to determine the average duration of the card sort technique, using 105 cards. The pilot test was performed in one hour and 45 minutes. After discussing the balance between the duration of the card sort technique on one hand and the level of detail, that becomes less when more cards are merged on the other, it has been chosen to use all the 105 cards for the card sort technique to maintain the current level of detail that arose after study 1.

The respondents were obtained during a meeting. In this meeting the entire target group was present. During this meeting a small explanation about the research was given. After the meeting the target group got the opportunity to sign in for the card sort technique, what resulted in 5 respondents. After the gathering of the respondents, the five respondents were individually invited. During the appointment the card sort was executed based on a protocol written in advance (Appendix 2). The cards were shuffled and placed randomly on a physical surface (figure 5). Then the respondent sorted cards into piles on the table in front of them. After the first round of sorting, the respondents were asked to sort the piles they had left to fewer piles, whereby the respondents were asked to give a name to the piles they created. After the respondent gave a name to the piles they created, they were asked again if they could merge the piles they created with other piles (second round). Because the respondents were free to decide with how many piles they ended the card sort technique with, it wasn't mandatory to complete the second or a potential third round. The final round of sorting was determined by the respondents. When they felt that the piles of card they had left, couldn't be merged because the piles would lose their distinctiveness, the card sort technique stopped.

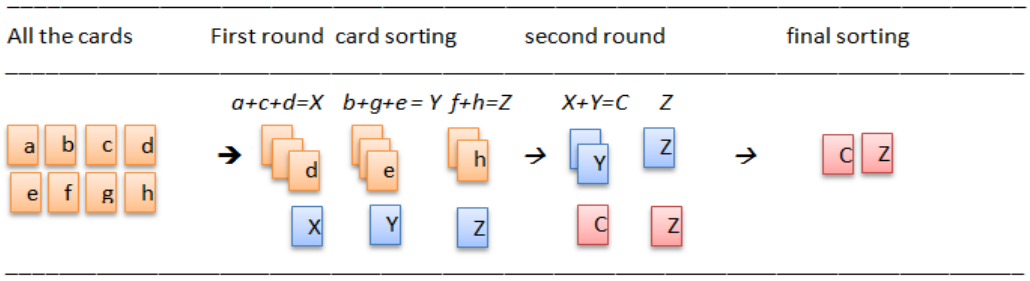

Figure 5. *Schematic representation of card sort technique*

Analysis. After the card sort technique, the data of the five card sorts was processed in excel formula sheets (Spencer, 2007) which have been used at previous research (Chope, 2014). The sheets are used to execute a cluster analysis.

During the cluster analysis, patterns of cards that are related to each other according to respondents 'mental models are identified by analyzing how often they are placed together on one pile (Wentzel, Müller, Beerlage- de Jong & Gemert-Pijnen, 2016). First a cluster analysis is executed by developing an item correlation matrix. After that the data from the item correlation matrix is imported in IBM SPSS v. 20 (Wentzel, Müller, Beerlage-de Jong & Gemert-Pijnen, 2016). With IBN SPSS v.20 a hierarchical cluster analysis was performed, the results are presented in a dendrogram (Appendix 6). In the dendrogram the relation and order between the 105 cards was displayed (Everitt, 1998). The order of the cards displayed at the dendrogram was used for further analysis within the excel sheet. After the order of the cards at the datasheet was changed, clusters appeared at the datasheet. The balance between detail and overview in combination with the dendrogram decided the final amount of clusters. The clusters contained information about the agreement within the cluster, which varied with intervals of 20%, from 0% till 100% and the internal consistency of the cluster.

The agreement reflects, in percentages, the extent to which cards are clustered together. For example, if card 1 and 2 had an agreement of 100% it means that these cards were consistently clustered by the five respondents. After the calculation of the agreement of the cluster the percentages range was colored, whereby each percentage got his own color and was then put in the result section.

The consistency was calculated with an excel formula and reflects the coherence of a cluster on a higher abstract level that the agreement does, whereby >75% -high; 50-75% -acceptable, 25-50%-average and <25%- weak (Wentzel, Müller, Beerlage-de Jong & Gemert-Pijnen, 2015).

Results

Study 1

The result from the secondary data analysis consists of four sections. Together they represent the four main values that have been derived from the analysis of the codes out of nine interviews. These four main values are; *awareness of feelings and emotions, Improvement of the current treatment*, *personalization of use* and *promote autonomy.* Each value is explained using the mind map (Appendix 1).

Awareness of feelings and emotions.
The first main value that has been found was the value awareness of feelings and emotions (Figure 6). During the interviews the respondents were asked to give their opinion about the current treatment. The respondents explained that the current skill training ensures the improvement of recognition of emotions by practice emotions, get more insight about what is going on in your body and learn the differentiation between the different emotions. The current therapy ensures the recognition of physical signals by getting more insight about your emotions, talking about emotions and physical signals and observing what is going on in your body. Respondents are stating that the yet to be developed technology has to meet the same features. According to respondent 1*; I think that the Sense-IT! would be very helpful when it helps the patient to get more emotional awareness'* and to respondent 4; '*In essence I think it's important that patients recognize emotions and tension in their bodies and fit their behavior to these recognitions'.* According to respondents 3 this could be done at different therapies that Scelta offers such as music therapy, systematic therapy, ERT, module and psychomotor therapy.

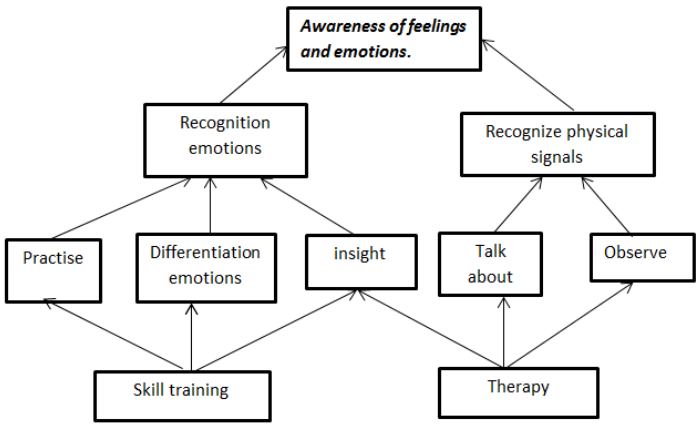

Figure 6. *Mind map value 'awareness of feelings and emotions'.*

Improvement of current treatment

The second value, improvement of current treatment (Figure 7), consist out of a lot of codes. Therefore, it has been decided to discuss the core and the most important codes according to the respondents. Respondents are stating that it's important to keep conducting research. From this research new insights can be implemented in the current treatment. Next to research, the respondents consider that it's important to develop new interventions that comply with the following features; reliable, effective and objective measurements. During study 1 respondents stated that they would like explanation about responsibility among the Sense-IT!; *I think that the bracelet is owned by Scelta and that the patient is asked to proceed cautiously with the technology. But we have to make sure that the bracelet get fixed when it is broken*'(respondent 1) versus '*When it is broken and it is because of careless and wild behavior than the patient has to arrange that the bracelet is made*' (respondent 8). Also they would like to have more information about the use and the technical aspect of the product (respondent 1 and 5), get time to familiarize themselves with the technology and get support from the organization during and after the implementation. All the 9 respondents think it is a good idea to use technology in the mental health care when the level of use is monitored; *It has to be a replenishment not a replacement'*, (respondent 5). The respondents cite a number of user requirements for the features and tasks of the new intervention, such as appearance and monitoring. Next to research and the development of new interventions, it is also important to stay focused on the psychological and physical risks of the Sense-IT!.

