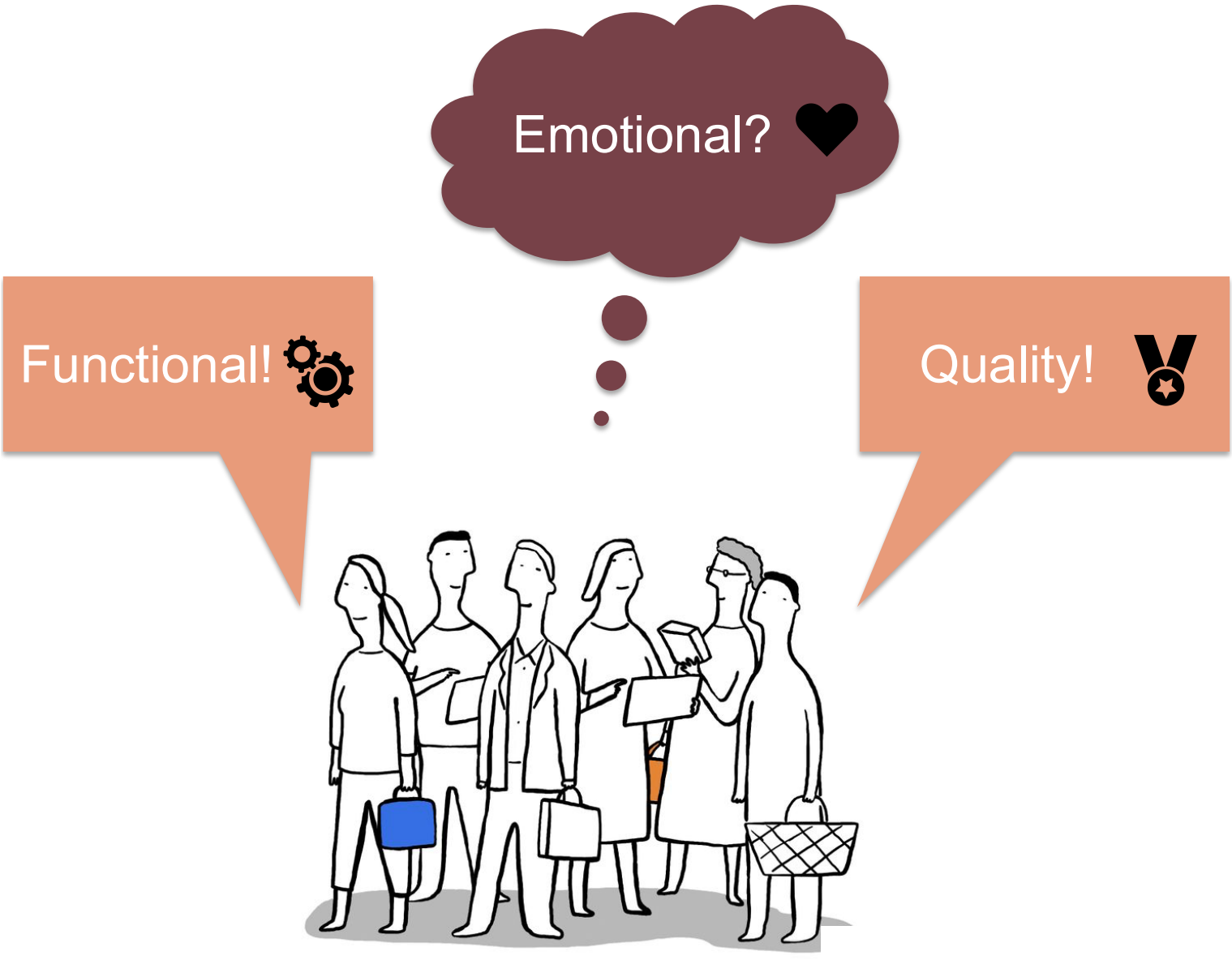
S. L. Bras

Creating the link between Schwartz' values and goals

Using a value system to define user goals for Goal-Oriented Requirement Engineering



TU Delft

THE UNIVERSITY OF MELBOURNE

Creating the link between Schwartz human values and goals

Using a value system to define user goals for Goal-Oriented Requirements Engineering for social applications

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Executive summary

By using Goal-Oriented Requirements Engineering (GORE), the goals of a user can be determined, which can help to select the right requirements for a product. According to the Emotional Goal Theory (EGT) an extra goal, called the emotional goal, should be added to the existing *functional* and *quality* goals of GORE. By enhancing the GORE with the EGT, the goals of users can be selected even better to understand the true wishes of the user, including his emotional wishes. The problem is however, that those goals can only be obtained in cost inefficient ways, like interviewing. Furthermore, there is no framework or systematic approach for selecting the right goals and therefore it is not an efficient method for a product designer. There is also not a clear theory about the drivers of the goals and how a user determines them. It is not completely clear yet why users have different goals. A reason for this might be that every user has different values and therefore thinks different aspects of life are important resulting in different goals. No link however has been made yet between these values and goals.

To solve these problems the objective of this study is to:

"Create a model that links the values of a user group to its goals for social applications based on the *Goal-Oriented Requirements Engineering* and *Emotional Goal Theory"*

And the corresponding research question is:

"To what extent can a model be created to link the values of a user group to its goals for social applications based on the Goal-oriented Requirements Engineering and Emotional Goal Theory?"

To answer the question, a number of steps had to be taken:

1. Get a better understanding of the GORE and EGT
2. Select the most suitable value system to identify the link
3. Define goal categories in order to make it possible to link values to different goals
4. Create the *value-goal model* and validate the model with a case study

Using the values to define a user's goals could be used to acquire more specified goals. When a product designer has to identify the goals and requirements by only a user study, the number of possible goals are countless. Using the values, however, could give the product designer a direction of preferred goals. The number of possible goals can be filtered by the value-goal model, giving the product designer a smaller amount of goals to use as input for the user study. This value-goal model will be a proof of concept and will thus demonstrate the feasibility of the idea to link values to goals.

GORE and EGT

In the Goal-Oriented Requirements Engineering approach, there is an important distinction between functional and non-functional requirements of the product. These are driven by respectively the functional goals and the quality goals, which are elicited by asking: "(1) what do you want to achieve (functional goals)?; and (2) how should it be achieved (quality

goals)?" (Miller et al., 2015). However, according to Miller et al. (2015) there is a third goal: the *emotional goal*, which could be obtained by asking: (3) how do you want to feel (emotional goals)? For example Instagram: a user wants to upload a picture to share with his or her friends (functional) and they want this to be easy and fast (quality). Next to this, they want to be engaged in the life of their friends and feel connected with them (emotional). The initial idea of Instagram fulfilled the functional and quality goal by making it possible to upload photos in an easy way, but the new features of Instagram also fulfil the emotional goals by adding the function of tagging and commenting on the picture (Miller et al., 2015).

The three goals are seen as drivers for the two requirements. The functional and quality goals are respectively the drivers to devise the functional and quality requirements. The emotional goal does not create a new class of requirements, but will be a driver to elicit new requirements, either functional of non-functional (Miller et al., 2015), as shown in Figure 1.

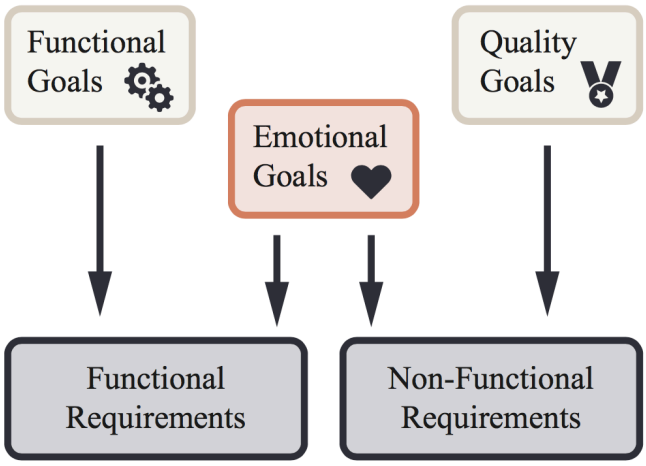


Figure I Model of goals as a driver for requirements according to GORE

Value system

Everyone has different values, they describe what people find important in life. In order to choose a value system, the four most common used value systems were compared, these are Values and Life Style (VALS), Rokeach Value Survey (RVS), Schwartz Value Survey (SVS) and List of Values (LOV), shown in Table I on the next page

Prior to the comparison of the value system, criteria were selected that defined the most suitable value system:

1. The value system should not be country specific and it should be possible to use it in various countries, so the value-goal model is applicable for many countries as well;
2. The value system must be used frequently, in order to have a high availability of data;
3. The value system must have a low number of values (preferable less than 15 values) in order to keep the complexity of the value-goal model at an intermediate level.

Value system	Advantages	Disadvantages	Classification	Criteria		
				1 Universal	**2** High availability	**3** Low number of values/types
VALS	Applicable for business marketing	• Demographic specific • Specific to the USA • Relatively not frequently used	Participant is classified in one category	×	✓	✓
RVS	• Well known • Frequently used • Applicable for all cultures • Includes external factors	• Empirical proof is missing for completeness of values • Too much values for a correspondent to remember • Values are measured in an ordinal scale instead of an interval scale and thus it is harder to compare values with each other. • Ranking instead of rating • Many values to link to goals	Participant ranks all 36 values	✓	✓	×
SVS	• Includes external factors • Frequently used • Applicable for all cultures • Only 10 values to remember	Values are measured in an ordinal scale instead of an interval scale thus it is harder to compare values with each other.	Participant rates all 10 values	✓	✓	✓
LOV	• More closely related to people's daily lives • Only 9 values to remember	• Focused on the individual himself • Ranking instead of rating	Participant ranks all 9 values	✓	×	✓

Table I Summary of the four different value systems

Since the SVS meets all three criteria and the other three value systems do not, the SVS is chosen as value system for the value-goal model.

Goal categorizing

The theory of Kietzmann (2011) about the functions of social media can be used to categorize the goals for the value-goal model: Show and keep your own identity (Identity), Have a conversation (Conversation), Share information (Sharing), Amuse yourself (Amusement), Show your reputation (Reputation) and Feel part of a group (Groups). The ten values of Schwartz are linked to these six goals. Literature shows a number of links are already found in empirical studies, but many links are not yet found. However, a number of links were made based on logic reasoning.

Model and validation

The links are used to create the value-goal model in Excel, which has the values of a user group as the input and has a list of most important goals of this user group as the output. The model is shown in Table II in which the links that are motivated in the literature are in between brackets

	Identity	Conversation	Sharing	Amusement	Reputation	Group
Tradition	+	[+]			[+]	+
Conformity		[-]			+	+
Security	+					+
Self-Direction	[+]					
Stimulation		+		+		
Hedonism				+		
Benevolence		+	[+]			+
Universalism		[+]	[+]			[+]
Power		[+]	+		+	+
Achievement			+		+	

Table II Summary of the links between Schwartz human values and the social application goals, in which the links that are motivated in the literature are in between brackets

In order to use the value-goal model, data about the values of a specific user group has to be available. A survey was found, called the European Social Survey (Europian Social Survey, n.d.), which is done in 20 European countries asking questions about different topics, including the human values of Schwartz, which can be very useful to select the exact user group. The average ranking of values can be used as input for the model. However when the user group has a different nationality than one of the 20 European countries, the data may not be valid. This was also the case for the emergency alarm case, which is used to validate the value-goal model. The emergency alarm case mapped the goals of elderly users that needed an emergency alarm. The information was obtained by interviewing people who lived in Melbourne, Australia. The cultural dimensions of Hofstede showed us that countries can be compared in terms of cultural dimensions. Therefore the data of a country that is surveyed in the European Social Survey, can be used for the value-goal model when the cultural dimensions of Hofstede of that country are similar to that of Australia.

Comparing the value-goal model with the Emergency alarm case

The emergency alarm case is an example to show the use of the value-goal model. Next to this, the emergency alarm case is used for evaluating the value-goal model as a proof of concept. If the value-goal model can show the same priority of goal categories as the goals that came up during the interviews in the emergency alarm case, the possible existence of the link between values and goals is shown and the feasibility of the value-goal model is shown as well.

Further research is necessary to compare the different goal ranking properly, but an attempt is made to compare the results. Qualitative comparison shows the goals are almost equally ranked, except for amusement and reputation, which are switched.

Quantitative comparison shows there is a bigger difference between the priorities of the goals. Since the differences between the rates of the goal categories based on the goal map

are small and the rates are defined based on an estimation (a number of goals seemed to belong to a goal category and this number defined the rate of the goal category) there is relatively big room for an error and therefore using this rate for validation is not possible. Next to this, the rates of the goal categories calculated in the value-goal model, are based on the links between the values and goals, which are not completely based on literature. Therefore you cannot say that based on Table 5.8 the value-goal model is valid or not.

Preface

The first three months of this thesis I worked at the University of Melbourne, which was a great opportunity. The university was beautiful, the city was amazing and Tim Miller was very helpful in both finding my way in Australia and guiding me in my thesis. In the first weeks we struggled a bit finding the right scope for my thesis, but with the feedback of Tim and my supervisors in the Netherlands, I was able to find an interesting and well-defined research objective.. It was interesting to work at a different university in a completely different country. In the Netherlands I mostly talk with students, mostly Dutch. In Melbourne I shared an office with a number of PhD's from all over the world. They all had different reasons and motivation to do a PhD in Melbourne and they explained a lot about their culture and traditions. We did a lot of fun things together including exploring the surroundings of Melbourne.

After the three months at the University of Melbourne I spend 2 months in Australia to travel around and get to know the rest of the country. Australia is so diverse and different and the people are lovely in every part of the country.

Back in the Netherlands it was time to start working again and to finish my thesis. Virginia Dignum and Martijn Warnier helped me a lot and gave useful advice what to do and what not to do.