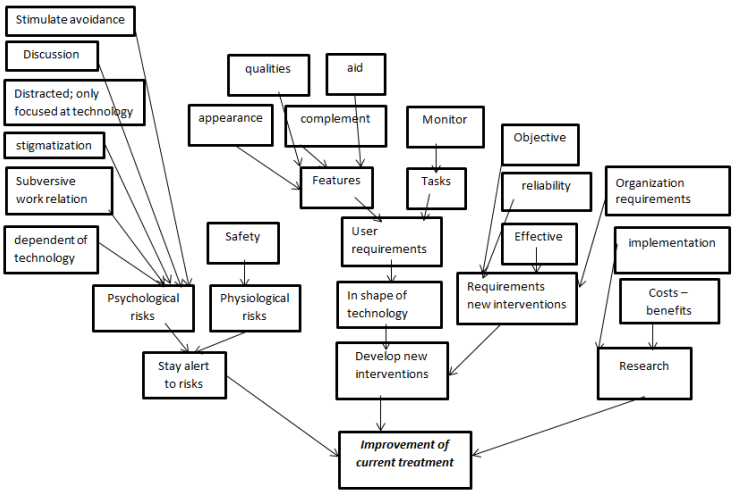

Figure 7. *Partial mind map value 'improvement of current treatment.*

Personalization of use

The third important factor for implementation of the Sense-IT! is the personalization of the use of the Sense-IT! (Figure 8). Respondents indicate that the technology features of the Sense-IT! should be personalized according to output and signal. Respondents would like to see clear graphs that shows the amount of tension a patient had in the last week, and suggestions for effective behavior when the patient is in great stress. Among the personalization of the signal it can be concluded that the use of a beep as signal would be discouraged by all the respondents. Some respondents are also discouraged by the use of a lamp. Others say that it's up to the patients, that they can choose the signal they want. Also respondents like to see personalization of use fitting to clinical diagnosis, and program; '*Personalization is very important to make sure that the patient for longer time is going to use the technology in stand of resisting to the product* (respondent 6)'. 4 of the 9 respondents are mentioning the importance of the fit between the clinical diagnoses of the patient and the personalization of the technology. Respondent 7 states that the technology should work in a different way when the patient is suffering from a borderline personality disorder rather than ADHD; 'For *example someone suffering from ADHD has difficulties with taking his medication on time. It would be great when the technology gives the patient a signal which ensures that the patients take his medication'.* This is also the same for the therapy that the patient follows. The personalization of the Sense-IT! is different for the different programs Scelta offers. Respondent 8 mentioned that it is important at program 1 to keep in mind that the overall tension is higher compared with the 'driedaagsedeeltijd', so the mean level of tension should also be higher. For patients at the driedaagsedeeltijd respondent 8 fears that stigmatization is probably higher because of the possibility that they have to wear the Sense-IT! to work. Respondent 9 noticed that it is also important to take a look at the time the Sense-IT! shuts down.

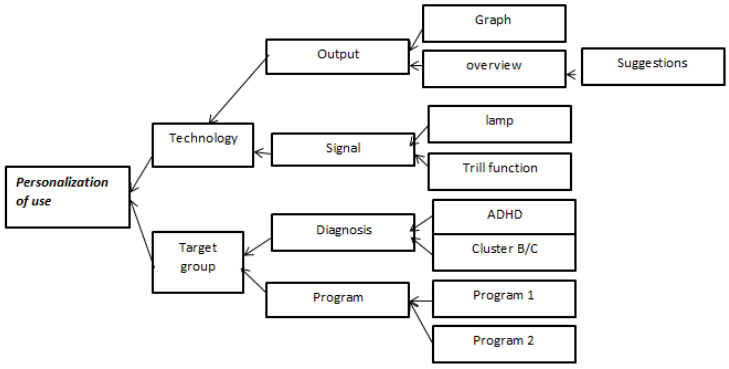

Figure 8. Mind map of value 'personalization of use'.

Improvement of autonomy

The last main value that has been found was the value; Improvement of autonomy (Figure 9). *The* respondents found it important that the technology makes sure that the patients keep their own control, that it doesn't interfere with the privacy and that it stimulates their independence. Participant 1 states; 'It *is important that we're not taking over'*. To promote the independency, it is critical that the patient starts with investigating their own feelings, thoughts and behavior. Also privacy is an important factor to consider when it comes to autonomy. All of the respondents emphasize the importance of privacy when it comes to the use of the Sense-IT!. Respondents were wondering if the patient is head owner of the information and data that the technology collects. Some respondents state that the patient can keep the information to him or herself and some respondents didn't agree with that. All of the respondents concluded that the patient is the head owner of the information and that they may choose to keep the data for themselves or to share it with the therapists and patients. However, the preference of the therapist is that the data is shown at the dossier.

To improve the control, it is important that the patient feels the freedom of choice. 'It *is important that the patient is able to turn off the bracelet. Patients can now escape by saying nothing during the therapy, which is fine. This way they can feel that they have a choice to say something' (respondent 5)*. The use of the Sense-IT! is discussed during the interviews. Out of the data It could be concluded that the respondents don't agree, when it comes to the frequencies of use of the Sense-IT!. However all the respondents concluded that it's important to gradually increase and decrease the frequency of the Sense-IT!. Respondent 1: *'I can imagine that when the patient after a couple of weeks has become accustomed, you can use the Sense-IT! at home or at work. But important is it to remove the Sense-IT! also gradually so that the patient learns to increase emotional awareness*'.

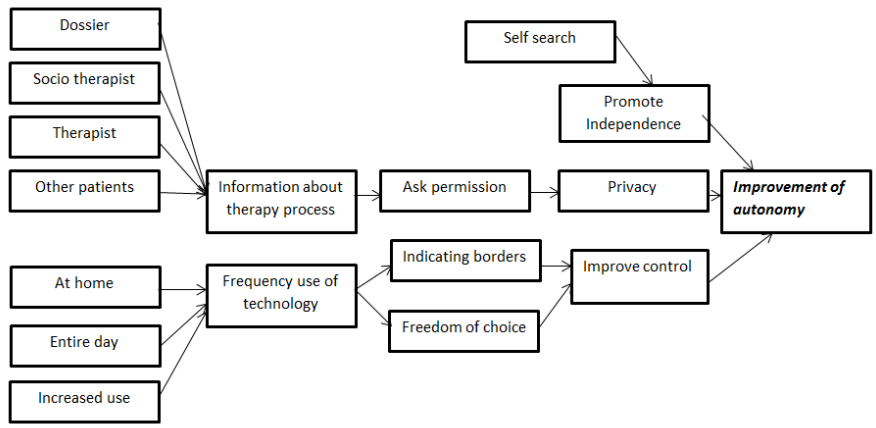

Figure 9. Mind map of the value 'improvement of autonomy'.

Study 2

Cluster analysis

On a card level, cluster analysis provides insight into which cards are placed together in a pile and are thus (content-wise) linked to each other (Wentzel, Müller, Beerlage-de Jong & Gemert-Pijnen, 2015). After the cluster analysis seven clusters were detected (Appendix 3). From the 105 cards 10 were detected as ambiguous and therefore less reliable; Use of technology during skill training (32), faster curing (80), aid instead of a replacement (42), freedom of choice (49), using socio therapists during use of intervention (81), use of therapies for implementation (93) and meaning of emotions (9). These cards were included at the analysis. The amount of final clusters will be determined by the balance between detail and overview in combination with the dendrogram. When these factors are taken into account it is decided to end up with seven clusters: Physiological parameters, technical aspects Sense-IT!, what is needed from the organization for implementation of Sense-IT!, risks that can occur during implementation of technology, target group for technology, what must the Sense-IT! improve and external characteristics and requirements of Sense-IT!!.

Custer 1: physiologic parameters (four cards)

The first cluster that was detected was the physiological parameters (table 2). This clusters consists of four cards; measuring temperature (92), sweat (105), measuring blood pressure (14) and measuring heart rate (40). All the five respondents put these cards together at their card sort. This cluster reflects the physiological parameters that the Sense-IT! could measure. The mean of the internal consistency of the first cluster is 100% what reflects a high intern consistency.

Card name	**92**	**105**	**14**	**40**
(92) Measuring temperature	X	100	100	100
(105) Sweat	100	X	100	100
(14) Measuring blood pressure	100	100	X	100
(40) Measuring hart rate	100	100	100	X

Table 2 . *First cluster physiological parameters*

Custer 2: Technical aspects Sense-IT! (15 cards)

The second cluster that was detected referred to the technical aspects of the Sense-IT! (table 3). This cluster contains of 15 cards. At table 2 it is visible that three cards; Giving family to access to data of patient (27), giving patients access to data of patients (70), information about data in file (46) are less coherent than the other cards. When looked at these three cards it is visible that the topic of these three cards differ from the other cards within the cluster. Cards 27, 70 and 46 are discussing whether the data or information derived from the technology should be visible for other patients or family, where the other cards at the cluster are focussing on the technical aspects of the Sense-IT!. It has been thought of to place these cards in a separate cluster. However, after calculating the mean

internal consistency of this cluster, these would drop from 46% (average internal consistency) to 24% (weak internal consistency). Within the cluster the cards; stimulating use of technology (31), implementing technology (91), asks of technology (89), technical aspects (90) and characteristics of technology (23) showed a high association with the cluster. If calculated separately the mean of the internal consistency of this cluster rises to 57, what reflects an acceptable internal consistency. Since the cluster would be very small it is chosen to also put the other cards into the cluster. This cluster summarizes the different aspects of technology; the physical risks, the characteristics, opinion, responsibility, the tasks of technology, the frequency of use and questions about the potential sharing of data which is derived through technology.

Card name	**27**	**70**	**46**	**59**	**99**	**29**	**54**	**31**	**91**	**89**	**90**	**23**	**20**	**45**	**28**
(27) giving family access to data of patient	x	100	20	0	0	0	0	0	0	0	0	0	0	0	0
(70) giving patients access to data of patients	100	x	20	0	0	0	0	0	0	0	0	0	0	0	0
(46) Information about data at dossier	20	20	x	40	40	20	0	20	20	20	20	20	20	20	0
(59) research effectiveness of tech	0	0	40	x	80	80	60	60	60	60	60	40	40	60	20
(99) Responsibility over technology	0	0	40	80	X	60	40	80	80	40	40	60	40	40	0
(29) Physical risks of tech.	0	0	20	80	60	x	60	40	40	40	40	20	20	40	40
(54) opinion about Sense-IT!	0	0	0	60	40	60	x	40	40	40	40	20	20	40	20
(31) stimulate use technology	0	0	20	60	80	40	40	x	100	60	60	80	40	40	20
(91) use of technology	0	0	20	60	80	40	40	100	x	60	60	80	40	40	20
(89) features of tech.	0	0	20	60	40	40	40	60	60	x	100	80	60	80	60
(90)technical aspects of technology	0	0	20	60	40	40	40	60	60	100	X	80	60	80	60
(23)characteristics of technology	0	0	20	40	60	20	20	80	80	80	80	x	60	60	40
(20)fitting target group by technology	0	0	20	40	40	20	20	40	40	60	60	60	x	60	20
(45) information in the shape of tech.	0	0	20	60	40	40	40	40	40	80	80	60	60	X	40
(28)frequency use of technology	0	0	0	20	0	40	20	20	20	60	60	40	20	40	x

Table 3. *Second cluster Technical aspects of Sense-IT!.*

Cluster 3: What is needed from the organisation for implementation of Sense-IT!

The third cluster consists of 13 cards (table 4). This cluster has an internal consistency of 42%, which reflects an average internal consistency. Before constructing the final clusters, use of technology during skill training (32), requirements new intervention (24), cost-benefits (51) and positive opinion about technology (71) were put together at the dendrogram (Appendix 6). When looked at these four cards it is concluded that the cards 24, 71 and 32 are formulated more abstract compared to other cards, what could result in a lower consistency with the cluster. Card 51 relates to conducting research to the cost-benefits of the new intervention and could therefore also be placed at cluster seven. During the constructing of cluster seven the fit between cluster seven and card 51 is researched. The other three cards; 24, 71 and 32 are removed from the third cluster and total results section because of their presumed ambiguity and higher abstract level. This removing will be

discussed at the discussion section. The other cards show a higher consistency with the clusters. Although the consistency is still acceptable.

Cards name	66	83	61	43	97	6	7	77	94	26	38	48	67
(66) organizational requirements	x	20	80	40	20	20	20	20	20	20	20	20	20
(83) receiving support from organization	20	X	40	40	40	60	20	20	20	20	20	20	20
(61)receive support time for tech.	80	40	x	60	40	40	20	20	20	20	20	20	20
(43) implementation of intervention	40	40	60	x	80	80	40	40	40	40	40	40	60
(97)explanation use technology	20	40	40	80	x	80	40	40	40	40	40	40	60
(6)guidance from organization	20	60	40	80	80	x	40	40	40	40	40	40	60
(7)giving therapist access to data patient	20	20	20	40	40	40	X	100	80	40	40	40	40
(77)Taking privacy patient into account	20	20	20	40	40	40	100	x	80	40	40	40	40
(94)asking patient permission for use data	20	20	20	40	40	40	80	80	x	60	60	40	40
(26)Evaluation data of patient	20	20	20	40	40	40	40	40	60	x	80	60	80
(38)graph of data	20	20	20	40	40	40	40	40	60	80	x	80	60
(48)Is the use mandatory	20	20	20	40	40	40	40	40	40	60	80	x	60
(67)Output in the shape of data	20	20	20	60	60	60	40	40	40	80	60	60	x

Table 4. *Third cluster: What is needed from the organisation for implementation of Sense-IT!*

Cluster 4: Risks that can occur during implementation of the technology (12 cards).

The fourth cluster consists of 12 cards and has a mean internal consistency of 59%, which reflects an acceptable internal consistency. Visible at table 5 is that the core of the cluster is formed by seven cards; reducing the amour of self-research (101), undermining working relation (103), dependency of technology (3), stimulating of avoidance (87), distractive /only focused on bracelet) (4), unsafety (63) and psychological risks (75). These seven cards are all risks that could occur while implementing technology. It can be concluded that all of the respondents are saying that it is possible that these risks occur, but not one of them states that because of their fears for these risks that we should not use the Sense-IT!. They mentioned that if the therapist monitors these risks and intervene when is necessary, that these risk wouldn't occur.

The remaining cards are about risks that could occur when implementing the technology. Perhaps the difference between the consistencies could be explained by importance of the risk or the expected frequency. Before constructing the final shape of the cluster, card faster healing (80) was also included. By removing this card, the mean internal consistency rose from 52 to 59%, which reflect both an acceptable internal consistency. When the content of this card was researched it could be concluded that this card is not a risk but more a goal of the technology and therefore would better fit at cluster 6. After research this card also didn't fit at cluster 6 therefore it was decided to remove the card. Finally, cluster four consists of all the risks that could occur while implementing the technology in the current treatment; independency of the technology, stigmatization, decreasing of introspection et cetera. Three of the five participants noticed during the card sort technique that they were not worried about these risks. They mentioned that if the therapist monitors these risks and intervenes when is necessary, these risks are mitigated.

Cards name	44	58	101	103	3	87	4	63	75	5	17	85
(44)Staying in touch with treatment	x	60	40	40	40	40	40	40	40	20	20	20
(58)Guidance instead of replacement	60	x	60	60	60	60	40	40	60	40	40	20
(101)reduce of self- research	40	60	x	100	100	100	80	80	80	60	60	60
(103) subversive of work relation	40	60	100	x	100	100	80	80	80	60	60	60
(3)Independent of technology	40	60	100	100	x	100	80	80	80	60	60	60
(87)Stimulating of avoidance	40	60	100	100	100	x	80	80	80	60	60	60
(4)Distracted; only focused on bracelet	40	40	80	80	80	80	X	80	60	40	40	80
(63)Unsafety	40	40	80	80	80	80	80	x	60	40	40	60
(75)Psychological risks	40	60	80	80	80	80	60	60	x	60	40	40
(5)Staying alert on risks	20	40	60	60	60	60	40	40	60	X	20	40
(17)Discussion; who's right	20	40	60	60	60	60	40	40	40	20	x	20
(85)Stigmatization of surrounding by bracelet	20	20	60	60	60	60	80	60	40	40	20	x

Table 5. *Fourth cluster: Risks that can occur during implementation of the technology (12 cards)*

Cluster 5: Target group for technology (4 cards)

Cluster five consists of cards about personality disorders and the clinical programs of Scelta Apeldoorn; program 1 (73), program 2 (74), target group cluster B (18) and target group cluster C (19). The entire cluster knows a consistency of 100%, what reflects a high internal consistency. All respondents stated during the card sort that they missed the cards about the program 'three day part time' and the 'resocialiserend part time' (other part time programs of Scelta). Also all the respondents argued that the technology can be used by both the clinical and part time groups.

Card name	73	74	18	19
(73)Program 1	X	100	100	100
(74) Program 2	100	X	100	100
(18) Target group cluster B	100	100	X	100
(19) Target group cluster C	100	100	100	X

Table 6. *Cluster five target group for technology*

Cluster 6: What must the Sense-IT! improve

Cluster six consists of 22 cards and shows two distinctive groups with a few loose cards within this cluster (table 7). This first group consisting of cards; recognition of emotions (41), awareness of feelings and emotions (13), observation of physical sensations (56), standing still by observing (86), learning how to emotions faster (25), insight (47) and recognizing physical signals (53) (Appendix 3) are the cards that have the highest consistency with the cluster. All these cards are aimed at improving emotional awareness by observing emotion, stimulating awareness and recognition of emotion. The second group consisting of the cards; pannenschema (69), suggestions for skills (88), skills (98), making emotions discussable (8), practising of emotions (57), differentiation emotions (16) and learning to set boundaries (39) are focused on the improvement of emotional regulation or awareness. However, these cards discuss the tools that are necessary to accomplish this aim. Cards Improving of control (76), improving independency (104), improvement of autonomy (11) and additional of existing offer of treatment (2) are not focussing on emotional awareness but are displaying other factors that the Sense-IT! must improve such as control, autonomy and independency.

During the construction of the cluster, card helping tool instead of replacement (42), giving freedom of choice (49), using socio therapists during use of intervention (81), using therapies for implementation (93) and meaning of emotions (9) were put at this cluster. When looked at the content of the cards, the content of card 42, 81 and 93 didn't fit the content of the cluster. However, card 9 and 49 could possibly fit at the cluster. Their low consistency with the cluster could perhaps be explained by ambiguity and indistinctness. After calculating both the internal consistency with the cards (34%) and without (54%) it has been decided that these factors were deleted from cluster six. The final internal consistency of 54% reflects an acceptable consistency.