I would like to express my gratitude to my graduation committee. I would like to thank Tim Miller for the support in Melbourne and for the countless number of brainstorm sessions how to scope my thesis and how to create the link between different concepts. Of course I would like to thank him as well for the amazing opportunity he gave me to come to Australia and let me work at an exceptional university, the University of Melbourne. This was an amazing opportunity and I could not thank him enough for this. I would also like to thank Virginia Dignum, for helping me to find a place to do my thesis abroad. Without her, I would probably have missed the opportunity to study abroad. Next to that, for making time for Skype conversations when I was in Melbourne, which was sometimes hard to schedule due to the time difference. Next to this, I would like to thank Martijn Warnier for guiding me while Virginia was in Australia and of course as well for making time for Skype conversations.

I would like to thank my friends back in Melbourne for making my time in Melbourne so much fun. And of course my friends and family here in the Netherlands, that gave me support during my thesis, did not let me forget home while I was in Melbourne and discussed different aspects of my thesis with me.

S. L. Bras

Delft, January 2017

Contents

1 Introduction

Whenever launching a product, the design of the product is a critical step; what are the functions, what does it look like and how does it work? These questions are essential in order to sell the right product to your potential customer and it is important to take the customers' opinion into consideration, as this relates to the use and satisfaction of the customer. There are different methods available for product design. One of these methods is the Requirements Engineering method (Tawbi & Souveyet, 1999). This method focuses on the requirements of a product and uses these requirements to design the product. Some researchers however argue it is hard to find the requirements when the underlying goals are not known, and therefore the Goal-Oriented Requirements Engineering (GORE) method was created (Yu & Mylopoulos, 1998). This method first identifies the users' goals and these goals are seen as drivers for the requirements and thus based on these goals the requirements are defined. Although the GORE method is helpful, they still do not always capture the exact wishes of the user. Even though the requirements of the users are used in the design process, often, the designers simply fulfil these requirements as they themselves would like it to be, instead of fulfilling the desires of the users, which lead to a failure of the product (Miller et al., 2015). Therefore, Miller argues that the GORE method should be improved and Miller suggests doing this by including emotional goals.

In the next section background information will be given, the problem statement will be described and the scope and relevance will be discussed. After this, section 1.2 will address the main research questions and the sub questions, followed by the research approach including the data collection in section 1.3. Section 1.4 will discuss the outline of the thesis.

1.1 Research problem

1.1.1 Goal-Oriented Requirements Engineering & Emotional Goal theory

When a company designs a product, it is important to know what the product should do and thus the designer should know the wishes of the potential users. This phase of the design process is called Requirements Engineering, which allows the designers to identify and document the requirements of the potential user (van Vliet & Brinkkemper, 2002). There has been a shift from the traditional Requirements Engineering to the Goal-Oriented Requirements Engineering (GORE) (Yu & Mylopoulos, 1998). By first identifying the goals of the user and the system, it is easier to define the requirements followed from these goals (Lapouchnian, 2005).

In the Goal-Oriented Requirements Engineering approach, there is an important distinction between functional and non-functional requirements of the product. These are driven by respectively the functional goals and the quality goals, which are elicited by asking: "(1) what do you want to achieve (*functional goals*)?; and (2) how should it be achieved (*quality goals*)?" (Miller et al., 2015). However, according to Miller et al. (2015) there is a third goal: the *emotional goal*, which could be obtained by asking: (3) how do you want to feel (*emotional goals*)? An example of Instagram will be given to explain the goals: a user wants to upload a picture to share with his or her friends (*functional*) and they want this to be easy and fast (*quality*). Next to this, they want to be engaged in the life of their friends and feel connected with them (*emotional*). The initial idea of Instagram fulfilled the functional and quality goal by making it possible to upload photos in an easy way, but the new features of Instagram also fulfilled the emotional goals by adding the function of tagging and commenting on the picture, which makes the user more connected to his or her friends (Miller et al., 2015).

The three goals are seen as drivers for the two requirements. The functional and quality goals are the drivers to devise the functional and quality requirements, respectively. The emotional goal does not create a new class of requirements, but will be a driver to elicit new requirements, either functional of non-functional (Miller et al., 2015), as shown in Figure 1.1.

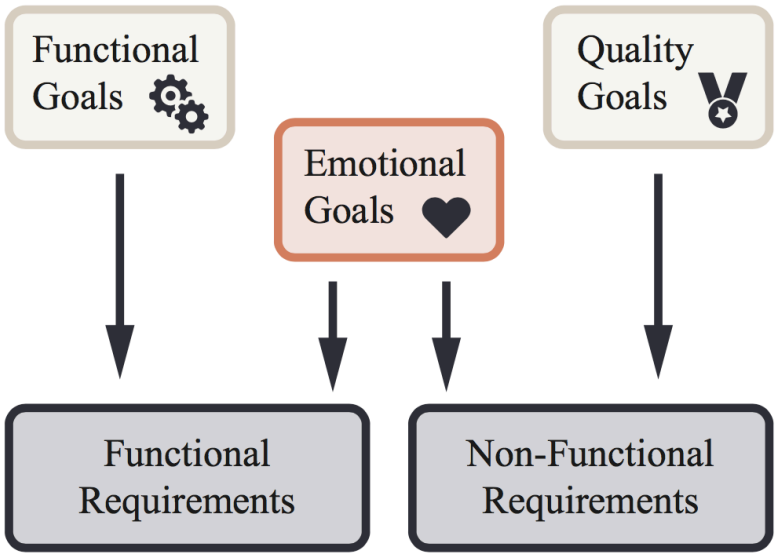


Figure 1.1 Model of goals as a driver for requirements according to GORE

Miller et al. (2015) argue that by enhancing the GORE method with the Emotional Goal Theory (EGT), which is the theory that argues adding the emotional goal is important, it might be possible to get a better understanding of the wishes of the users. There has already been a number of cases where the emotional goals are included in the GORE method by a group of researchers (Brown, 2016; Pedell, Sterling, & Keirnan, 2012), but the theory is still quite new and more research is necessary to support this theory, which can be seen as a knowledge gap.

The way a product designer identifies the right goals for GORE is explained in a number of studies (Chawla & Srivastava, 2012; Lamsweerde, 2001; Yu & Mylopoulos, 1998), but identifying goals when using GORE in combination with EGT is not as clear yet and a systematic approach to identify the different goals is missing. This is a knowledge gap.

When Miller et al (2015) identified the goals in various case studies, they performed interviews with the potential users. This is cost and time inefficient and there is a need for a tool that could narrow the possible goals for a user. If the product designer already knows what the priority of goals of the user group is, he could focus on these goals and the wishes of the user can be made more specific to start with. This enables the product designer to avoid the comprehensive process of getting a global idea of the wishes of the user. This could be seen as a knowledge gap as well.

1.1.2 Values

Not all people have exactly the same goals when using a product, because people are not unique. You could suppose that different factors influence the (functional, quality and emotional) goals of a person and therefore this study will look into these factors by using a classification for people. Different researchers have tried to characterize people based on different attributes, which resulted in different *types* of models. One characterizes people based on their personality traits (Foundation, n.d.; Furnham, 1996; Tupes & Christal, 1961), another on one's values (Rokeach, 1973; Schwartz, 1992) and yet another based on how happy they are (Desmet & Ruitenberg, 2012).

In order to define the scope for this study, there has been chosen to use a model that characterizes a person based on his *values*. This means that people are classified different if they have different values. Values are structured in a value system, which is a collection of the views and beliefs of a person (Kamakura & Novak, 1992). The reason for this decision is that this study will focus on characterizing a user group instead of individuals. The personality trait models and happiness model is often used to categorize an individual. An example of this is a personality trait model that characterizes a person to see how he performs in a group and what his role should be in a group (Furnham, 1996). The type of model based on values however categorizes groups and uses the average scores for a complete country (Europian Social Survey, n.d.; Schwartz, 2012). Since the value system focuses on classifying groups, while the other type focus more on classifying an individual, the value based type of model will be more suitable for this study.

People with certain values think different things in life are more important than others, compared to other people. One thinks it is important to have a close connection with your family or friends, another wants to feel successful and a third wants to be independent (Schwartz, 1992). This link is no found in literature yet and therefore the following model is proposed, in which one will have values and based on those values, one has certain wishes in life and therefore has certain goals (functional, quality and emotional). This is shown in Figure 1.2. The link between values and goals is not mentioned in literature yet and therefore this is a proposition to investigate further in this research.

The value system of a person will define his values (1) and his values will influence his goals (2). There might be other factors as well influencing the goals, but there has been chosen to only focus on the influence of the values on the goals, in order to avoid an expansion of the scope. This however will limit the validity of the model, since not all factors are taken into account. In order to know which product a product designer has to create, it is important to use these goals as input for the Goal-Oriented Requirements Engineering method (3) and design the exact product a user wants (4). If the designer did not perceive the goals of the user correct (2), he will make the wrong product and the product will not be accepted by the user. Using the value system can make the users' goals more accurate and thus increase the acceptance of the product.

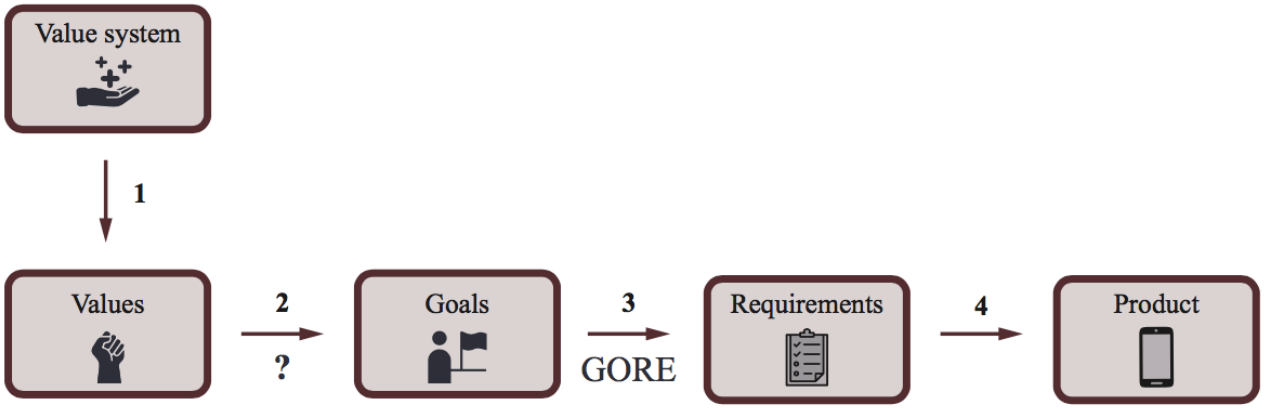


Figure 1.2 GORE enhanced with Emotional Goal theory

However, how these values will influence and define the user's goals (1 and 2) is not known yet and therefore considered a knowledge gap. This research will link values and goals in order to design a product more according to the wishes of the users.

There are many different theories about a person's value system, which is the set of values a person has. Arnold Mitchell introduced the Values and LifeStyles and tried to explain certain trends of users by illustrating people based on their attitudes, needs, wants and beliefs (Mitchell, 1983). Another well-known theory that is already used for many years is the value system of Rokeach (1973), in which he defined 18 terminal and 18 instrumental values (which are means of achieving the terminal values). According to Rokeach, each person has all 36 values, but every person ranks the values differently (Kamakura & Novak, 1992). Another system is the List of Values (Kahle, 1983), which only has 9 values and a fourth well-known value system is the system of human values of Schwartz (Schwartz, 1992), which uses a list of 10 values. In this thesis a critical analysis will be made in order to select the most applicable value system for the link between the values and goals. This is seen as a knowledge gap.

1.1.3 Knowledge gaps

As mentioned in previous sections different knowledge gaps have been found:

1. It is unclear to what extent EGT can enhance the GORE method
2. There is no systematic approach to find the right goals using GORE and EGT
3. The process of getting a global idea of the wishes of the potential users, is time and cost inefficient
4. It is unclear in what way values are linked to goals
5. It is unclear which value system is the most suitable one to link values to goals

This research will address these five knowledge gaps, but the focus of this research will be on the fourth knowledge gap. To fill this gap, the fifth knowledge gap also has to be answered. On top of that, the link between values and goals could give a more systematic approach to identify different goals and thus the second knowledge gap will also be answered. The link between values and goals will also provide a direction for the product designer to know what goals are important for the user group and therefore the third knowledge gap will also be answered. Filling the first knowledge gap is too big to address in this study due to time limits, but the link between the values and goals can show if these goals also include emotional goals. If so, this study shows the EGT can enhance the GORE method and a part of the first knowledge gap will be answered.

1.1.4 Problem statement

As described above GORE can help with finding the right requirements for a product, in order to design the product exactly as the user requires. By determining the goals first, the requirements can be selected more precisely and the chance of neglecting important requirements will be reduced. Enhancing GORE with EGT is promising, as the emotional aspects of the users are included, leading to a better understanding of the true wishes of the user and resulting in better fitted identified goals. When a designer understands the wishes, and therefore the goals of the user completely, he is able to design the exact product that the user wants.

Currently the goals (including the emotional ones) are obtained by talking with the users, for example via interviews (Miller et al., 2015). This is a cost inefficient and iterative process, since the interviewer will find interesting insights during the interviews, which have to be incorporated in the previous interviews as well (Bewley, 2002). Next to this, there is no framework or systematic approach for selecting the right goals and for these reasons this is not an efficient method for a product designer (Miller et al., 2015).

On top of that there is no clear theory about the drivers of goals and how these are determined by a user. It is not completely clear yet how these goals are determined by the user. An explanation for this might be that every user has different values and therefore thinks different things in life are important and thus have different goals. There is however no link yet made between these values and goals.

Therefore the problem statement is:

"Although enhancing the Goal-Oriented Requirements Engineering with the Emotional Goal Theory will increase the understanding of the wishes of the user by the product designer, there is no systematic approach to obtain those goals yet and neither are the factors known that influence those goals. A hypothesis is that one of those factors factor could be the values the user has, but there is no clear link yet made in literature."

Since goals can be very broad, a scope should be defined for this study. If the goals are too general, the links will be too general as well and thus not useful for a product designer, but if the goals are too specific, the link can only be used for one product. For this reason there has been chosen to focus on social applications. This means the framework is only suitable for software designers that want to create a product for social applications. Social applications are applications that supports group interaction (Shirky, 2003). This topic is small enough to obtain specific guidelines and still broad enough to use these links for more than just one application. It might be possible to use it for other products as well, but the validity is not guaranteed.

Another decision that has been made for this study is the fact that although there are many ways to design a product, the GORE method is chosen. As Miller uses the GORE method in combination with the EGT as basis as well, it is used in this research as basis for designing a product. The advantages and disadvantages of GORE and EGT are explained in chapter 2.

1.1.5 Relevance

Providing the link between values and goals will lead to economic benefits, because this link will provide a better focus for initial user studies and interviews, which will save money. This study offers a systematic approach to find goals of the users, which will make the GORE and EGT less vague and therefore easier to use. The link will also decrease the barrier of implementing the GORE and EGT methods for companies, allowing them to profit from the advantages of the EGT and GORE. Using GORE and EGT will enable the product designers to estimate the functional, quality and emotional goals of the users in a more precise way, which leads to improved software systems and content users. This is socially relevant as well, since the population will get products that better fit their needs.

The scientific relevance can be found in different elements. The first important element is that knowledge can be gained about how to link a value system with other goals and how to model these links. Second, a comparison will be made between the different value systems, which will show different aspects of the different value systems. Next to this, based on this study, further research could be done, for example in which extent a product can fulfil a user's goals.

1.2 Research objective and research questions

This section will discuss the research objective and deliverable in section 1.2.1, followed by the research question and sub questions in 1.2.2.

1.2.1 Research Objective & deliverable

To solve the aforementioned problem statement and fill the knowledge gaps, the research objective of this study will be:

"Create a model that links the values of a user group to its goals for social applications based on the *Goal-Oriented Requirements Engineering* and *Emotional Goal Theory"*

In order to make the links between values and goals more clear and interpretable and to make it easier to use the links for the product designers, a model can be made that has the values of a user group as input and has a list of most important goals of this user group as output, a so-called value-goal model. A value-goal model will be created during this research, which can determine which goals are the most important ones based on the values of a user group. Once the product designer knows the values of his user group, he can easily obtain their goals as well. Using the values to define a user's goals could be used to acquire more specified goals. When a product designer has to identify the goals and requirements by only a user study, the number of possible goals are countless. Using the values, however, could give the product designer a direction of preferred goals. The number of possible goals can be filtered by this link between values and goals, which gives the product designer a smaller amount of goals to use as input for the user study. This link can give the product designer a better focus for further research on the users. This is shown in Figure 1.3. The value-goal model will not substitute a complete user study, but will instead give the product designer a better focus for better research on the users. This value-goal model will be a proof of concept and will thus demonstrate the feasibility of the idea to link values to goals.

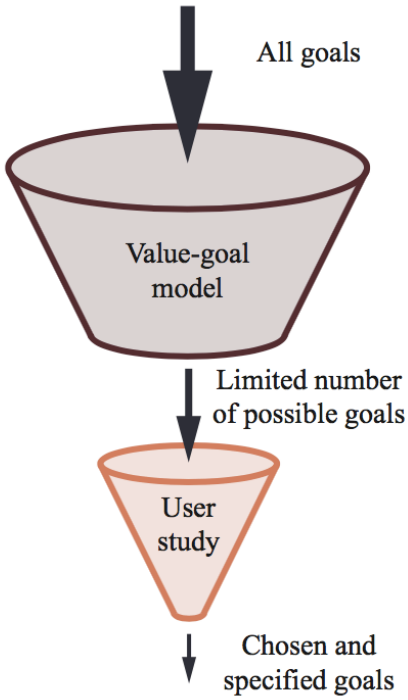


Figure 1.3 The use of the value-goal model as a filter before a user study

The deliverable will be a value-goal model that can be used by a product designer to get a better understanding of the goals of a user. The value-goal model will use the values of the user group to calculate how important every goal is.

1.2.2 Research question

Based on the problem statement and the research objective, a research question can be given:

"To what extent can a model be created to link the values of a user group to its goals for social applications based on the Goal-oriented Requirements Engineering and Emotional Goal Theory?"

The sub questions accompanying the main research question are:

1. *How could the Emotional Goal Theory enhance the Goal-Oriented Requirements Engineering method?*
   In order to get a better understanding of both theories, it is important to compare them and see in which way they are combined.

2. *What is the most suitable value system to define the user's values?*
   a. *Which value systems are most known and what do they look like?*
      A list of different possible systems will be described and the advantages and disadvantages of these systems will be discussed.
   b. *Which system is the most suitable one?*
      Based on the advantages and disadvantages, the most suitable system can be chosen.

3. *How are the values linked to the goals?*
   a. *Which goal categories can be used?*
      In order to make the value-goal model usable for multiple designs, the goals should be general enough to use the goals for other products as well. Yet, the goals should also be specific enough to be useful for social applications. Therefore categories of goals will be defined.
   b. *What are the links?*
      The links between the values and goals will be specified and made clear.

4. *What will the value-goal model look like?*
   The value-goal model will be created to show the link between the different systems and goals.
   a. *What does the value-goal model look like?*
      This will describe the conceptual value-goal model and also shows how this will be implemented.
   b. *How will the value-goal model be validated with the emergency alarm case?*
      The value-goal model will be validated with an Emergency alarm case in which the success of the EGT is showed. Comparing the results of the value-goal model with the results of the case study could show if creating a link between values and goals is a valid idea could validate the value-goal model. Next to this, it will be explained how to obtain the data necessary to use the emergency alarm case and how to use the value-goal model itself. These methods are executed and the results of the value-goal model are shown.
   c. *How do the results of the value-goal model compare to the results of the Emergency alarm case?*
      The results of the value-goal model will be compared with the goals of the emergency alarm case. This can show us if the value-goal model is valid.

1.3 Research approach

In this chapter the research method per sub question is described as well as the deliverable of each sub question. Figure 1.4 shows a visualization of the research approach, which will be explained below.

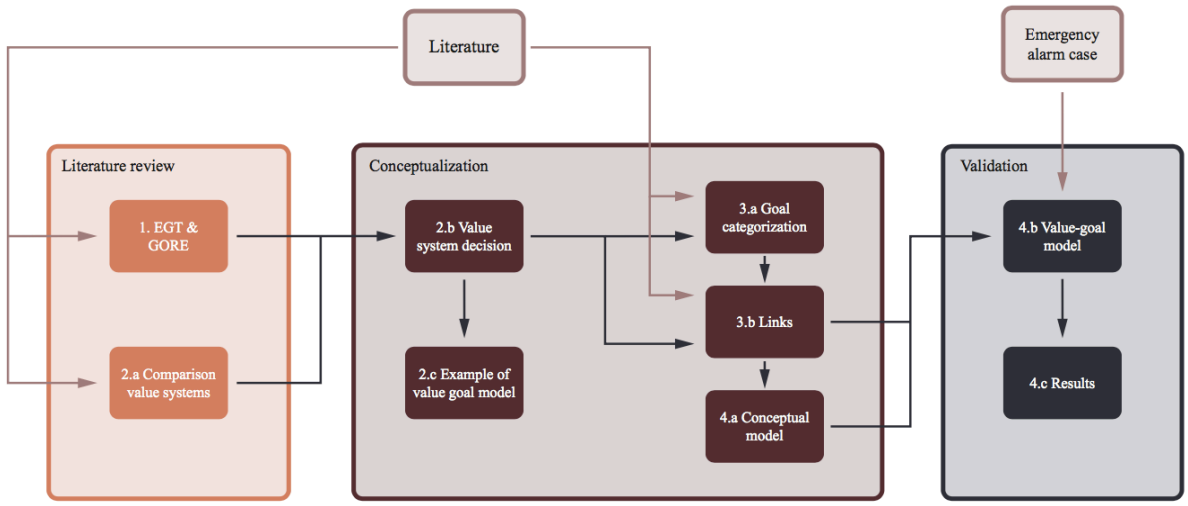


Figure 1.4 Research approach

The sub questions will be researched as follows:

1. *How could the Emotional Goal Theory enhance the Goal-Oriented Requirements Engineering method?*

   A great number of studies can be found on Goal-Oriented Requirements Engineering and this will be used to get insights of the method and the basic steps. This will be followed by a explaining the different concepts of Emotional Goal theory based on literature. Next to this, the advantages and disadvantages of both theories will be discussed.

2. *What is the suitable value system to define the user's values?*
   a. *Which value systems are most known and what do they look like?*

      Since there are many value systems, one of these should be chosen. First the most common value systems should be gathered in order to be sure data can be found of people and the data of their values. Hereafter, the most common value systems have to be compared. Both can be done by a literature study; the systems named in the literature most frequently are also the best known and literature can also describe the different value systems including their advantages and disadvantages. A problem could be that a very suitable value system is less known and thus will not be selected. A solution for this is that the criteria set up below, will not only select a well-known and accepted value system, but also takes the suitability into account.

   b. *Which system is the most suitable one?*

In order to use a value system for the value-goal model, one value system should be selected, based on the comparison made in sub research question 2.b. The most suitable one will be:

i. The value system should not be country specific and it should be possible to use it in various countries, so the value-goal model is applicable for many countries as well;
ii. The value system must be used frequently, in order to have a high availability of data;
iii. The value system must have a low number of values (preferable less than 15 values) in order to keep the complexity of the value-goal model at an intermediate level.

3. *How are the values linked to the goals?*

   a. *Which goal categories can be used?*

      Literature will be used to find different goals or functions of social applications. This set of goals should be as complete and exclusive as possible to increase the quality and thus the usability of the value-goal model. Different literature is written about the goals of social media and a choice has to be made. This will be done based on the arguments discussed in the literature and by asking experts. It might be difficult to find literature that reflects the right goals for social applications and maybe different literature should be combined to define the appropriate goal categories for the value-goal model.

   b. *What are the links?*

      There is no research available yet about the link between values and goals and therefore this will be the main focus of this research as explained. However, there has been done research on the relation between values and goals in less specific words: there is not a paper that mentions specifically values and (social application) goals together, but there has been a link made between the fact that for example someone who has *value x* ranked as a high value, wants to achieve *goal y*. A more concrete example is: someone who has *universalism* ranked as a high value, wants to share their thoughts about life and the world with others and therefore prioritize the goal *sharing as high*. It is also possible that a link can be made by common sense, even though this link has not yet been researched and thus cannot be found in literature. As long as these thoughts are correctly motivated, these can also be included in the value-goal model. For example the link that someone who wants to have much power, also thinks it is important to update his relatives often about his life and thus has the goal *sharing* as a high priority. Since it is not certain all the links included in the model are existing, this value-goal model could be seen as a proof of concept, which demonstrates the feasibility of the idea to link values to goals. Validating these links could be done by asking others to do the same thing and see if the result is the same. Another possibility is to survey different participants and ask them about their values and their goals when using social applications. The results can be used to find the links between values and

goals and correct the proof of concept and thus the links discussed in this study.

4. *What will the value-goal model look like?*
    a. *What does the value-goal model look like?*

        The answer to this question will be a description of the conceptual model of the value-goal model. Since calculating the ranking of the goals based on the ranking of the values is not complicated, a simple model will satisfy. Therefore the decision has been made to use the program Excel to implement the value-goal model. Excel is an easy program to understand for others as well, including the product designers and thus in most cases no education is necessary for somebody to use the value-goal model. Next to this, since this value-goal model will be a proof of concepts and changes might be needed, it is simple for somebody to alter the model. A disadvantage could be that Excel has the image of simple and that it is difficult to implement more complex concepts in Excel. However, many companies use Excel for analysis, including more complex issues (Bodnick, 2014; Sathian, 2013).

    b. *How will the value-goal model be validated with the emergency alarm case?*

        An emergency alarm case is already used as a case study to evaluate the Emotional Goal Theory by Miller et al. (2015) and Pedell, Sterling, & Keirnan (2012) and therefore this case will also be used for this study to validate the value-goal model. The emergency alarm system allows Australian elderly to raise an alarm when something happens and they have to "check in" every day to show that they are well. Pedell et al. (2012) created a *goal map* including the functional, quality and emotional goals prior and after interviews with users. Therefore, this case study can be used to review the model. If the value-goal model shows the same priority of goals as the goal map, the value-goal model could be credible. One inconsistency between the goal map and value-goal model is the fact that the goal map shows different goals than the goal categories of the value-goal model explained in sub question 3.a. Hence, the goals of the emergency alarm case should be classified in the categories of the value-goal model. Another inconsistency is the fact that the function of the value-goal model is to prioritize the goals, but the emergency alarm case however does not include the importance of the goals. Therefore, the number of goals classified to a goal category will represent the priority of this goal category. The more goals are connected to a goal category, the more important this goal category is. Since the value-goal model will give a ranking of the goal categories, these two results can then be compared. The information about the case study will not be used or read before the value-goal model is finalized. If the case study is read prior to the creation of the value-goal model and therefore the goals that have been identified in the case study are known, type of goals that should be included in the value-goal model will be already known, which will affect the validity of the value-goal model.

        During the literature study of this thesis, a European Social Survey (Europian Social Survey, n.d.) is found, which contains information including social demographic information, gender, age and income and the values of the

participants of twenty European countries. This survey can be used to select the right user group to obtain the right values, which will be the input for the value-goal model. The documentation describes the preparation for the data and the syntax to calculate the right values out of the answers of the survey. A problem is that the ESS is only been done in European countries, while the case study has a user group coming from Australia. Since these countries are both Western countries, the value ranking might be similar. The cultural dimensions of Hofstede do compare cultures and therefore this can be used to check which country of the ESS is most similar to Australia.

c. *How are the results of the value-goal model compared to the results of the Emergency alarm case?*

   The results of the value-goal model will be compared with the goals of the emergency alarm case. This can show us if the link between values and goals could exist. A limitation for this study could be that the Emergency alarm case does not include the goal categories, but specific goals, which makes it more difficult to compare the priorities of the goals.

1.4 Structure

The structure of this study will be described in this section and is also shown in Figure 1.5 .