Card	55	82	12	47	25	86	53	56	13	41	69	88	98	8	57	16	39	76	104	11	2
55	x	60	20	40	60	60	60	60	60	60	60	40	40	40	20	40	20	40	40	40	40
82	60	x	40	60	60	60	60	60	60	60	20	20	20	40	20	40	20	40	40	40	20
12	20	40	X	80	40	40	60	60	60	60	40	40	40	40	40	40	40	40	40	40	40
47	40	60	80	x	60	60	80	80	80	80	40	40	40	60	40	60	40	60	60	60	20
25	60	60	40	60	x	100	80	80	80	80	40	40	40	60	40	60	40	40	40	40	40
86	60	60	40	60	100	x	80	80	80	80	40	40	40	60	40	60	40	40	40	40	40
53	60	60	60	80	80	80	x	100	100	100	60	60	60	80	60	80	60	60	60	60	40
56	60	60	60	80	80	80	100	x	100	100	60	60	60	80	60	80	60	60	60	60	40
13	60	60	60	80	80	80	100	100	x	100	60	60	60	80	60	80	60	60	60	60	40
41	60	60	60	80	80	80	100	100	100	x	60	60	60	80	60	80	60	60	60	60	40
69	60	20	40	40	40	40	60	60	60	60	x	80	80	40	60	40	60	40	40	40	40
88	40	20	40	40	40	40	60	60	60	60	80	x	80	40	60	40	60	40	40	40	40
98	40	20	40	40	40	40	60	60	60	60	80	80	x	40	60	40	60	60	60	60	60
8	40	40	40	60	60	60	80	80	80	80	40	40	40	x	80	80	60	40	40	40	20
57	20	20	40	40	40	40	60	60	60	60	60	60	60	80	x	60	80	20	20	20	20
16	40	40	40	60	60	60	80	80	80	80	40	40	40	80	60	x	80	40	40	40	20
39	20	20	40	40	40	40	60	60	60	60	60	60	60	60	80	80	x	20	20	20	20
76	40	40	40	60	40	40	60	60	60	60	40	40	60	40	20	40	20	x	100	100	40
104	40	40	40	60	40	40	60	60	60	60	40	40	60	40	20	40	20	100	x	100	40
11	40	40	40	60	40	40	60	60	60	60	40	40	60	40	20	40	20	100	100	x	40
2	40	20	40	20	40	40	40	40	40	40	40	40	60	20	20	20	20	40	40	40	x

Table 7. *Cluster six: What must the Sense-IT! improve.*

Cluster 7: External characteristics and requirements of Sense-IT!

The last cluster (table 8) consists of 21 cards and knows an internal consistency of 71%, what reflects an acceptable consistency. This big cluster shows a great consistency with these 21 cards. The highest consistency is between the cards; discrete (60), rechargeable (65), wearable design (21), good and clear reading (37), small of size (50), user-friendly (34) and smooth texture (36). These cards all reflect requirements about the qualities of the Sense-IT! . For example, wearable design, discrete, chargeable et cetera. The cards vibrate function (95), use or no use small lamp (102), signal of technology (79) and firm material (84) all discussed the appearance and the signal of the Sense-IT!; lamp, vibration function and firm. The other cards are discussing the qualities and appearance of the Sense-IT!, perhaps their lower consistency can be explained by ambiguity or indistinctness.

Before the cluster got his final shape, cards; personalization of use (30), gaining overview (68) and usability of Sense-IT! (15) were also placed at cluster seven. After analysis by content and consistency it was concluded that card 30 and 68 were discussing benefits of the Sense-IT! instead of external characteristics and requirements. Card 15 mentioned the usability of the Sense-IT! and was

therefore also removed from cluster seven. After removing these card, the internal consistency increased from 53% (acceptable internal consistency) to 71% (internal consistency).

Card	10	52	35	72	1	22	60	65	21	37	50	34	36	95	102	79	84	78	96	33	64
10	x	80	40	40	60	60	40	40	40	40	40	40	40	40	40	40	40	60	20	60	20
52	80	x	60	60	40	40	60	60	60	60	60	60	60	40	40	40	40	80	40	40	40
35	40	60	x	100	60	60	80	80	80	80	80	80	80	60	60	60	60	80	60	80	80
72	40	60	100	X	60	60	80	80	80	80	80	80	80	60	60	60	60	80	60	80	80
1	60	40	60	60	x	100	80	80	80	80	80	80	80	80	80	80	80	60	60	80	40
22	60	40	60	60	100	x	80	80	80	80	80	80	80	80	80	80	80	60	60	80	40
60	40	60	80	80	80	80	x	100	100	100	100	100	100	80	80	80	80	80	80	60	60
65	40	60	80	80	80	80	100	x	100	100	100	100	100	80	80	80	80	80	80	60	60
21	40	60	80	80	80	80	100	100	x	100	100	100	100	80	80	80	80	80	80	60	60
37	40	60	80	80	80	80	100	100	100	x	100	100	100	80	80	80	80	80	80	60	60
50	40	60	80	80	80	80	100	100	100	100	x	100	100	80	80	80	80	80	80	60	60
34	40	60	80	80	80	80	100	100	100	100	100	x	100	80	80	80	80	80	80	60	60
36	40	60	80	80	80	80	100	100	100	100	100	100	x	80	80	80	80	80	80	60	60
95	40	40	60	60	80	80	80	80	80	80	80	80	80	x	100	100	80	60	60	60	40
102	40	40	60	60	80	80	80	80	80	80	80	80	80	100	x	100	80	60	60	60	40
79	40	40	60	60	80	80	80	80	80	80	80	80	80	100	100	x	80	60	60	60	40
84	40	40	60	60	80	80	80	80	80	80	80	80	80	80	80	80	x	60	60	60	40
78	60	80	80	80	60	60	80	80	80	80	80	80	80	60	60	60	60	x	60	60	60
96	20	40	60	60	60	60	80	80	80	80	80	80	80	60	60	60	60	60	x	40	40
33	60	40	80	80	80	80	60	60	60	60	60	60	60	60	60	60	60	60	40	x	60
64	20	40	80	80	40	40	60	60	60	60	60	60	60	40	40	40	40	60	40	60	x

Table 8. *Cluster seven: External characteristics and requirements of Sense-IT!*

Conclusion and discussion

Conclusion

The main question asked during this study was; *which needs and values are of interest according to the therapists when they are going to use the yet to be developed technology in their treatment?* This question has been researched by two studies, study 1 and study 2. The first one consisted of an analysis of transcripts and the second one consisted of analysis of respondent data, using a card sort technique. From these studies the following statements can be concluded.

In study 1 four values were found that reflected the values of the respondents regarding the use of the Sense-IT! and the current vision of Scelta. These are; awareness of feelings and emotions, improvement of the current treatment, personalization of use and improvement of autonomy. These four values are reflecting 105 codes resulting from the analysis of transcripts. Respondents stated that the yet to be developed technology has to meet the value 'awareness of feelings and emotions'. Whereby the technology must enhance the insight of emotions, stimulate more practice with emotions, develop more understanding of the meaning of emotions, learn how to communicate about emotions and to recognize emotions in daily settings.

The second value that the technology must meet is the 'improvement of the current treatment'.

Respondents argued that it is important to develop new interventions and new organizational conditions. It is important to note that time is needed to get familiar with the technology and get more information about who is responsible for the proper operation of the technology. Next to research and the development of new interventions, it is important to stay focused on the psychological and physical risks of the Sense-IT!.

The third value that the technology must meet is the 'personalization of use', whereby the technological features of the Sense-IT! should be personalized according to the respondents needs and for the different treatments Scelta offers.

The final value, 'improvement of autonomy' emphasizes that the technology must improve independency and the amount of control that the patients have over their life. Also privacy is an important factor to consider when it comes to autonomy. In the context of autonomy respondents were wondering if the patient is main owner of the information and data that the technology collects.

During study 1 a question arose from the respondents. Some stated that they couldn't decide what they are legally allowed to do with the data collected from the patients. They were wondering with whom they could share the data with and whether or not the data should be saved at the electronical patient file. They would like to have more information about this subject from the

organization or someone who is specialized in ethical questions like this one. Also they mentioned the importance of a clear implementation plan for the organization, whereby each step of implementation is clearly described.

During study 2, the clustering of the 105 factors by a card sort technique (study 2) showed seven important clusters that need to be considered while implementing new technology; 1.physiologic parameters, 2. technical aspects Sense-IT!, 3. what is needed from the organisation for implementing Sense-IT!,4. risks that can occur during implementation of the technology, 5. target group for technology, 6. what Sense-IT! must improve, 7. external characteristics and requirements of Sense-IT! .