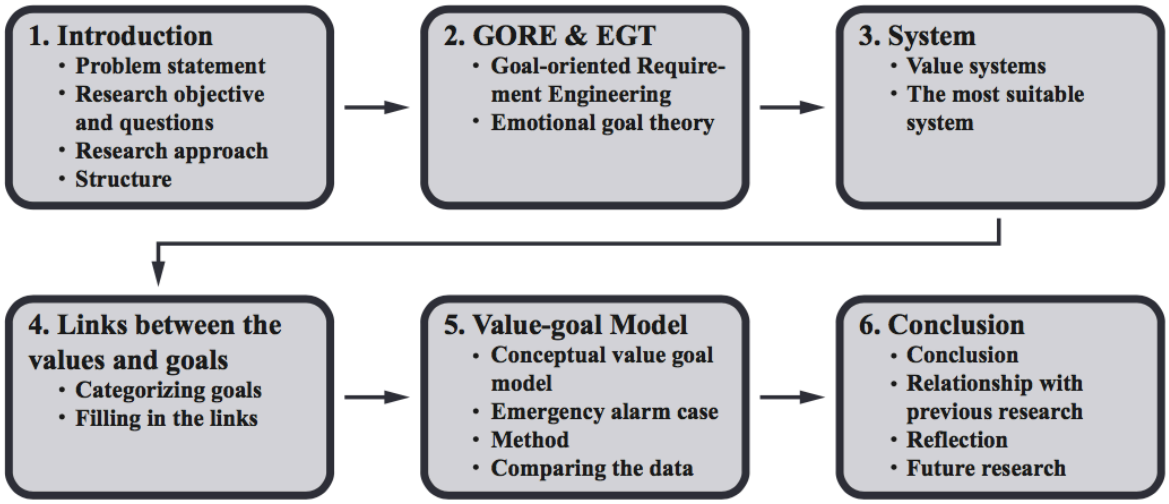


Figure 1.5 Outline of study

This first chapter was the introduction of this study and stated the problem, the research objective and the questions. This will be followed by a theoretical review of the GORE and the EGT, explaining how they can be combined in chapter 2, which will answer the first research sub question. Chapter 3 will answer the second research sub question by describing different value systems and discuss their advantages and disadvantages. Based on this comparison the most suitable system will be chosen and an example of the link between this value system and possible goals will be explained in order to give a better understanding of the model. The third research question will be answered in chapter 4 by categorizing the different goals and creating the link between the values and the goal categories. Chapter 5 will discuss the value-goal model in order to answer research sub question 4, by first

describing the conceptual value-goal model, second the emergency alarm case, third the method to use the value-goal model for the emergency alarm case, fourth the execution of the method and at last the comparison of the data. The conclusion, relationship with previous research, reflection and future research will be discussed in chapter 6.

2
GORE and EGT

Due to the fact that Miller & Pedell et al. (2015; 2012) use Goal-oriented Requirement Engineering in combination with Emotional Goal Theory, these theories are also used in this study. Therefore this will be seen as a fact. Nevertheless, next to the definition and explanation of these theories, the different theories will be criticized.

2.1 (Goal-Oriented) Requirements Engineering

Goal-Oriented Requirements Engineering (GORE) is a specialization of Requirements Engineering and therefore first Requirements Engineering will be explained, followed by an explanation of GORE.

2.1.1 Requirements Engineering

This is the phase in which the wishes of the users and other stakeholders are identified and documented. This is a constructive process in which it is not yet the question of how these requirements will be executed, but only the question of what these requirements are. In Requirements Engineering there are three phases (Nuseibeh & Easterbrook, 2000):

1. Requirements elicitations, which focus on understanding the problem, by describing the situation by making an explicit model, which contains all the relevant information of the situation;
2. Requirement specification, which focus on writing down the requirements, to make it easier to communicate with the stakeholders and designers;
3. Requirement validation and verification, which focus on making an agreement between the parties that the correct requirements are established (validation) and that they are written down in the right way (verification).

Criticism of Requirement Engineering is (Roman, 1985) that an often made mistake is the lack of precision, which results in a requirement that is too vague to fulfil and it will be hard to guess what the designer wants exactly. Next to this, if the requirement is too ambiguous, which makes it possible that several realizations will meet the requirement, while only one realization was wanted. Next to this, it is hard to reach completeness and consistency, because you will never know if you included all possible requirements.

2.1.2 Goal-oriented Requirements Engineering

With GORE the goals are defined for the different users and based on those goals, the requirements will be established. Although Requirements Engineering was increasing in popularity, there were some criticisms (Lamsweerde, 2001) and therefore Goal-Oriented Requirements Engineering was introduced.

Firstly, according to Lamsweerde (2001) and Roman (1985) it was difficult to achieve completeness when formulating requirements and therefore Lamsweerde goals can help to reach sufficient completeness of a requirement specification. If all goals are achieved, the set of requirement is specific and complete. In this way, since every requirement is linked to a specific goal, you will only choose the requirements that are necessary according to the goals and not the irrelevant requirements.

Second, refining goals gives a clear structure for complex requirements as well and this makes it easier to communicate the goals to stakeholders, because it is simpler to understand the goals. Due to the fact that communication will improve with a structured goal list, there will be fewer conflicts due to multiple viewpoints (Lamsweerde, 2001).

These are all reasons why the GORE method should be used. A deficiency of the GORE method is that it still does not create the perfect product and not all wishes of the users are taken into account. Therefore the EGT should be introduced.

2.2 Emotional Goal theory

Norman (2004) argues that emotions are important for product design in general and argues that designers should explicitly address them as part of the design process. As described in section 1.1.2, Miller et al. (2015) agrees with this and uses Normans theory to enhance the Goal-Oriented Requirements Engineering method. First Norman's theory will be explained. However, Norman's theory is very different from GORE. According to Norman there are three different aspects of evaluation of the product by the user (Norman, 2004):

- Visceral design: the appearance of the product. These will be fast, rapid, negative or positive judgments about the product. The user will have an automatic reaction on the product, based on the looks of the product, such as the colour or style.

- Behavioural design: the pleasure and effectiveness of use. The user will have experiences with the product related to function, performance, and usability.

- Reflective design: the rationalization and intellectualization of a product. The user will interpret, understand and reason about the product and have certain feelings, emotions and cognitions for the product. This aspect is influenced the most by culture, experience, education, and individual differences. (Norman, 2004, p. 38).

Based on Norman's theory Miller et al. (2015) argue that these aspects can be linked to Requirements Engineering: the behavioural level is mostly focussing on the functional and quality goals, whereas the reflective level is mostly focussing on the emotional desires or emotional goals.

In order to make a clear visual model of the different goals and to show how the goals relate to each other, Millet et al. (2015) propose a motivational *goal map* with a similar notation as Sterling and Taveter (2009) to map the functional, quality and emotional goals and roles.

The definitions of the different aspects are as follow:

- *Functional goals* "are based on motives, and describe an intended state of the environment. Functional goals can consist of sub-goals" (Miller et al., 2015, p. 58).

- *Quality goal*s "are non-functional goals (sometimes referred to as soft goals). Quality goals are attached to functional goals, capturing that the functional goal should be achieved while maintaining the quality" (Miller et al., 2015, p. 56).

- *Emotional goal*s "are non-functional goals that describe a desired reflective-level emotion of a role. An *emotion* is a feeling that characterises a state of mind. Examples of emotions include feeling joy, terror, safe, empowered, or normal" (Miller et al., 2015, p. 59).

- *Roles* are positions that achieve goals. Normally they are human, but they can also be artificial. A role has one or more responsibilities.

By enhancing the Goal-Oriented Requirements Engineering with the Emotional Goal Theory, the advantages of the GORE can still be used, e.g. requirements can be more specific, the set of requirements is more complete and communication to the different stakeholders is easier. The advantage of using GORE is also that software engineers would understand this goal map and thus understand why they implement specific functions, instead of getting vague terms and interviews with the users. This way, software engineers can be more involved in the design, which could result in a better compliance between the design and the implementation. By enhancing the GORE with the EGT, the set of goals are more complete and the underlying thought of the functional and quality goals is captured.

In order to know the goals of the users, the next chapter will analyse the values of users, which could influence the goals of users.

3 Value systems

Now the theory behind the Gore-Oriented Requirements Engineering and the Emotional Goal theory is clear, the right value system has to be chosen to represent the values that will influence the goals of the user. A number of researchers have tried to set up a value system in order to describe a person based on his values. In section 3.1 a comparison of the different value systems will be made and their advantages and disadvantages will be discussed. Section 3.2 will choose the most suitable value system and section 3.3 will give an example of the possible link to give a better understanding of the value-goal model.

3.1 Values

Everyone has different values, which describe what one thinks is important in life. There are many different definitions for the concept of value and therefore Schwartz and Bilsky (1987) have a description of five commonalities among different value systems, which are generally accepted:

- Values are concepts;
- Values refer to a desirable end-states of existence;
- Values are abstract goals and thus surpass specific actions and situations;
- Values help to make decisions for certain behaviour;
- Values have a ranking.

These commonalities are used and complemented by many researchers the past years. For example, Oppenhuisen (2000) added that values are culture dependent, early acquired and stable over time. Values are structured in a value system, which is a collection of the views and beliefs of a person, which refers to the desirable behaviour and lifestyle of that person(Kamakura & Novak, 1992).

There are many applications for values, for example to predict mass media usage. Becker and Conner (1981) found that there is a relation between the values and the media usage of a person. “Heavy television viewers have more traditionally religious value systems, less concern for achievement and success; and more concern with developing satisfying interpersonal relationships. Heavy magazine readers, on the other hand, appear to be almost the mirror image of heavy television viewers. Heavy newspaper readers share values with each of the other groups but are most similar to the heavy magazine readers. The authors suggest that, although media usage is also related to demographics and particularly education, values are much more of a causal factor than education” (Beatty, Kahle, Homer, & Misra, 1985, p. 183).

In order to choose which value system is the most suitable for the value-goal model, four different value systems will be compared. As mentioned before, there is a range of different

value systems and therefore the four most well-known value system that are compared with each other in other literature as well, are used to compare (Kamakura & Novak, 1992; Ladhari, Pons, Bressolles, & Zins, 2011; McIntyre, Reid, & David, 1994; Novak & MacEvoy, 1990). Using well-known and common-used value systems was important, because data has to be available for a large group of people in order to obtain the values for the user group of the product. The four value systems are:

- Values And Life Style (VALS)
- Rokeach Value Survey (RVS)
- Schwartz Value Survey (SVS)
- List Of Values (LOV)

As described in section 1.3, criteria were selected that defined the most suitable value system:

1. The value system should not be country specific and it should be possible to use it in various countries, so the value-goal model is applicable for many countries as well;
2. The value system must be used frequently, in order to have a high availability of data;
3. The value system must have a low number of values (preferable less than 15 values) in order to keep the complexity of the value-goal model at an intermediate level.

The four value systems are compared, which included an explanation of the systems, a description of the advantages and disadvantages and control to which extent the value systems met the criteria, described in section 3.1.1 until 3.1.4. A summary of this comparison is shown in a table in 3.1.5.

3.1.1 Values and Life Style

In 1978 the SRI International, an American non-profit research institute, announced a new system for value and lifestyles, originally introduced by Arnold Mitchell (founder of SRI International). Later, they improved the system and upgraded it to VALS2. Both systems tried to explain certain trends of users by illustrating people based on their attitudes, needs, wants and beliefs (Mitchell, 1983). The first system, VALS, introduces nine different lifestyles or types, which are divided in 4 different groups:

1. Need-driven groups
    a. Survivor lifestyle
    b. Sustainer lifestyle
2. Outer-directed groups
    a. Belongers lifestyle
    b. Emulator lifestyle
    c. Achiever lifestyle
3. Inner-directed groups
    a. I-am-me lifestyle
    b. Experiential lifestyle
    c. Societally conscious lifestyle
4. Combined outer- and inner-directed group
    a. Integrated lifestyle

The VALS typology is hierarchical. The need-driven groups are desperate and very poor and thus they are only focused on surviving, while the last group (the Integrated ones) has put it all together, “they are fully mature in a psychological sense – able to see many sides of an

issue, able to lead if necessary, and willing to take a secondary role if that is appropriate" (Gilman, 1983).

The advantage of VALS1 is that this method can help the product designer people to categorize a population based on attitudinal and demographical questions and thus has a clearer view of the different user groups. However, the SRI themselves criticized VALS1 based on the fact that it emphasized too much on the activities and interests and they realized this typology was not applicable for businesses. For that reason they introduced a second system: VALS2, which is more focussed on the psychological thoughts of people, such as their attitudes and values. The VALS2 shows "how a person will express himself or herself in the marketplace as a consumer" (Strategic Business Insights, n.d.). The VALS2 typology divides people into 8 typologies on two dimensions (Shih, 1986):

1. Primary motivation: which driver motivates one. There are three different drivers: ideals, achievement and self-expression.
2. Resources: to what extent has one the resources to pursue their needs and wishes, containing income, age and education, as well as capabilities, such as leadership, intellectualism, and energy.

With VALS2, you can obtain the values, attitudes and lifestyle of your user group and you can understand what your consumer is thinking and therefore also know what kind of product will attract him (Bhasin, 2016). Opponents of this system say that this survey "relies heavily on demographic variables and does not relate to consumer behaviours as closely as do their systems, such as LOV" (Kahle & Kennedy, 1988, p. 5). This system is made to characterize the people from the United States and because of the demographically questions it is less useful for customers from other countries. For example, a question about the political situation have different implications in Europe and in the United States (Kahle & Kennedy, 1988). Another example is a question about the bible that might be less relevant for countries where the Koran is heavily supported.

3.1.2 Rokeach Value Survey

In contrast to VALS1 and 2, the other three value systems do not categorize people in different types, but state that a person has all values with a certain ranking or rating. Where VALS1 and 2 already put a person in a box based on certain characteristic, the other three value system do not draw conclusions based on these values, but simply enables the researcher to obtain the different value ranking/rating. It is up to the researcher what to do with these ranking/rating, including the possibility to categorize the people based on this ranking/rating. Rokeach was one of the first to investigate the values of a person and therefore will be discussed first.

Rokeach wrote a book titled *The Nature of Human Values* in 1973 in which he described his Value survey. In this book he defines a value as follows (1973, p. 5):

"A value is an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence."

This definition corresponds to most of the commonalities discussed before. Rokeach adds the fact that a value should be the converse of another end-state of existence. He proposes the

Rokeach Value Survey (RVS) in order to identify the different value systems of individuals. The RVS consists of 18 terminal values and 18 instrumental values (Table 3.1) and the participants are asked to rank the eighteen terminal followed by the eighteen instrumental values, so only one goal can be the most important one. Terminal values are the desirable end-states of existence, thus the goals that we would like to achieve during our lifetime. Instrumental vales are the preferable modes of behaviour to achieve the desirable end-states, which can be seen as a means to an end and are likely to describe a person's personality and way of living (Rokeach, 1973).

Terminal Values	Instrumental values
True Friendship	Cheerfulness
Mature Love	Ambition
Self-Respect	Love
Happiness	Cleanliness
Inner Harmony	Self-Control
Equality	Capability
Freedom	Courage
Pleasure	Politeness
Social Recognition	Honesty
Wisdom	Imagination
Salvation	Independence
Family Security	Intellect
National Security	Broad-Mindedness
A Sense of Accomplishment	Logic
A World of Beauty	Obedience
A World at Peace	Helpfulness
A Comfortable Life	Responsibility
An Exciting Life	Forgiveness

Table 3.1 The 36 values of RVS (Rokeach, 1973)

The RVS is a widely used instrument to identify people. It is well known and frequently used and therefore a large amount of data is available for further research. The RVS is also applicable for all cultures, since the values are not country specific. Next to this, the RVS includes besides individual values, external factors as well, such as a world at peace, national security and a world of beauty.

There are however some critics. According to many researchers including Braithwaite and Law (1985), there is a lack of empirical proof that these 36 values are the most important one and so completeness cannot be guaranteed. Braithwaite and Law (1985) argue that values for physical well-being, individual rights, biological drives and carelessness should be added.

According to Kahle & Kennedy (1988) the RVS has too many values for the respondents to remember all the values in their short term-memory, which makes it harder for the respondents to rank them. Next to that, Clawson and Vinson (1978) argue that by using a rank to prioritize the values, the data obtained is less informative than using an interval scale.

A ranking does show what value is more important, but does not show how much more important than another value. Therefore less information can be obtained by using a ranking.

3.1.3 Schwartz Value Survey

Bilsky and Schwartz (1994) based the Schwartz Value survey on the RVS, but adjusted the survey according to their criticism. They said there were three universal requirements: need of individuals as biological organisms, the need of coordinated social integration and the survival and welfare of groups. Based on these universal requirements Schwartz created a value system containing 10 basic values shown in Table 3.2 with two dimensions: openness to change versus conservation and self-transcendence versus self-enhancements.

Dimension	Value	Definition
Openness to change	Self-direction	Independent thought and action-choosing, creating, exploring
	Stimulation	Excitement, novelty, and challenge in life
Conservation	Security	Safety, harmony, and stability of society, of relationships, and of self
	Tradition	Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion impose on the self
	Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms
Self-transcendence	Benevolence	Preservation and enhancement of the welfare of people with who one is in frequent personal contact;
	Universalism	Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature
Self-enhancement	Hedonism	Pleasure or sensuous gratification for oneself
	Achievement	Personal success through demonstrating competence according to social standards
	Power	Social status and prestige, control or dominance over people and resources

Table 3.2 The 10 basic values according to Bilsky & Schwartz (1994)

Although the Schwartz Value Survey (Bilsky & Schwartz, 1994) is based on the RVS, there are some differences, such as the distinction of Rokeach between end values and instrumental values (Hitlin & Piliavin, 2004). Schwartz did not include this in his value system, because he could not find enough empirical evidence for the existence of this distinction (Gorgievski et al., 2006). Another difference is the disagreement about the hierarchy of values (Bilsky & Schwartz, 1994; Debats, 1996). Rokeach argues that values are always hierarchic and that an individual can always choose which value is more important for him, while Schwartz says an individual can think two values are equal important to him. For this reason the participant of the SVS has to rate the values and can therefore also choose to equally rate two values, while the participant of the RVS can only give one value a certain ranking and even when to values are equally important to him, he still has to choose(Kamakura & Novak, 1992).

Like the RVS, the SVS is also well known and it is frequently used and therefore a large amount of data is available for further research. The SVS is also applicable for all cultures, since the values are not country specific. The SVS is not only focused internally on the

individual, but externally as well, like the RVS, which means he also takes the environment, like *conformity*, *benevolence* and *Universalism*.

3.1.4 List of Values

Just like Schwartz, Kahle (1983) did not agree with Rokeach as well and thus created his own system: the List of Values. This list contained nine values conducted from Rokeach Value Survey, Maslow's hierarchy of values, and various other studies. The nine values are:

1. Self-respect
2. Security
3. Warm relationship
4. Sense of accomplishment
5. Self-fulfilment
6. Sense of belonging
7. Well respected
8. Enjoy of life
9. Excitement

Although both Schwartz (1992) and Kahle (1983) criticized the RVS and created a new model based on the RVS, the value systems are still different. The values from the List of Values by Kahle are "more closely related to people's daily lives than RVS. For example, most people rank highly the RVS value of "world peace," but few people take active steps in any given day to reflect that value, especially in their consumer roles." (Kahle & Kennedy, 1988). Next to this, it is easier to administer the LOV because it has fewer values. In this way, it is easier for the respondent to remember all values and rank them after know them all.

The difference between the LOV and SVS are that the SVS is that the SVS is more externally focused while the LOV is only focused on the individual itself.

3.1.5 Summary

The four value systems are summarized in Table 3.3 on the next page, which include the advantages and disadvantages, the way of classifying the values, and which shows which criterion is met by the value systems.

Value system	Advantages	Disadvantages	Classification	Criteria		
				1 Universal	**2** High availability	**3** Low number of values/types
VALS	Applicable for business marketing	• Demographic specific • Specific to the USA • Relatively not frequently used	Participant is classified in one category	×	✓	✓
RVS	• Well known • Frequently used • Applicable for all cultures • Includes external factors	• Empirical proof is missing for completeness of values • Too much values for a correspondent to remember • Values are measured in an ordinal scale instead of an interval scale and thus it is harder to compare values with each other. • Ranking instead of rating • Many values to link to goals	Participant ranks all 36 values	✓	✓	×
SVS	• Includes external factors • Frequently used • Applicable for all cultures • Only 10 values to remember	Values are measured in an ordinal scale instead of an interval scale thus it is harder to compare values with each other.	Participant rates all 10 values	✓	✓	✓
LOV	• More closely related to people's daily lives • Only 9 values to remember	• Focused on the individual himself • Ranking instead of rating	Participant ranks all 9 values	✓	×	✓

Table 3.3 Summary of the four different value systems

3.2 The most suitable systems

As mentioned in the beginning of section 3.1 three criteria were used to select a value system. In table 3.3 in section 3.1.5 one can see a summary of the four types of value systems and whether they fulfill these three criteria.

The VALS system does have a marketing perspective, but since this study is too demographically focused on the U.S.A. it does not meet criteria 1. Since a high number of countries doubt the usefulness ofVALS1/VALS2, not much data is available and thus it does

not meet criteria 2. Since the VALS categorizes a person in one of the nine values, it has a low number of possible types and thus it meets criteria 3. However, one person can only be one type of the VALS, which makes it less applicable for this study.

The other three systems are more similar because the LOV and the SVS are based on the RVS. The RVS is not country specific and thus universal and therefore meets criterion 1. Due to its wide spread usage it meets criterion 2 as well. However it does not meet criterion 3, because it has such a large amount of values that is will be more difficult to link all values to specific goals. Such a large size of values is a problem (Peterson & Peterson, 1959) and it is a well-known problem in different studies when using the RVS (Bilsky & Schwartz, 1994; Shih, 1986).

Therefore the RVS is widely shortened to make the survey more practical, which resulted in the SVS and the LOV among others. The SVS meets criterion 1, 2 and 3 due to the fact it is not country specific, its wide spread usage and the fact it includes only 10 values instead of 36. The same goes for the LOV, but the difference is that the LOV is less known and therefore less data is available, which means criteria 2 is not met by the LOV. The other difference between the LOV and the SVS is that the SVS also considers the environment such as *conformity*, *benevolence* and *universalism*. These values can be relevant for marketing when considering a goal like "environmental friendly". When the values are more extensive, the goals will also be more extensive, which means that the product can fit better to the user's needs. Therefore the SVS has been chosen to represent the value system for this study.

3.3 Example of goal-value model

Now the right value system has been chosen, an example of the link between values and goals will be given to make the value-goal model easier to understand. The decisions and choices made in this section are shown as an example and not correctly selected and motivated. The next chapters will discuss the right decisions and motivate them correctly.

In order to make a non-specific framework for software applications, there should be a classification for the goals. These goal categories could look as follows:

- Feel successful
- Feel amused
- Use a product with a high usability
- Feel liked by people
- Show life events

This list is an example and the actual goal categories will be selected in section 4.1. To illustrate the value-goal model, John's value ranking could therefore for example be arranged as follows according to Schwartz Value Survey (with the lowest rating being the most important value and the highest rating being the least important value):

- *Achievement* *-1,7*
- *Self-direction* *-1,5*
- *Stimulation* *-1,3*
- *Power* *-0,7*

- *Hedonism* *-0,5*
- *Security* *0,1*
- *Benevolence* *0,4*
- *Conformity* *0,7*
- *Universalism* *1,3*
- *Tradition* *1,6*

After obtaining the rating of the values of the participant, the goals of the participant must be determined. There are no studies done on the link between values and goals and it is therefore a challenge to make this link as concrete and complete as possible. The possibilities of defining this link will be extended in the next chapter, but a global idea of these possibilities will be given here as an example. The goals could be ranked based on the ranking of the participant's values, which means that the goal linked to *achievement* would be higher ranked than the goal linked to *tradition*. John's goal ranking could be for example be arranged as follows from most to least important goals, based on his value ranking:

1. Feel successful: if he feels successful, his *achievements* of life will be confirmed.
2. Show life events: by showing his life events (e.g. job promotion, buying expensive products, buying a new house, having great children, creating a beautiful painting) he can show his friends that he achieved may things in life, which is important for him (*Achievement, Stimulation and Hedonism*).
3. Feel liked by people: if he feels that people like him, he has achieved more in life (*power and tradition*).
4. Usability: to have a high level of *self-direction* the application should be easy to use so the user will not feel dependent (self-direction).
5. Amuse: to have enjoyment in life, amusement is necessary (*stimulation and hedonism)*.

When the user's goals are known, the product can be designed, keeping in mind these goals in every single design step. This could be done via the guidelines of Goal-oriented Requirements Engineering (Lamsweerde, 2001).

4
Link between values and goals

In order to be able for businesses to design goals with this value-goal model, it is necessary that links are created between the values and goals. In this way, the designer can simulate his target group with the value-goal model and set the ranked values of his target group to the value-goal model as input. The output of the value-goal model should be a list of the most important goals of the users, which can be used to point the designer in the right direction and reduce the possible goals and wishes of the users that are taken into account in the subsequent user study, which is after the value-goal model the next step to take by the product designer.

Because goals can be very broad, it is important to first find a classification of goals to make them more concrete for social applications. This will be done in section 4.1. The theory behind this classification and the definitions of the different goal categories will be explained, as well as how the goals are divided in functional, quality and emotional goals. Once the classes of goals are known in social applications, a literature study can be done to find the links between the 10 values and the classes of goals, which will be done in section 4.2. The findings will be concluded in section 4.3.

4.1 Making goals specific

In order to make the value-goal model more specific and useful, it has been chosen to make the value-goal model for specifically social applications, as explained in section 1.1.4. As the value-goal model will link values to goals, a list of goals is needed, which the values can be linked to. These goals should be social application specific. Goal categories will be set up to make the value-goal usable for more than just one product. Kietzmann, Hermkens, Mccarthy, & Silvestre (2011) created a honeycomb that will be used to classify the goals into goal categories. This honeycomb will be explained in section 4.1.1. The honeycomb of Kietzmann et al. (2011) will be altered for the use of this value-goal model in section 4.1.2 and 4.1.3 will elaborate on the final goal categories in more details.

4.1.1 Honeycomb of Kietzmann

The theory of Kietzmann et al. (2011) is chosen because it is a well-known theory and is cited in more than 2000 studies (He, Zha, & Li, 2013; Laroche, Habibi, & Richard, 2013; Laroche, Habibi, Richard, & Sankaranarayanan, 2012; Leung, Law, van Hoof, & Buhalis, 2013; A. N. Smith, Fischer, & Yongjian, 2012; Zafarani, Abbasi, & Liu, 2014)

The honeycomb of Kietzmann et al. (2011) that represents the functions of social media, is shown in Figure 4.1. This honeycomb will make social media more understandable, can

explain the various forms social media can take and show how to use social media for business purposes.

The honeycomb of Kietzmann et al. (2011) says the functions show how people see and express their identity on social media and that is why they put the identity of a person in the middle of the honeycomb. They obtained the different functions by studying various sources (Butterfield, 2003; Morville, 2004; G. Smith, 2007; Webb, 2004). Kietzmann et al. also explain that these seven functions are not mutually exclusive and neither do they all have to be present in a social media activity.

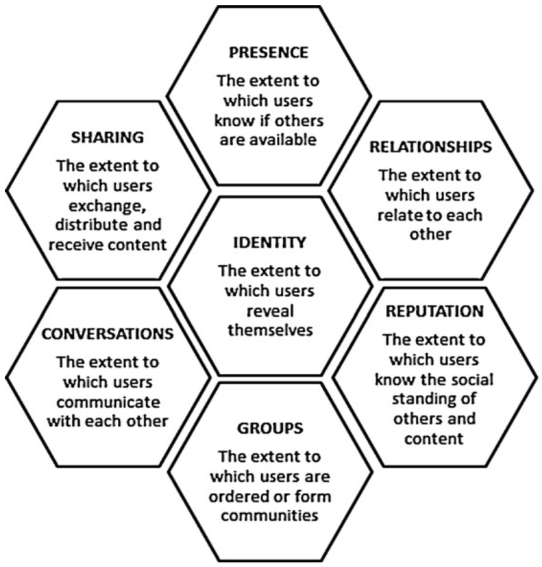


Figure 4.1 Honeycomb of functions of social media (Kietzmann et al., 2011)

One critical point is the fact that the honeycomb of Kietzmann et al. (2011) is based on the functions of social media, while the value-goal model is created for social applications. Social applications were defined by Shirky as applications that support group interaction (2003). Kietzmann et al. (2011) define social media as a product that provides an interactive online platform that enables individuals and groups to share content, discuss, communicate, co-create and modify user-generated content (Kietzmann et al., 2011). So Kietzmann et al. include the functions of social applications, which is group interaction and therefore the theory can be used for the value-goal model. However, Kietzmann et al. also include the creation of content in their honeycomb, which is not part of the value-goal model and this should be kept in mind when the goal categories are chosen.