During the card sort technique three out of the five participants mentioned that they were not worried about possible risks, such as reducing the self-research, undermining working relation, dependency of technology, stimulating of avoidance, distraction of the bracelet and unsafety. They mentioned that if the therapist monitors these risks and intervenes when it is necessary, that these risks wouldn't occur.

Referring to the main question of this research; *which values are of interest according to therapists when they are going to use the yet to be developed technology in their treatment?* It can be concluded that during study 1 four values and study 2 seven factors have been found.

Discussion

Interpretation of the results

Comparing the results of study 1 and the results of Beekes (2014), it can be concluded that in both studies four main values have been identified (Table 9). Three of these values have been identified by both of the researchers: personalization of use, autonomy and improvement of current treatment. The fourth value differs: 'awareness of feelings and emotions' or 'improve quality of life'. To determine which name fits the fourth value the best, both values are compared.

Main values study 1	**Main values, Beekes (2014)**
Awareness of feelings and emotions	Improve quality of life
Improvement of the current treatment	Optimization of current treatment
Personalization of use	Provide custom care
Improvement of autonomy	Increasing or maintaining the autonomy of the patient

Table 9. *Main values from study 1 compared to the main values of Beekes* (2014).

Beekes (2014) describes that the fourth value 'improve quality of life' exists of two user goals; the patient experiences more balance' and 'the patient experiences more depth with social contacts'.

Beekes (2014) described that both user goals were mentioned once. Beekes (2014) did not show which codes are related to the value 'improve quality of life', which means that the codes belonging to the value 'improve quality of life' cannot be compared with the codes of the fourth value 'awareness of feelings and emotions' of this study. This study shows that the fourth values exists of codes related to emotions, therapy and the improvement of emotional processes.

Quality of life was mentioned once at the transcripts; '*When emotional and physicals signals are processed earlier, the client can participate earlier. This way it becomes more clear for the client when he or she has to intervene. I hope therefore that quality of life will be improved …. '.* Presumably Beekes (2014) coded this fragment as quality of life, whereby this study coded this fragment as awareness of feelings and emotions. It can be concluded that presumably Beekes (2014) coded this and other text regarding to emotional awareness on a higher abstract level. Literature states that indeed the improvement of emotional awareness can cause improvement of quality of life and well-being (Torrado, Ouakinin & Bacelar-Nicolau, 2013). However, there are other effects of improved emotional awareness such as decreased depression (Adenzato, Todisco & Arsito, 2012) that were also mentioned during the interviews, but were not named as a value. Therefore, considering the fact that the codes belonging to the fourth value of Beekes (2014) are not traceable and therefore incomparable, it has been decided to use the name of this study for the fourth value; awareness of feelings and emotions.

During study 1 four values have been found. When these four values are compared with the four values of Scelta's vison mentioned at the preface (freedom of choice, collaboration, the right intensity at the right time and expertise center), it is noticeable that all of the four values are showing resemblance with one or more vision values (table 10). The values improvement of the current treatment and awareness of feelings and emotions fit the vision value 'expert center' of Scelta. The personalization of use, shows resemblance with the vision value 'right intensity at the right time'. The last value, promote autonomy, shows resemblance with the vision value 'freedom of choice'. Only the vision value 'collaboration' didn't knew a resemblance with the values. It can be concluded that three of the vision values of Scelta are carried out by the nine respondents. It could be possible that the fourth vision value, collaboration, is less prominent because of current reorganization at Scelta what may cause less collaboration and more individuality.

Main values study 1	**Values vision Scelta**
Awareness of feelings and emotions	Collaboration
Improvement of the current treatment	Expert center
Personalization of use	Right intensity at the right time
Promote autonomy	Freedom of choice

Table 10. *Main values from study 1 compared to the main values of Scelta's vision* (2014).

Comparing the results from study 1 and study 2, it is noticeable that the first study produced four values and study 2 produced seven clusters. The researcher expected before the performing of the method that if a card sort technique would be used, this technique would identify values. To understand the difference between the results from study 1 and study 2, first the difference between the results of these studies are compared and then the cause of these differences will be discussed.

Study 1 is a qualitative secondary data analysis, as to where study 2 knows a quantitative design in the shape of a card sort technique. Both of the studies knew the same input, whereby study 1 provided values and study 2 clusters. When the codes of the values and the codes of the clusters are compared it is visible that all the seven clusters each show a great resemblance to one or more values (Table 11). For example, the codes of the cluster 'physiological reaction' are, during study 1, completely ordered at the value improvement of the current treatment. Therefore, it can be concluded that the clusters are a part of one or more values.

Cluster	**Values**
Psychological parameters	Improvement of the current treatment
Technical aspects Sense-IT!	Personalization of use Improvement of the current treatment Improvement of autonomy
What is needed from the organization for implementation of Sense-IT!	Personalization of use Improvement of the current treatment Improvement of autonomy
Risks that can occur during implementation of technology	Improvement of current treatment
Target group for technology	Personalization of use
What must the Sense-IT! improve	Awareness of feelings and emotions Improvement of the current treatment
External characteristics and requirements of Sense-IT!	Personalization of use Improvement of the current treatment

Table 11. *Values in which the codes from the clusters were found.*

The clusters don't provide direction and seem to refer to user requirements and areas that need attention while implementing new technology. When looking back at the CeHRes Roadmap described at the introduction (Figure 10), it can be hypothesized that study 1 provides values, whereby study 2 provides user requirements and areas of attention. van Gemert-Pijnen, Nijland, Ossebaard et al. (2011) describe the relation between the user requirements and the value drivers. They state that after specifying the values, eHealth goals can be formulated and the requirements must be defined in order to realize the values. When indeed both values as user requirements and areas that need attention were found, this research shows that with the same data both values, user requirements and areas that need attention while implementation can be researched. However, this

assumption is only based on a comparison between the codes belonging to the values and the codes belonging to the clusters and need more research to be accepted or rejected. Now the results of study 1 and 2 are compared it is important to understand what caused these differences.

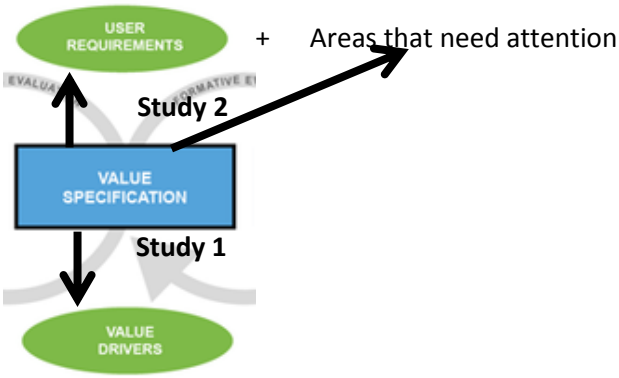

Figure 10. *Second phase, value specification of the CeHRes Roadmap* (van Gemert-Pijnen, Nijland, Ossebaard et al. 2011).

The data of study 1 is based on the data of Beekes (2014) which was obtained by interviews. During these interviews, Beekes (2014) asked questions targeting values and user requirements (Appendix 1) with the aim to derive values. During study 2 the method didn't provide questions or direction because the respondent itself provided the direction. It is possible that because of the interviews, the results of study 1 were more controlled and directed by the researchers' aim and perspective and its research question than at study 2.

When the text above is summarized it can be concluded that because the change of perspective during the studies, whereby during study 1 the researcher wanted to find values and during study 2 the respondents determined the results, both values, user requirements and areas that need attention while implementing technology were found.

Strengths and weaknesses of the research

This research showed strengths and weaknesses. During this part, the use of the qualitative research method, internal consistency, ambiguous transcripts and the lack of saturation during the card sort technique are discussed.

The results from study 1 were constructed by a qualitative research method. This means that the merging of the 840 variables that originally were found at the transcripts were done by one researcher. A disadvantage of this working method is that the framework of reference from the researcher of this study could have influenced the way of merging the original 840 variables. This problem has partially been solved by comparing the results from this study with the results from

Beekes (2014) and adding a card sort technique. However, because of the qualitative design of the research this remains a weakness of this research.

During study 2, cards were removed from the cluster to gain a higher internal consistency. Hereby, it is possible that important information is deleted from the study. However, when the cards are semantically researched it stands out that all of the removed cards are ambiguously named and therefore more sensitive for bias. By removing the cards, the internal consistency of the cluster arose what resulted in six clusters with an acceptable consistency and one, 'What is needed from the organization for implementation of Sense-IT!' showed an average internal consistency. None of the clusters showed a high or low consistency. Probably the lower consistency of the cluster, 'What is needed from the organization for implementation of Sense-IT!', can be explained because some respondents argued that they sometimes didn't had an opinion about organizational requirements and therefore didn't put the same cards at this cluster.