4.1.2 Altering the honeycomb

Even though these functions make sense, there is still an important goal missing in the honeycomb in my opinion, which is *amusement*. This is probably because the honeycomb focus on functions that represent identity and amusement does not do this. Nevertheless, amusement as a function of social media can be found in different sources (Chu, 2011; Quan-Haase & Young, 2010; Stieglitz & Dang-Xuan, 2013). Chu shows various users seek entertainment on social media and use social media to achieve a sense of leisure and amusement (Chu, 2011). Additionally, amusement is an important factor in motivating people (Barnes, Powell, Chaffin, & Lipford, 2008), when a task is not only useful or mandatory, but gives pleasure as well, people are more motivated to do the task. Therefore the goal a*musement* will be added to the list of goals.

As said by Kietzmann et al. (2011), the functions are not mutually exclusive and therefore might overlap. The function *relationship* is according to some too close to *conversation*, as these both represent the relation between users (Anderson, Carleton, & Swim, 1998; Brunell, Pilkington, & Webster, 2007). Therefore *relationship* will not be used in this value-goal model.

Since it is also possible to have communication via a conversation or by sharing information, without both communication partners be present at the same moment, the presence of a user

(the extent to which users know if others are available) also does not seem as a high priority for this value-goal model and thus is also not used.

Section 4.1.1 explained that the honeycomb also includes content creation, which is not part of the value-goal model. The function of the honeycomb focusing on content creation is mostly 'sharing' since this enables the user to exchange, distribute and receive content. Since this is also seen as a form of communication and interaction, it will be included in the value-goal model.

The five remaining functions of Kietzmann et al. (2011) and the added goal of amusement, are transformed to the following goal categories:

1. Show and keep your own identity (Identity)
2. Have a conversation (Conversation)
3. Share information (Sharing)
4. Amuse yourself (Amusement)
5. Show your reputation (Reputation)
6. Feel part of a group (Groups)

The combination of these six goal categories are not validated yet, and therefore future research could show if other goals should be added or if goals should be removed from the list.

4.1.3 Explanation of the goal categories

The definitions of the goal categories are explained in this paragraph as described in the article of Kietzmann et al. (2011). In order to make the goals more concrete, the explanation is complemented with sub goals, not specifically written by Kietzmann et al., but derived from their explanation of the functions. These sub goals are not validated, but derived from the description Kietzmann et al. gave about the different functions from the honeycomb.

There are many functional (sub) goals, and there are also a number of emotional sub goals, which shows that the old way of thinking in GORE without including emotional goal is outdated. No quality goals are identified, but this can be explained by the fact quality goals are normally about the way a product works, the usability, quality or speed of the application. The quality of the product is almost never the reason why a customer uses a product type with these specific functions. For every sub goal it is described whether it is a functional (F) or an emotional (E) goal.

4.1.3.1 Show and have own *Identity*:

This represents "the extent to which users exchange, distribute and receive content" (Kietzmann et al. 2011, 243). Many social applications require the user to create a profile and include different information such as name, age, gender, birthdate, and profession. Social applications give the opportunity to their users to show their identity to other users in the way they want. By update all this information only of course other problems occur, mostly the problem of privacy. Although users willingly share their identity, it does not have to mean that they do not care about their privacy (Kietzmann and Angell 2010). According to Kietzmann et al. (2011, p. 243) you have to strike "a careful balance between sharing identities and protecting privacy, which is crucial in selecting social media tools; the wrong mix can lead to a lack of accountability among users, encourage cyber-bullying, and pave the way for off-topic and off-colour comments".

Sub goals will be:

A. Feeling independent (E)
B. Secure privacy (F/Q)
C. Show who you are (F)
D. Show what you have achieved (F)

4.1.3.2 Have a *conversation*

This represents "the extent to which users communicate with each other"(Kietzmann et al., 2011, p. 243). This conversation can happen in different ways: chatting, tweeting, blogging, tagging etcetera. Tweeting is about exchanging short messages, while blogging is about facilitating lengthy conversations and chatting is about really interacting in a fast way. An interesting note is that companies try to influence these conversations and starting discussions about their products. Kietzmann et al.(2011, p. 244) explain that "firms which know when to chime in——and, when not to——show their audience that they care, and are seen as a positive addition to the conversation; this is in contrast to firms which flood conversations that were not 'theirs' in the first place".

Sub goals will be:

- Asking questions to somebody (F)
- Ask help/support (F)
- Talk about your concerns (F)
- Talk about things that happened to you (F)
- Share your emotions (E)

4.1.3.3 *Share* information

This represents "the extent to which users exchange, distribute and receive content (Kietzmann et al., 2011, p. 243). Some applications facilitate the sharing function by letting the users send pictures to each other (Instagram and Snapchat) and others by sharing music (Soundcloud), CVs (LinkedIn), videos (YouTube) or life events (Facebook).

Sub goals will be:

- Show what you are doing (F)
- Show your interests (F)
- See how your friends are (F)
- See what your friends have been doing (F)
- See what your friends like to get to know them better (F)

4.1.3.4 *Amuse* himself

This represents the extent to which users use social applications to have fun and to kill time and to relax(Chu, 2011; Quan-Haase & Young, 2010; Stieglitz & Dang-Xuan, 2013). By reading interesting articles that their friends have posted, reading their blogs, playing games, admiring pictures, listening to music or watching videos.

Sub goals will be:

- Feel more happy (E)

- Get less stress (E)
- Think about something else than your worries (F)
- Learn something interesting (and feel smarter afterwards) (F/E)

4.1.3.5 Show your *reputation*

This represents "the extent to which users can identify the standing of others, including themselves, in a social media setting" (Kietzmann et al., 2011, p. 243). On Twitter it is shown how many followers the user has (which could say the more followers, the more popular), and on LinkedIn the user can show his reputation as well by showing off with his education and different job titles, but also by updating different articles or thoughts. On YouTube the users reputation could be based on 'view counts' or 'ratings', while on Facebook this could be the number of 'likes' for a status update.

Sub goals will be:

- Feeling good about yourself (E)
- Learn about yourself and how likeable you are (F)

4.1.3.6 Feel part of a *group*

This represents "the extent to which users are ordered or form communities" (Kietzmann et al., 2011, p. 243). A group can be all kinds of communities, such as a family, a group of old high school friends, a group of people with the same interests (for example photography) or people who want to meet up for traveling (Couchsurfing). In this group people can talk about their mutual interests or activities they are planning.

Sub goals will be:

- Do not feel alone (E)
- Feel connected (E)
- Feel understood (E)
- Know that you have a group of people that you can trust and support on them (E)

4.2 Filling in the links

As said before in section 1.3 there is no research available yet about the link between values and goals and therefore this will be the main focus of this research as explained. But, research has been done on these links in other context than the SVS and goals for social applications: there is not a paper that mentions specifically Schwartz values and (social application) goals together, but for example there has been a link made between the fact that someone who has *universalism* ranked as a high value, wants to share their thoughts about life and the world with others and therefore prioritize the goal *sharing* (Brunsting & Postmes, 2002b). It is also possible that a link can be made by common sense, even though this link has not yet been researched and thus cannot be found in literature. As long as these thoughts are correctly motivated, these can also be included in the value-goal model. For example the link that someone who wants to have much power, also thinks it is important to update his relatives often about his life and thus has the goal *sharing* as a high priority. The sub goals used as an example in section 4.1.3.1 until 4.1.3.6 will also be kept in mind in this part of the study to get a clearer view of the goal categories.

Including links in the model based on common sense should be criticized. There is a chance these links are wrong and cannot be validated. This should be kept in mind. However, to give an idea of the links and the value-goal model, this value-goal model could be seen as a proof of concept, to demonstrate the feasibility of linking values to goals.

The links found in this study are summarized in Table 4.1, in which the links that are motivated in the literature are in between brackets. The links are motivated in paragraph 4.2.1 until 4.2.10.

	Identity	Conversation	Sharing	Amusement	Reputation	Group
Tradition	+	[+]			[+]	+
Conformity		[-]			+	+
Security	+					+
Self-Direction	[+]					
Stimulation		+		+		
Hedonism				+		
Benevolence		+	[+]			+
Universalism		[+]	[+]			[+]
Power		[+]	+		+	+
Achievement			+		+	

Table 4.1 Summary of the links between Schwartz human values and the social application goals, in which the links that are motivated in the literature are in between brackets

4.2.1 Tradition

Having *tradition* as a high value means that you prioritize respect, commitment and acceptance of the customs and ideas that one's culture or religion provides (Schwartz, 2012). This makes you devout, accepting portion in life, humble, moderate and you have respect for tradition. You want to be part of the culture, of a certain group and these culture members could support you. This tradition/culture can help you live your life and support you when this is necessary.

4.2.1.1 Identity

If your culture or tradition is important to you, you might want to show your culture or radiation to others as well. If you are a member of a certain culture or have traditions, this changes you as a person and how you are and therefore influence your *identity*. Therefore, having and showing your *identity* might also be more important to you. This is however not found in literature.

4.2.1.2 Conversation

Kashima (2016) explains it is important for a culture to share and transmit information about the culture. For people that rank the value *tradition* as a high value, it is important to talk about the culture and learn more about it and next to this, support each other and make the culture stronger, and therefore *conversation* will be prioritized by one that ranks *tradition* high. This link was not discussed in literature.

4.2.1.3 Reputation

Reputation is seen as an important desirability in many, if not all, known cultures (Conte & Paolucci, 2002). As Conte & Paolucci (2002, p. 15) noted "from different tradition are driven by an intrinsic motivation to obtain and publicly display a high status position, and that the same people are likely to sacrifice material gains to satisfy this motivation (Huberman et al., 2001)." Conte & Paolucci (2002) explain that when the traditions are violated, you are a less good person and get less respect in the group of the culture or tradition. The Japanese tradition is an example of this, which still emphasize on the traditional social concept of *giri*, which means you should not damage your own or somebody else's reputation, behave polite and give gifts (Conte & Paolucci, 2002). Since the culture is so important, you do not want to lose your reputation.

4.2.1.4 Group

Since it is so important to be part of the culture, feeling part of the group is very important for one as well. If one is left behind and outside the group, it might be the case that one does not feel connected to the culture as well, which will let him feel very unhappy or let him drop the culture. However, there is no direct link found in literature.

4.2.2 Conformity

Conformity values create the wish to not upset others by your impulses, actions or inclination to avoid disruption and undermining smooth interaction and group functioning. According to Schwartz, a highly ranked *conformity* person can be described as obedient, self-disciplined, polite, honouring parents and elders, loyal and responsible (Schwartz, 2012).

4.2.2.1 Conversation

Polite and quiet are often used together to describe a certain personality (Friedman, 1964; G. J. Hofstede & Pedersen, 1999), which can link the value *conformity* and the goal *conversation* together in a negative way. A person who does not want to give any impulses to upset or harm others will avoid conversations.

4.2.2.2 Reputation

When you ranked *conformity* high in your value ranking, it is important for you that you are polite, you honour your parents and elders and you are self-disciplined. All these characteristics could indicate that you think it is important what others think of you and therefore your reputation is important as well. However, there is no direct link found in literature.

4.2.2.3 Group

It is hard to find a link between these two in literature, due to the fact that both concepts are quite vague. However, due to the fact *conformity*-persons do think group functioning is the one of the most important things in life, you could also say being part of a group is important for this person. There is no direct link found in literature.

4.2.3 Security

Schwartz (Schwartz, 2012, p. 6) explains that *security* values derive from basic individual (e.g. clean) and group requirements (e.g. national security). People that have *security* highly ranked prioritize safety, harmony, and stability of society, of relationships, and of self, thus

they think social order, family security, national security, cleanness, reciprocation of favours and health are important.

4.2.3.1 Identity

Due to the fact a sub goal of the *identity* goal is secure privacy, there is a link between the value *security* and the goal *identity*. Next to that, a sub goal is *feeling independent*, which can be achieved when your life is not unsecure. A person who gave the value "*security*" a high ranking, thinks it is important that there is safety, harmony, and stability of society, of relationships and of self. The sub goal of feeling independent is a continuation of the value privacy. In other words: when a person feels he has his own *identity*, is a unique person and if he wants to change this *identity*, he is able to, because he is independent. This is not a link found in literature, but this is based on the definition of the value and goal.

4.2.3.2 Group

In order to feel secure, it could be important to be a member of a group, for example a society with strict rules to secure social stability. Having a family can also secure safety, because they can help you when you have a problem. Next to this, as mentioned above, Schwartz states that stability of relationships and harmony is important as well and therefore being part of a group is important for a highly *security* ranked person. This link is not researched yet in other papers, but based on the definitions this link can still be made.

4.2.4 Self-Direction

Self-direction focuses on being independent and having the ability to make your own choices. It derives from the organismic need for control and mastery and let the person avoid being trapped or being told what to do without having their own freedom. A highly *self-direction* ranked person is characterized by creativity, freedom, choosing his own goals, curiosity, independent, self-respect, intelligence and privacy (Schwartz, 2012).

4.2.4.1 Identity

Since the definition of *self-direction* is independent thought and action choosing (Schwartz, 2012), prioritizing the goal of *identity* very high and therefore choosing how to show your *identity* in the application is very important.

4.2.5 Stimulation

The need for *stimulation* comes from the organismic need for diversity in life and for stimulation in order to maintain a positive level of activation. Having an exciting and varied life gives a person motivation to survive, where novelty and a challenge in life can contribute to this motivation (Schwartz, 2012). The focus for this value is on novelty and variation in life.

4.2.5.1 Conversation

Different conversations with different people can give one a new idea to execute in order to have more variation in life. One can hear a story about a trip somebody has made that changed his life forever. This could motivate another to do the same thing to have diversity in life. However, there is no direct link found in literature.

4.2.5.2 Amusement

Having amusement in one's life is important to be motivated to survive. Amusement can make one's life more exciting and gives a stimulation to live. This link is not researched yet in other papers, but based on the definitions this link can still be made.

4.2.6 Hedonism

Hedonism and *stimulation* are similar, but the biggest difference is that *hedonism* focuses on pleasure and joy rather than variation. The most important goal for a highly ranked *hedonism* person is to satisfy his organismic need. He wants to pleasure himself and is self-indulgent, which means he thinks he is the most important person to gratify (Schwartz, 2012).

4.2.6.1 Amusement

This link is clear: in order to have pleasure and joy in one's life, one needs amusement. Therefore a highly *hedonism* ranked person will make it his goal to have *amusement*. However, there is no direct link found in literature.

4.2.7 Benevolence

Benevolence derives from the need for affiliation. A highly ranked *benevolence* person cares about what the family thinks of him and that he can support his friends and family when they need him to. In order to do this, he shows voluntary concern for others' welfare. He is helpful, honest, forgiving, responsible, and loyal and prioritize true friendship and mature love. Schwartz explains that "*benevolence* and *conformity* values both promote cooperative and supportive social relations. However, *benevolence* values provide an internalized motivational base for such behaviour. In contrast, *conformity* values promote cooperation in order to avoid negative outcomes for self. Both values may motivate the same helpful act, separately or together" (2012, p. 7).

4.2.7.1 Conversation

In order to be helpful and maintain the welfare of those close around you, it is important to know what a friend is going through and what is happening in his life. Therefore, communication is important. When two friends talk to each other, they know better what the other persons wants and needs and they can help each other. Next to this, you can only help people if they trust you and support is only accepted if you have a good, solid basis (Klift, Kunc, Street, Alberni, & Canada, 1994). In order to help a person, you need to have certain information, which you can only obtain by talking with him. Since *conformity* is focused on avoiding confrontation, while *benevolence* is focused on strengthen relationships, it follows the usually accepted rules of logic that the relation between the value *conformity* and the goal conversation is negative, since it has to be avoided to avoid confrontation, while the relation between value *benevolence* and the goal *conversation* is positive, since a conversation will strengthen the relationship.

4.2.7.2 Sharing

When you share your experiences and stories with another person, you feel more attached to him and the relationship will become stronger. This will be a true friendship, a characteristic of the value *benevolence* (Klift et al., 1994).

4.2.7.3 Group

Being benevolent, you think it is important to maintain good relationships with your friends. You want to have a true friendship and want to feel a connection with certain persons. Therefore, it is important that you feel connected to a group of people you think are important in your life. When you do not belong to a certain group, the relationship between you and those group members will immediately weaken, which will make you unhappy, since this is very important to you. This link is not researched yet in other papers, but based on the definitions this link can still be made.

4.2.8 Universalism

While the value *benevolence* mainly focuses on the in-group harmony, the value *universalism* focuses beyond the group. *Universalism* contains two subtypes of concern: for nature and for the welfare of others beyond their inner group (the larger society). A highly *universalism* ranked person knows the threat of failure to accept others who are different, which can lead to life-threating strife and also knows that "failure to protect the natural environment will lead to the destruction of the resources on which life depends"(Schwartz, 2012, p. 7).

4.2.8.1 Conversation

There is a possibility that somebody that is motivated to protect the environment and make the world a better place, would like to share this idea with others same-minded. Research shows that social media is a widely used mean to start (political) discussions and talk about matters that are important to different groups (Briones, Kuch, Liu, & Jin, 2011; Tufekci & Wilson, 2012). Here the difference between *sharing* and *conversation* is important: with *conversation* the participants will actually discuss a matter, get feedback and give feedback, while for *sharing* it is more about giving a (short) update about your life or your opinion without actually starting a conversation.

4.2.8.2 Sharing

Also the option to share your thoughts with your friends is important for the ones that rank *universalism* as a high value. They might have interesting information or a new view on a problem that they want to share with their friends. According to Brunsting & Postmest (2002b, p. 525) "activists and social movements have been quick to discover the power of mass communication of the Internet [and that] communicate calls for action ranging from protest e-mails to digital sit-ins". This shows communication is very important and especially the two-communication, which can be a discussion about how to solve a problem.

4.2.8.3 Group

Firstly, being part of a group can make your feelings stronger about a certain movement or belief by knowing that others are thinking the same thing. Second, according to Postmes & Brunsting (2002a) the relative anonymity and isolation of many social media applications can also make the group feeling stronger by reducing the attention to individual differences in the group, called *depersonalization*. The differences will be less important and the group will focus on the similarities and the common thoughts, which will give the online group a very strong sense of common identity or common purpose. They will share their thoughts about the in-group concerning desirability and possibility of social change, which will make their feelings about this issue even stronger.

4.2.9 Power

Some individuals have the need for dominance and control and thus the need for power which shows that the functioning of social institutions apparently requires some degree of status differentiation (Schwartz, 2012). A highly *power* person prioritize social status and prestige, control or dominance over people and resources, authority, wealth and social power. Next to this, they want to preserve their public image and their social recognition.

4.2.9.1 Conversation

Although there is no research that can prove the link between the value *power* and the goal Communication, there are other researches that show the link indirectly. Without good communication a leader will not be powerful, but forceful (Tunkelo, 2013) and "effective communication is grounded in the character, conviction, and personal example of the leader" (Baldoni, 2004, p. 20). Due to the fact a person wants to be powerful, he also ranks the goal communication higher, in order to be powerful. Also, in order to get access to people and resources, communication is necessary.

4.2.9.2 Sharing

In order to have a social status and prestige, sharing your life events with status updates, pictures and music is essential. However, no literature is found that shows the direct link.

4.2.9.3 Reputation

If you want to be powerful, people should look up to you and see you as someone how is higher in the hierarchy than you are. Therefore it is important to take care of your reputation. There is no literature that can confirm these motivations, but based on logic reasoning, this link is still included in the value-goal model.

4.2.9.4 Group

If one wants to have *power* and be the top in the hierarchy, a group is necessary to be able to have a hierarchy. Next to this, if one is not part of the group or does not feel part of the group, being the leader will be impossible. Therefore the goal *group* is very important for a highly *power* ranked person. This link is not researched yet in other papers, but based on the definitions this link can still be made.

4.2.10 Achievement

The most important goal in life of an achiever is to be successful and achieve their goals, even more to show this to others. Schwartz (2012, p. 5) explains that the goal of a highly *achievement* ranked person is having "personal success through demonstrating competence according to social standards" and "*achievement* values emphasize demonstrating competence in terms of prevailing cultural standards, thereby obtaining social approval". One will be ambitious, successful, capable, influential, intelligent and self-respected.

Although both *power* and *achievement* are values of the social status and hierarchy, "*achievement* emphasizes the active demonstration of successful performance in concrete interaction, whereas *power* emphasizes the attainment or preservation of a dominant position within the more general social system"(Schwartz, 2012, p. 6). Thus, a highly *achievement* ranked person wants to show their capabilities in a specific action, while the highly *power* ranked person wants to be seen as a capable person in general, not specifically linked to one action.

4.2.10.1 Sharing

By sharing ones actions and events with his friends, he can show what he has achieved and by doing this he can demonstrate his competence according to social standards. However, no literature is found that shows the direct link.

4.2.10.2 Reputation

In order to feel successful and capable, the achiever should be able to compare himself with others, which is possible by looking at his own reputations and the reputation of others. Since the achiever wants to show his reputation in certain actions, showing his reputation via social applications is important. This link is not researched yet in other papers, but based on the definitions this link can still be made.

4.3 Conclusion

As explained before, the described value-goal model is a proof of concept. This model shows how a link between Schwartz' values and goals of social applications could look like. This model could give an indication to the product designer of what is important for the user and in which direction the product designer has to search for the right product. This value-goal model can help the product designer filter the possible user goals.

Although there was literature available to motivate a number of links, there are some links that are not motivated by previous research, but by common sense. Using common sense to link the values to the goals is a limitation of this research, since the accuracy is not investigated and the link might not exist.

Therefore the links have to be validated and the best method to do this is by conducting interviews. The participants could be asked certain questions to obtain their values according to the SVS and their wishes with regard to the six goal categories. This empirical research will not only show if there is a link between a value and a link, but also how strong a link is (the index of the link), which can put different links in perspective to each other and make the total score of a goal category more realistic. Next to this, the empirical research can also show if there are any negative links. In order to make the value-goal model applicable for different countries, the empirical research should also been done in different countries to see if the links are different in different countries. Hofstede's cultural dimensions could help the researchers to see which countries are comparable and which one are different.

Another less time-consuming option to check the links is by asking experts to investigate the links by themselves and see if they would make the same link between the values and goals.

As mentioned before, the links made in the last section are a possible way to link the values to the goals and there might be another way to do it. The links might depend on the user group, perhaps age or nationality might influence the index or the very existence of a link. Therefore this is a proof of concept and is an idea of how the value-goal model could look like and could be different as well.

5 Value-goal model

First the conceptual value-goal model will be explained in section 5.1, followed by the explanation of the emergency alarm case in section 5.2. Next, section 5.3 will discuss the method to obtain the data necessary to use the emergency alarm case and how to use the value-goal model itself. Section 5.4 will show how the value-goal model is used and will show the results, which will be compared with the goal map of the emergency alarm case in section 5.5. This chapter will be concluded with in section 5.6.

5.1 Conceptual value-goal model

The value that is most important to a person will have the biggest influence on his goals and wishes in life. If a person prioritizes *hedonism* the highest, he would also think the goal *amusement* is the most important goal to fulfil and if he ranks *self-direction* as second most important goal, he will also think *identity* as an important goal, but a little bit less. Therefore the model should use the value ranking to assign certain point to the different goal categories and the sum of these points is the final score for the goal categories. In this way, the most important values will increase the score of the goal categories the most and thus make those goal categories the most important goals to fulfil.

Thus, a method is needed that includes different weighting for aspects of a concept to compare different concepts with each other. The method that satisfies these needs is the multi criteria analysis. Multi criteria analysis is a scientific evaluation method that you can use to choose between alternatives based on a number of criteria (Mateo, 2012). A large scale of multi criteria analysis methods are available. One of those is the Best Worst Method, which only two criteria are chosen: the best one (with the most important role to make the decision) and the worst one (with the least important role to make the decision) (Rezaei, 2015). However, since this method will not take into account the other 8 values, this method will be too radical and not appropriate for the value-goal model. Another option is Goal programming, which gives the option to the designer to include certain goals as the score for criteria X must at least be 5. But, since the score on a criteria is a minus, zero or plus, and you do not want to exclude any links, this model is no option. Since the criteria, ranking and links are quantified, the comparison does not contain any qualitative criteria and thus the Evidential reasoning approach does not suite here(Yang & Xu, 2002). The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is a method that selects the alternative that has the smallest distance to the ideal solution, but since there is no ideal solution in the value-goal model (there is no goal better than the other goals), TOPSIS is not suitable to use as method for the value-goal model (Triantaphyllou, Shu, Nieto Sanchez, & Ray, 1998). Next, there is a simple model, which is called the weighted sum model (WSM), which uses the total sum of the scores that an alternative gets for each criteria and the highest score for an alternative is seen as the best. The requirement for the use of the WSM is that all criteria have the same direction of scale and thus should be all cost- or benefit-type (in which

the highest score is always positive or always negative)(Caterino, Iervolino, Manfredi, & Cosenza, 2009; Mateo, 2012). This is the case for the value-goal model. Moreover, the criteria should be measured quantitatively for the WSM, which is the case as well in the value-goal model. Therefore the WSM is chosen as multi criteria decision model for the value-goal model.

As shown in Table 5.1, different criteria are set up (first column) and scored for every single alternative (third till last column). Since some criteria are more important than others (for example costs versus comfort), the criteria are weighted, so the most important criterion has more leverage than others. The total score of the alternative is the sum of the products of the score on each criterion with the weight of these criteria. Based on these different total scores, the different alternatives are ranked of most suitable (the one that meets the criteria the most) to least suitable. In this case alternative A will be the most suited alternative and alternative D the least.

Criteria	**Weights**	**Alternatives**			
		A	B	C	D
W	3	2	-1	0	2
X	1	1	-2	1	0
Y	2	-2	1	-1	0
Z	4	0	2	0	-2
Total		3	1	-1	-2

Table 5.1 Example of Weighted Sum Model

For this study, the alternatives will be the goals and the choice will be to decide on which goals to focus the most. The criteria will be Schwartz human values, shown in the rows. The weights are in this case determined by the ranking of the values. The links between the values and the goal categories are shown in column 3-8. The total score for each goal category is the sum of the multiplication of the ranking and the corresponding link. In Table 5.2 an example of the ranking of the values is given, but the relations between the values and goal categories is based on the relations found in chapter 4.

Value	**Ranking**	**Goals**					
		Identity	Conversation	Sharing	Amusement	Reputation	Group
Tradition	1	+	+			+	+
Conformity	4		-			+	+
Security	2	+					+
Self-direction	7	+					
Stimulation	9		+		+		
Hedonism	10				+		
Benevolence	8		+	+			+
Universalism	5		+	+			+
Power	3		+	+		+	+
Achievement	6			+		+	
Total		10	22	22	19	14	23

Table 5.2 Example of the structure of the value-goal model based on the links found in chapter 4

The scores are summed and the goal category with the highest total score will be the most important goal category. Due to the fact that some goal categories, for example *group*, are related to more values than others, for example i*dentity*, these goal categories will most likely be ranked higher as well. But due to the ranking of values this can still be influenced. In this value-goal model the goal category *group* will almost always be the most important goal category, due to the fact that it is related to many values. Whether this result is correct can be questioned, but because the more values link to this goal category, the more important this goal category will be for a person, it will be assumed that this is a correct result. Next to this, the ranking of the values can still influence the importance of the goal categories, and therefore there can still be a case that *group* is not the most important goal category. For example, if the person whose values are ranked as in table 5, switches *benevolence* and *achievement*, *sharing* will be the most important goal category, as *group* will decrease to a total score of 21.