Important to discuss is the quality of the transcripts derived from Beekes (2014). Study 1 started with an analysis of transcripts that were provided by Beekes (2014). This way of working has both advantages and some disadvantages. Advantages were time saving, cost saving and the sample group wasn't asked to participate to the same interview that was executed by Beekes (2014). Despite the advantages, this working method also shows us a disadvantage. Because the interviews were transcripted ambiguously, the coding of the fragments may have led to different codes and therefore to different values. However, when the results of study 1 are compared with the values of Beekes (2014), three out of the four values are the same. Hereby it can be concluded that probably the impact of the sometimes ambiguously transcripts, was very small.

At the method section it was argued that no clear evidence exists on an appropriate number of respondents for this type of study to use (The usability body of knowledge, 2005). Kaufman recommended to use at least ten participants for a cart sort technique, but cites no data for his recommendation. Paul (2007) suggested that a reasonable structure can be generated using as few as five participants. According to the literature of Paul (2007) and because of the extent of this research, it has been decided that five respondents were asked to execute the card sort technique. However, after investigating the data it was noticeable that after five respondents still new code groups were formed. This means that there was no saturation among the five card sorts. The lack of saturation didn't become a huge problem, because there were two studies investigating the values and the group sample reflected the size of the target group. However, for future research it is recommended to use at least more than five respondents while using a card sort technique to create a structure.

Recommendations

Recommendations for research

The aim of this research was to map the values of interest according to the therapist. This aim belongs to the second stage of the CeHRes Roadmap (van Gemert-Pijnen, Peters & Ossebaard, 2013). By mapping these values and user requirements the second stage, value specification, is completed. For further research it is important to start with the next stage of the CeHRes Roadmap, the design stage. During this stage a prototype is designed based on the outcomes of the first and second stage of the CeHRes Roadmap (van Gemert-Pijnen, Peters & Ossebaard, 2013). When a prototype is made, it is needed to evaluate the prototype among the users. It is recommended to test the prototype among the patients, because at the end they are going the use the technology and because their opinions and values were not yet measured. During this research it has been decided to investigate the therapist instead of the patients because the Sense-IT! will be implemented at the work setting of the therapists, and the intensity of the use of the Sense-IT! depends on the amount of support from the organization. A possible way of testing this could be done by a pilot test, whereby patients from all of the therapeutic programs are represented. During this pilot test, patients could be monitored with questionnaires concerning requirements and the four values. After the pilot test the data of the questionnaires provides more information about possible adjustments for the technology.

In regards to the value 'improvement of the current treatment' it is recommended to make sure that the effectiveness of the treatment of Scelta increases, through the use of the Sense-IT!. This could be monitored through a randomized controlled trial. During the current therapeutic programs of Scelta each patient fills in the Routine Outcome Monitoring (ROM) which includes several questionnaires such as the OQ-45, which measures general health (Jong, Nugter, Pollak, Wagenborg, Spinhoven & Heiser, 2008) and the MHC-SF which measures positive mental health (Lamers. Westerhof, Bohlmeijer, ten Klooster & Keyes, 2011). By monitoring the ROM, the effectiveness of the current treatment can be measured (Seligman, 1995).

During the discussion it became clear that after five respondents still new codes groups were formed. This means that there was no saturation among the five card sorts and that it is recommended for future research to use, when there are 105 cards used during the card sort technique, at least more than five respondents to create a structure. Literature states that there is no clear evidence on the appropriate number of respondents for a card sort technique (The usability body of knowledge, 2005). It is recommended for further research to gain more insight at the appropriate number of respondents while using a card sort technique. This could be possible by producing a lot of card sort techniques with a different amount of respondents and cards. By

determining when saturation happens, a table can be made that explains for each amount of cards the appropriate number of respondents and vice versa. The saturation can be determined by looking at the amount of newly formed group names.

It has been discussed at the previous paragraph that during this research both values, user requirements and areas that need attention while implementing technology were found. However, this assumption is only based on a comparison between the codes belonging to the values and the codes belonging to the clusters. More research is necessary to understand the differences, similarities and the possible relations between the results from a content analysis and a card sort technique. This could be researched by the means of a literature study. By preforming a literature study the exact development of values and user requirements can be researched. With the possible differences between the development of a value and an user requirement in mind, it is possible to look again at the data retrieved from this research.

When more insight is giving on the differences, similarities and the possible relations between the results from a content analysis and a card sort technique a recommendation could be given about when an interview and/ or when a card sort technique can be used. If it is assumed that indeed user requirements and areas that need attention while implanting technology were found, It is recommended that when values or user requirements are investigated, an interview can be used as long as the semi-structured interview focusses on values and/or user requirements. When there is no preference for values or user requirements and the aim of the research is to map the mind of the user, it is recommended to use a card sort technique. By using a card sort technique, the results are not controlled or forwarded to values or user-requirements but show the overall mind map of the respondent.

Recommendations for practise

Regarding the results when it comes to the first value, 'Awareness of feelings and emotions' it is important to make sure that the Sense-IT! improves the awareness of feelings and emotions, by implementing as good as possible the technology. Next to the Sense-IT! it is important that all of the therapeutic programs among other things are focusing enough on the improvement of awareness of feelings and emotions. This could be researched by evaluating each therapeutic program by its effectiveness at improving the awareness of feelings and emotions.

The fourth value 'improvement of autonomy' has been mentioned a lot by the respondents. It is therefore important to pursue this value during the therapeutic programs. Literature states that autonomy can be pursued by stimulating self-confidence, self-knowledge and self-acceptance (Boom, Corstanje, Dijkstra, den Hulk, Frouws, Hazes, Kamp et al. 2005). These concepts, especially self-acceptance will be improved through the Wellbeing therapy (Fava & Ruini, 2003). By

implementing this therapy at the current treatment, for example in the shape of relapse prevention, the autonomy will be improved.

During both studies questions arose from the respondents about the use of the data derived from the Sense-IT!. Three out of the five respondents stated that they couldn't decide what they are legally allowed to do with the data collected from the patients. They were wondering with whom they could share the data with and whether or not the data should be saved at the electronical patient file. It is recommended to organize a meeting with the entire organization and an expert who is specialized in ethical question like these to discuss these topics.

During the previous paragraph it was concluded that the resemblance between the four values and the four vision values of Scelta was clearly present. Only the vision value 'collaboration' didn't know a resemblance with the values. It can be concluded that the value 'collaboration' is therefore less expressed by the respondents. It is recommended that the manager belonging to the different therapeutic programs, writes a plan to improve the amount of collaboration with the patients, coworkers and other healthcare organizations. A few options to improve the collaboration between coworkers is by understanding each other's values and strengths (Steerneman, 2014). This could be derived in the shape of the card game 'collaborate opportunity addressed', developed by healthcare organization Sevagram (Sevagram, 2015). Options to improve collaboration between other healthcare organizations is by investing time for appointments and presentations at other healthcare organizations (Steerman, 2014).

Finally, during the interviews the respondents mentioned that they would like to see a clear implementation plan for themselves. At this plan each step of implementation should be clearly described. It is therefore recommended that before the implementation of the Sense-IT! starts, each employee receives a clearly written implementation plan. To support the clearness of the implementation plan it is recommended to organize a presentation whereby these steps are clearly discussed.

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Appendix 1. Interview format study 1 (Beekes, 2014)

De actieve betrokkenheid van klinische behandelaren en begeleiders in het ontwerpproces van een nieuwe mobiele biosensor-techniek binnen de GGZ - *Sens-IT!, het vergroten van emotioneel waarnemend vermogen bij patiënten met een borderline persoonlijkheidsstoornis met behulp van moderne draagbare biosensor-techniek*

Deel 1 Visie – op de nieuwe mobiele biosensor-techniek
1. Wat vind je van het idee dat er binnen de GGZ gebruik zal worden gemaakt van moderne technologie ?
Subvraag: Wat stel je je er bij voor? Wat verwacht je ervan?
Speerpunt: Mening: positief/negatief.

2. Wanneer zou je de mobiele biosensor-techniek als succesvol omschrijven, voor jou als behandelaar/begeleider en voor de patiënt?
Subvraag: Waar hoop je op? Welke kansen zie je? Welke veranderingen zouden zichtbaar moeten zijn?Wat zou het nut moeten zijn?
Speerpunt: Bruikbaarheidsdoelen.

3. Wat wordt er al aan gedaan aan het vergroten van emotieregulatievaardigheden, en is dit voldoende?
Subvraag: Wat mis je? Waar loop je tegen aan?
Speerpunt: Gebruikersbehoeften; gebruikersproblemen.

4. Waarin zou de mobiele biosensor-techniek een aanvulling kunnen zijn op het huidige behandelaanbod?
Subvraag: Wat voor behandeldoelen zouden er (extra) behaald kunnen worden?Wat zou de meerwaarde moeten zijn?
Speerpunt: Gebruikersbehoeften; gebruikersproblemen.

5. Aan welke patiënten zou de mobiele biosensor-techniek een bijdrage kunnen leveren?
Subvraag: Voor alle patiënten, op aanvraag of advies, welke problematieken?
Speerpunt: Bruikbaarheidsdoelen (doelgroep)

Deel 2 Gebruikersvoorwaarden – voorwaarden die voor jou nodig zijn om met de Sens-IT! te gaan werken
6. Er vanuit gaande dat de Sens-IT! met behulp van biosensoren lichamelijke signalen kan meten, en hierdoor informatie geeft over een verhoogd spanningsniveau bij de patiënt, voor wie zou deze informatie dan beschikbaar moeten zijn?
Subvraag: Voor de patiënt, begeleiders, behandelaren, het eigen netwerk?
Speerpunt: Voorwaarden (voor wie).

7. Op wat voor manier zou de informatie zichtbaar moeten worden?
Subvraag: Zou het apparaat een signaal moeten afgeven, zo ja wat voor signaal? Of (enkel) via de computer?
Speerpunt:Voorwaarden (hoe).

8. Op welke momenten zou deze informatie gegeven moeten worden?
Subvraag: Binnen of buiten de therapiesetting? Voortdurend of op selectieve momenten?
Speerpunt: Voorwaarden (wanneer).

9. Wat zou er volgens jou dan met de informatie moeten gebeuren om de emotieregulatievaardigheden te vergroten?
Subvraag: Moet het geregistreerd worden, en zo ja waar? Moet het terugkomen tijdens overlegmomenten van het team (evaluaties, overdracht)?

Speerpunt: Voorwaarden (wat).

10. Wat ben je bereid om te doen aan handelingen zodat de patiënt de Sens-IT! kan gebruiken?
Subvraag: Wil je instructies geven, data bekijken/registreren/interpreteren/bespreekbaar maken, apparaat onderhouden/opladen?
Speerpunt: Voorwaarden (bereidheid; inhoudelijk).

11. Hoeveel tijd ben je bereid te besteden, per werkdag, om de patiënt met de Sens-IT! te laten werken?
Subvraag: Mag het je extra tijd kosten?
Speerpunt: Voorwaarden (bereidheid; tijd).

12. Wat heb je nodig vanuit de organisatie om met de Sens-IT! te kunnen gaan werken?
Subvragen: Te denken valt aan training, instructie, informatie, tijd?
Speerpunt:Voorwaarden (organisatievoorwaarden).

Deel 3 Gebruikerseisen – producteisen waaraan het apparaat aan zal moeten voldoen

13. Aan welke drie eigenschappen zal de Sens-IT! absoluut aan moeten voldoen?
Subvraag: Te denken valt aan draagbaarheid, uiterlijk, effectiviteit?
Speerpunt: Gebruikerseisen (eigenschappen).

14. Zou de Sens-IT! naast lichamelijke signalen nog meer moeten meten?
Subvraag: Te denken valt aan vragenlijsten invullen, activiteiten invoeren, subjectieve beleving naast de objectieve meting?
Speerpunt: Gebruikerseisen (taken).

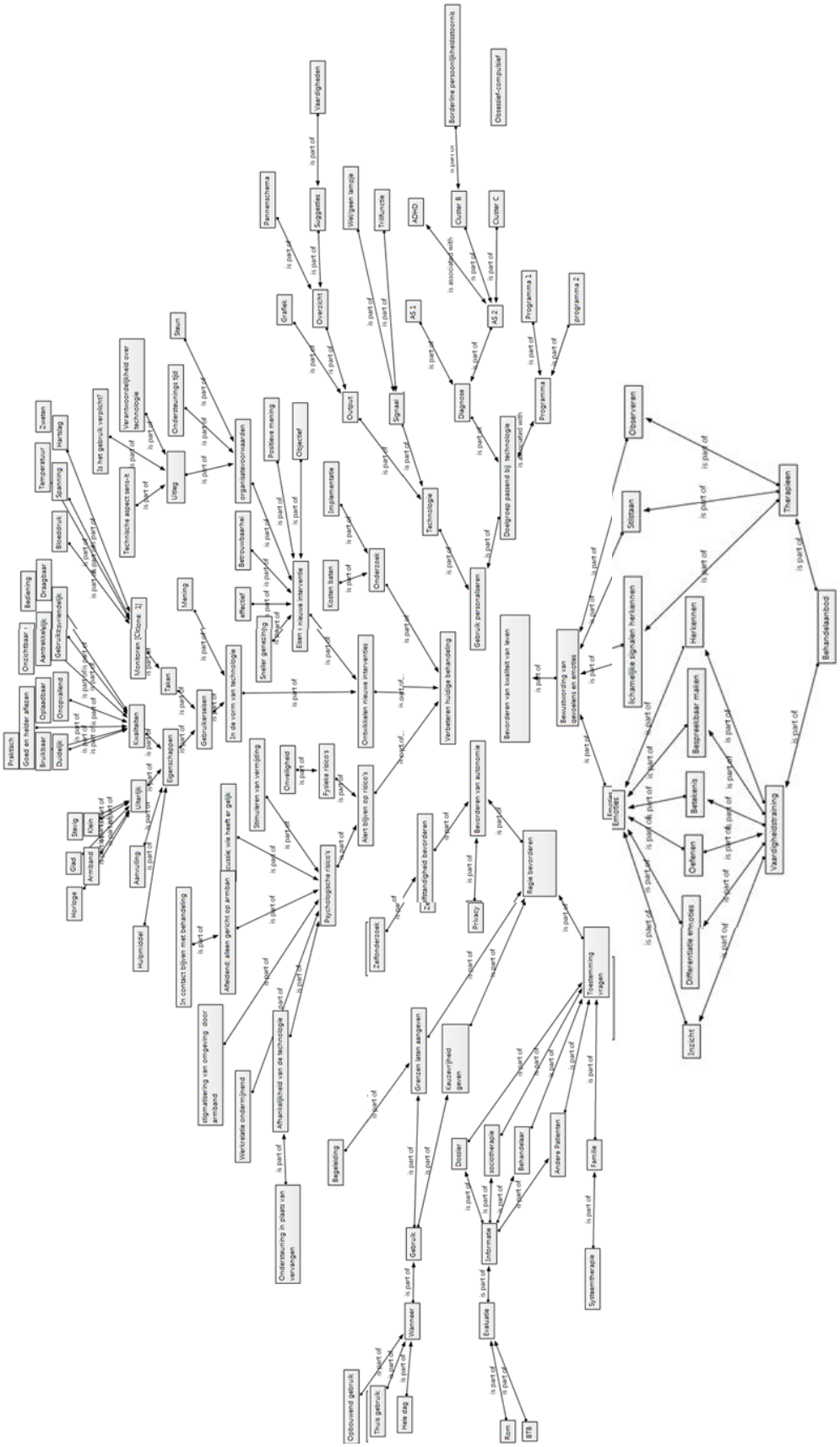
15. Welke vormen van feedback zijn volgens jou nodig zodat de patiënt zelfstandig met de Sens-IT! zou kunnen trainen?
Subvraag: Te denken valt aan monitoring, begeleiding, coaching, suggesties geven?
Speerpunt: Gebruikerseisen (taken)

16. Wat voor risico's zijn er volgens jou van toepassing van de Sens-IT! voor de patiënt en voor jou als behandelaar/begeleider?
Subvraag: Te denken valt aan privacy, afhankelijkheid, verkeerd gebruik van het apparaat?

Speerpunt: Gebruikerseisen (risico's).
17. Wat zou voor jou de reden kunnen zijn om niet met de Sens-IT! te gaan werken?
Subvraag: Wat is de belangrijkste uitsluitcriteria?

Speerpunt: Gebruikerseis (mening-)
18. Wat zou voor jou de reden kunnen zijn om wel met de Sens-IT! te gaan werken?
Subvraag: Wat is de belangrijkste insluitcriteria?
Speerpunt: Gebruikerseis (mening+)

Appendix 2. Network model factors resulting from study one (Dutch)



Appendix 2. Protocol for card sort technique (Dutch)

1 Introductie
Bedankt dat uw wil meedoen aan onderzoek omtrent de Sense-it. Doel van vandaag is om een beter beeld krijgen over hoe u de kaartjes die ik straks ga verspreiden op de tafel, samenbrengt en waarom u dat op deze manier doet. Dit zal belangrijke informatie opleveren voor ons onderzoek. Het onderzoek zal ongeveer een uur duren. Hierin ga ik u verschillende vragen stellen. Om een helder beeld te krijgen over de redenen waarom u de kaartjes op een bepaalde manier samenbrengt mag u hardop denken. Dit onderzoek wordt gefilmd zodat indien bij twijfel kan worden teruggekeken naar de beelden. Op deze film worden alleen uw handen en niet uw gezicht gefilmd. Na de analyse van de kaartjes worden deze bestanden zo spoedig mogelijk verwijderd. Alle informatie die verkregen wordt tijdens dit onderzoek is vertrouwelijk en wordt niet met derden gedeeld.

Heeft u nog vragen omtrent het onderzoek?

___2 Uitvoeren _____
Ik zal eerst voor u de kaartjes verspreiden op de tafel.
Actie; kaartjes verspreiden
De bedoeling is nu dat u mag beginnen met het sorteren van de kaartjes zodat u minder stapeltjes over houd. Hoeveel dit er zijn mag u zelf weten. Heeft u nog vragen over het sorteren?
Dan mag u beginnen.

<u>Eerste ronde card sort technique</u>
- Stapeltjes namen geven door te vragen;

Wat voor naam zal je aan dit stapeltje tekst geven?
Wat maakt dat je deze kaartjes samen heb gevoegd?
- Naam van groepen op een papiertje schrijven en deze naam **oranje markeren**. Vervolgens voeg je papiertje met markering toe (bovenop) aan het stapeltje door middel van een paperclip.

<u>Tweede ronde cart sort techniqe</u>
- Stapeltjes namen geven door te vragen;

Wat voor naam zal je aan dit stapeltje tekst geven?
Wat maakt dat je deze kaartjes samen heb gevoegd?
- Naam van groepen op een papiertje schrijven en deze naam **groen markeren**. Vervolgens voeg je papiertje met markering toe (bovenop) aan het stapeltje door middel van een paperclip.

<u>Eventuele derde ronde cart sort techniqe</u>
- Stapeltjes namen geven door te vragen;

Wat voor naam zal je aan dit stapeltje tekst geven?
Wat maakt dat je deze kaartjes samen heb gevoegd?
- Naam van groepen op een papiertje schrijven en deze naam **roze markeren**. Vervolgens voeg je papiertje met markering toe (bovenop) aan het stapeltje door middel van een paperclip.

__3 Afsluiting_____

Dit was het onderzoek. Wat vond u ervan? Wat vond u makkelijk gaan en/of moeilijk? Indien u nog vragen heeft kunt u die altijd stellen via e-mail of mij persoonlijk aanspreken.

Appendix 3. Factors before card sort technique with card numbers (Dutch)

1-Aantrekkelijk om te dragen
2-Aanvullend op bestaand behandelaanbod
3-Afhankelijkheid van de technologie
4-Afleidend; alleen gericht op armband
5-Alert blijven op risico's
6-Begeleiding ontvangen van organisatie
7-Behandelaar toegang geven tot data van patiënten
8-Bespreekbaar maken van emoties
9-Betekenis van emoties
10-Betrouwbaarheid van instrument
11-Bevorderen van autonomie
12-Bevorderen van kwaliteit van leven
13-Bewustwording van gevoelens en emoties
14-Bloeddruk meten
15-Bruikbaarheid van Sense-IT!
16-Differentiatie emoties
17-Discussie; wie heeft er gelijk
18-Doelgroep Cluster B
19-Doelgroep Cluster C
20-Doelgroep passend bij technologie
21-Draagbaar ontwerp
22-Duidelijk scherm
23-Eigenschappen van technologie
24-Eisen nieuwe interventie
25-Emoties sneller leren herkennen
26-Evaluatie van data van technologie
27-Familie toegang geven tot data van patiënt
28-Frequentie van gebruik technologie
29-Fysieke risico's van het apparaat
30-Gebruik personaliseren
31-Gebruik technologie stimuleren
32-Gebruik van technologie tijdens vaardigheidstraining
33-Gebruikerseisen
34-Gebruiksvriendelijk
35-Gebruiksvriendelijke bediending van apparaat
36-Gladde textuur
37-Goed en helder aflezen
38-Grafiek van data patiënt
39-Grenzen laten aangeven
40-Hartslag meten
41-Herkennen van emoties
42-Hulpmiddel in plaats van vervanging
43-Implementatie van interventie
44-In contact blijven met behandeling
45-Informatie in de vorm van technologie
46-Informatie over data in dossier
47-Inzicht
48-Is het gebruik verplicht?
49-Keuzevrijheid geven
50-Klein van formaat
51-Kosten baten
53-lichamelijke signalen herkennen
52-kwaliteiten vd Sense-IT!
54-Mening over de Sense-IT!
55-Monitoren van fysiologische reacties
56-Observeren van lichamelijke sensaties
57-Oefenen van emoties
58-Ondersteuning in plaats van vervangen
59-Onderzoek naar effectiviteit van technologie
60-Onopvallend
61-ontvangen van ondersteunings tijd voor technologie
62-Ontwikkelen nieuwe interventies
63-Onveiligheid
64-Onzichtbaar
65-Oplaadbaar
66-organisatievoorwaarden
67-Output in de vorm van data van technologie
68-Overzicht verkrijgen
69-Pannenschema
70-Patiënten toegang geven tot data van patiënten
71-Positieve mening over technologie
72-Praktisch in gebruik
73-Programma 1
74-programma 2
75-Psychologische risico's
76-Regie bevorderen
77-Rekening houden met privacy van patiënt
78-Sense-IT! gedragen om pols
79-Signaal van technologie
80-Sneller genezing
81-sociotherapie gebruiken bij inzetten interventie
82-Spanning meten
83-Steun ontvangen vanuit organisatie
84-Stevig materiaal
85-stigmatisering van omgeving door armband
86-Stilstaan door observeren
87-Stimuleren van vermijding
88-Suggesties voor inzetten van vaardigheden
89-Taken van technologie
90-Technische aspect sens-it
91-Technologie inzetten
92-Temperatuur meten
93-Therapieën gebruiken voor implementatie
94-Toestemming vragen aan patiënt voor gebruik van data
95Tril functie
96-Uiterlijk
97-Uitleg over gebruik technologie
98-Vaardigheden
99-Verantwoordelijkheid over technologie
100-Verbeteren huidige behandeling
101-Verminderen van zelfonderzoek
102-Wel/geen lampje
103-Werkrelatie ondermijnend
104-Zelfstandigheid bevorderen
105- Zweet

Appendix 4. Categories after standardizing (Dutch)

1. Doelgroep voor interventie
Doelgroep
Doelgroep
Doelgroep

2. Redenen om interventie niet te gebruiken
Niet mee eens
Absurd

3. Niet in te delen
Overig
Overig

4. Discussiepunten voor gebruik interventie
Overstijgende vragen
Discussiepunten
Discussiepunten
Discussiepunten
Aarzelingen bij inzetten van Sense-IT!

5. Implementatie van interventie
Hoe ga je ermee verder
Implementatie
Implementatie in behandeling

6. Hardware
Hardware
Direct gerelateerd aan apparaat

7. Risico's bij gebruik interventie
Valkuilen
Risicofactoren
Mogelijke risico's

8. Nodig vanuit de organisatie
Vanuit organisatie
Verantwoordelijkheden van organisatie

9. Technologie in behandeling
Gebruik van technologie in behandeling
Technologie in behandeling algemeen

10. Toegevoegde waarde van interventie aan behandeling
Waarde van Sense-IT!
Kwaliteiten van Sense-IT!
Toegevoegde waarde voor behandeling
Verbeteren huidige behandeling door
Waarom gebruiken binnen deze doelgroep

11. Effect
Effect van Sense-IT!
Basale functies, wat wordt er geleerd
Verwacht je als je emotionele awareness stimuleert

12. Doel
Emotieregulatie; wat wil je mensen leren
Wat kan patiënt leren
Doel van Sense-IT!; wat doen in behandeling

13. Algemene voorwaarden voor gebruik interventie door behandelaar
Bruikbaarheid en eisen vanuit de behandelaar

14. Algemene voorwaarden voor gebruik
Voorwaarden gebruik

15. Fysiologische parameters door interventie
Fysiologische reacties die gemeten moeten worden
Fysiologische parameters
Grove parameters
Wat Sense-IT! kan meten

16. Uiterlijke kenmerken hardware van interventie
Pragmatische eisen, uiterlijk
Fysieke kenmerken
Eigenschappen van Sense-IT!

17. Technische aspecten
Technische aspecten

18. Technologie
Technologie

19. Signaal
Signaal

20. Privacy
Privacy

21. Keuzevrijheid
Keuzevrijheid

22. Kernwaarden
Kernwaarden

23. Bijdrage van technologie aan behandeling
Bijdrage van technologie aan behandeling

24. Gebruiksvriendelijk
Gebruiksvriendelijk

Appendix 5. *Dendrogram using Centroid Linkage*