The method of ranking the values can also be of influence on the multi criteria analysis. In the previous example the values are ranked from 1 to 10 where 1 is the least important value and 10 is the most important value. However, the ranking can for example also increase linearly or exponentially. As the available values are already ranked, this method of ranking will be kept for the value-goal model. The dataset that is going to be used, is from the European Social Survey, where the data is centred to indicate the relative importance of each value in the value system, where lower scores signify that the value is more important (Schwartz, 2014). Since this data and scale use represents the ranking of the values of the people the most, the exact value ranking of the data set will be used.

Implementing the value-goal model in Excel and using the ranking of the population of the United Kingdom as an example of the ESS data shows the following value-goal model and result in Table 5.3.

Ranking of user group	Values	Identity	Conver-sation	Sharing	Amuse-ment	Reputa-tion	Group
0,0567	Tradition	1	1			1	1
0,2051	Conformity		-1			1	1
-0,4165	Security	1					1
-0,4049	Self-Direction	1					
0,5108	Stimulation		1		1		
0,3122	Hedonism				1		
-0,7777	Benevolence		1	1			1
-0,5259	Universalism		1	1			1
0,9469	Power		1	1		1	1
0,3564	Achievement			1		1	
Total		-0,7647	0,0057	-0,0003	0,823	1,5651	-0,5114

Table 5.3 Results of the value-goal model with the rankings of the United Kingdom

Based on the ranking of values for people form the United Kingdom, the ranking of the goal categories from most important goal category to least important goal category is as following:

1. Identity (-0,76)
2. Group (-0,51)
3. Sharing (0,00)
4. Conversation (0,01)
5. Amusement (0,82)
6. Reputation (1,57)

Now the value-goal model is finished, the emergency alarm system case will be used as an example and as validation.

5.2 The case

The emergency alarm case will be an example to show how to use the value-goal model. This case was used by Pedell et al. (2012) to investigate the use of the emotional goals in addition to the functional and quality goals of the GORE method. They have shown including emotional goals can better capture the wishes of the users and thus create a better product. In order to reduce the time spend on interviews with the user, the value-goal model can be used to point the product designer in the right direction.

The emergency alarm case will be used to show the usability of the value-goal model. Next to this, the emergency alarm case will be used for validating the value-goal model. If the value-goal model can show the same priority of goal categories as the goals that came up during the interviews in the emergency alarm case, the possible existence of a link between values and goals is shown and the feasibility of the value-goal model is shown as well.

The University of Swinburne performed a study on the use of emergency alarms by older people to get a better understanding of their emotions, wishes and challenges that are encountered when elderly people use emergency alarms. The reason was a disappointing number of use of emergency alarms under elderly (Lorence & Park, 2006). They argued that one of the reasons the emergency systems suffer from usage problems, is because the emergency alarm designers normally do not consider the emotional needs of the elderly people using them (Pedell et al., 2012). Therefore Pedell et al. (2012) reviewed the wishes of the elderly by creating a goal map that included the Emotional Goal Theory.

The first step was to create an initial goal map based on their knowledge of emergency alarms and the use of technology by elderly. This goal map helped them structuring the interviews that they conducted with eight elderly people and four relatives who take care of their parents. These interviews gave them new insights and an overview of their thoughts and the situation around the use of emergency alarms. These interviews showed that the initial goal map was incorrect and therefore the general thoughts about the needs and wishes of the older adults are sometimes incorrect. A number of goals included in the goal map were not really a goal for the elderly and next to this, goals were missing, especially emotional goals. Therefore a new goal map was made based on the interviews, shown in Figure 5.2 and on one of the functional goals has been zoomed in, shown in Figure 5.3 on the second next page. This new goal map was used as input for designing a new emergency alarm: a tablet that makes them interact with a picture frame on which they can see photos sent by their family and friends. The elderly persons has to check in every 24 hours by touching the button that

says ‘I am ok’ or by sending a message, most likely about the photo. This application is shown in Figure 5.1. The results were promising and most of the elderly were comfortable using the tablet. Although some relatives had some reluctant thoughts about the tablet and the relatives thought the participants were not able to use the tablet, all participants were able to give some reply by sending a message or by pressing the ‘I am ok’ button.

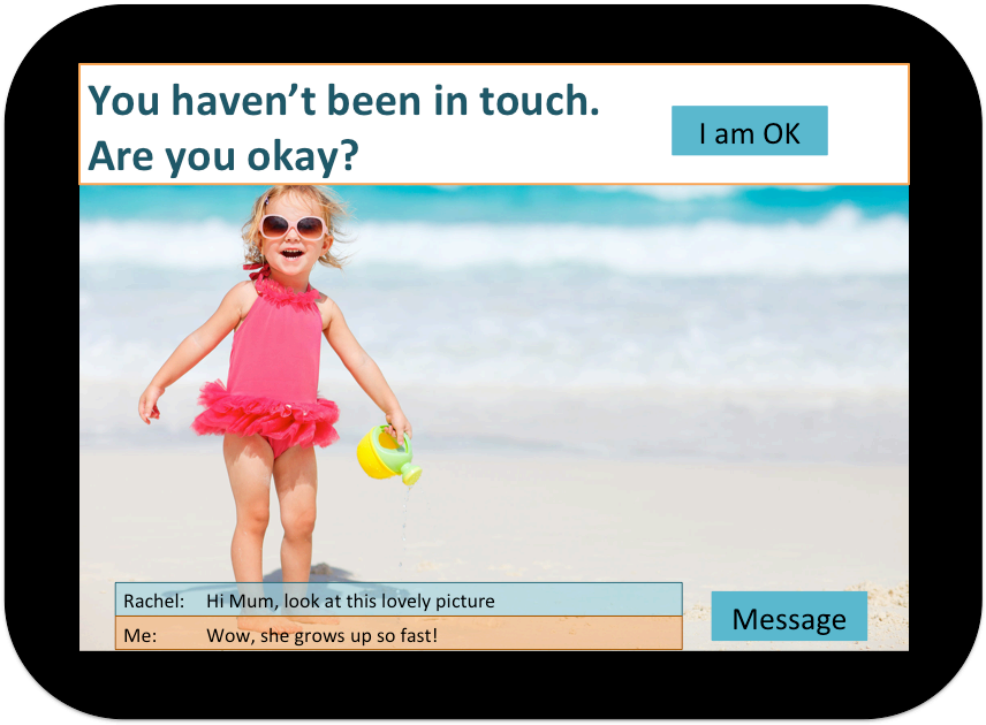


Figure 5.1 Example of screen of the iPad Emergency alarm application, based on an example of Pedell et al. (2012)

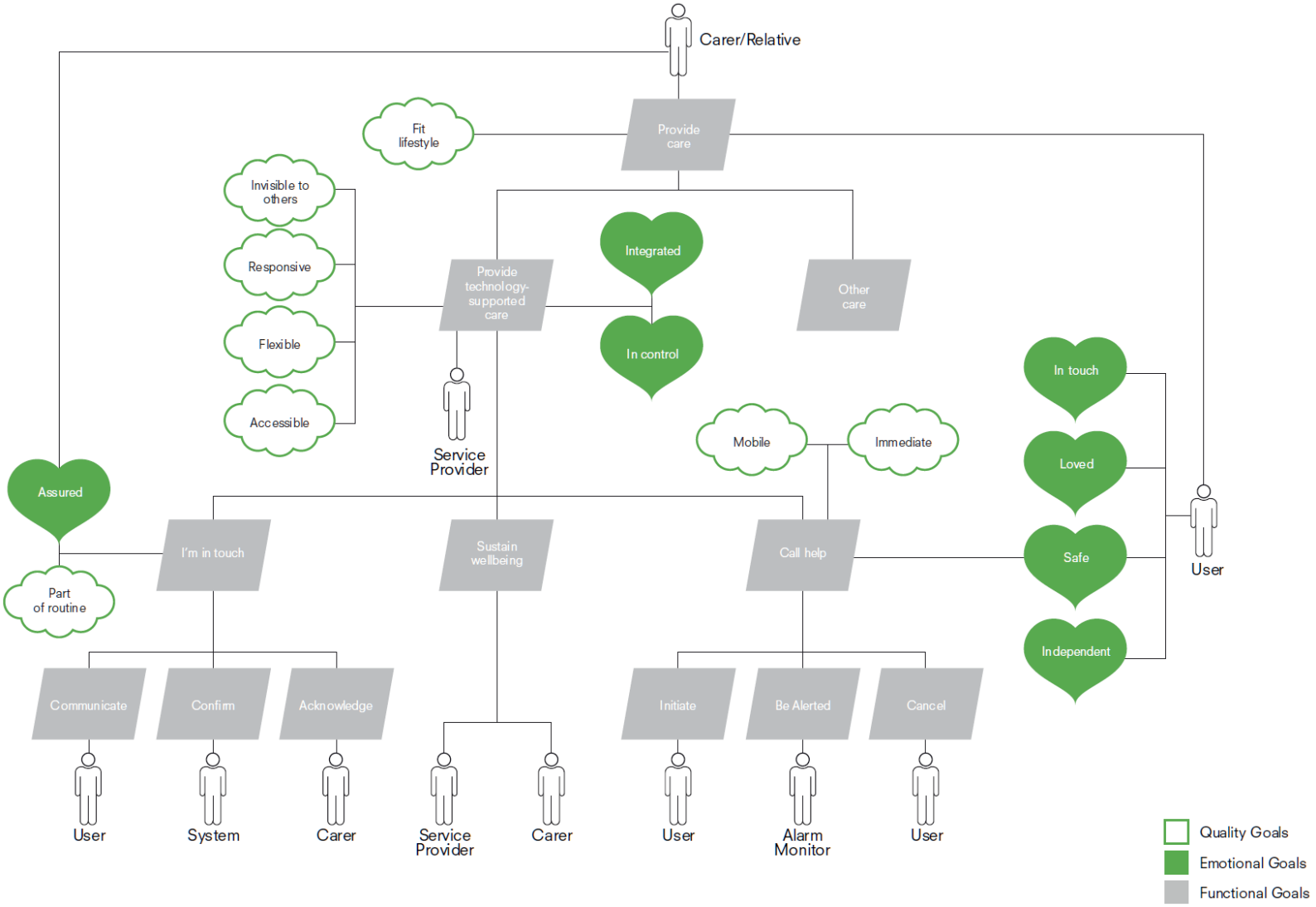
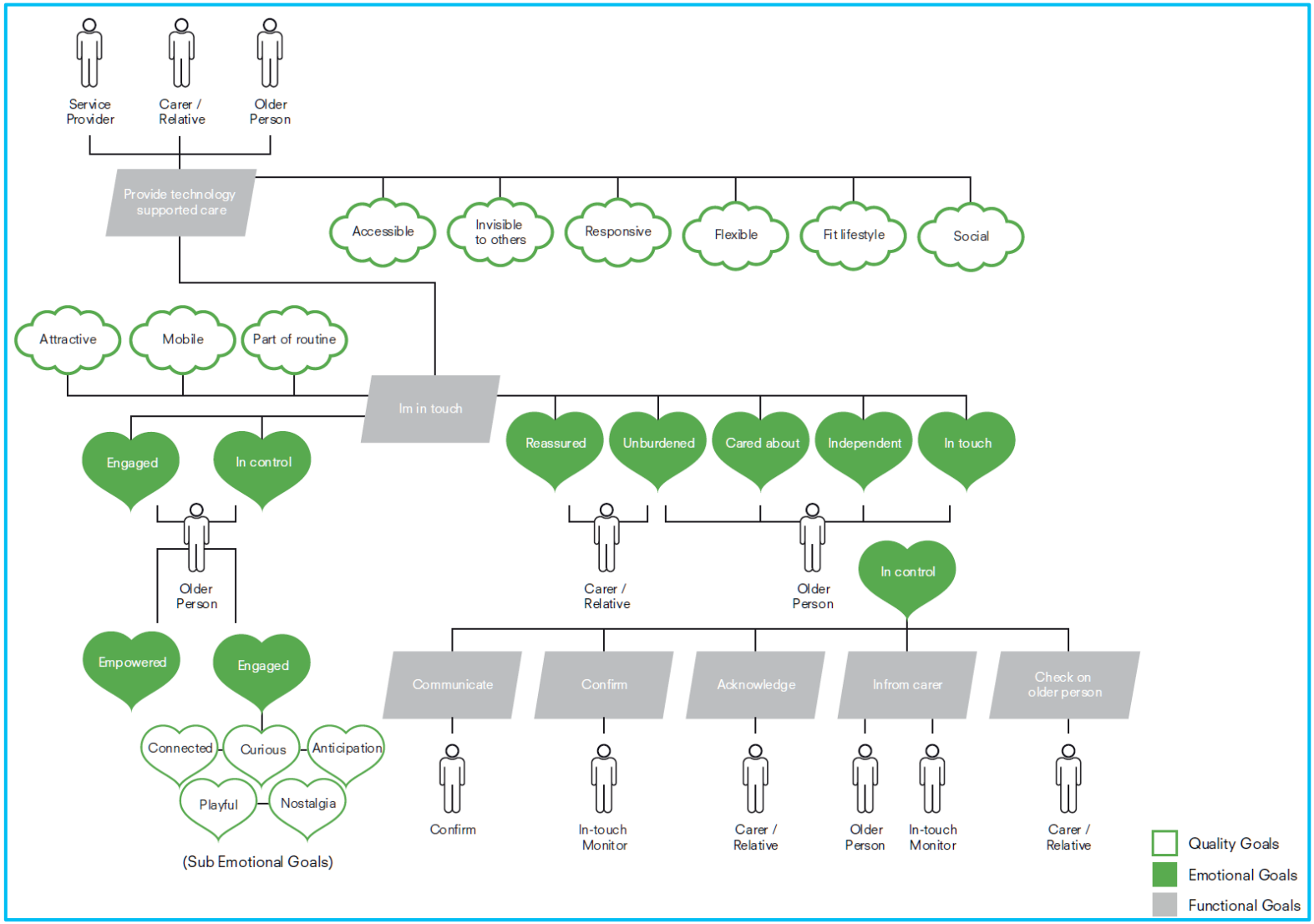


Figure 5.2 Goal map for emergency alarm use based on field study data (Pedell et al., 2012, p. 29)



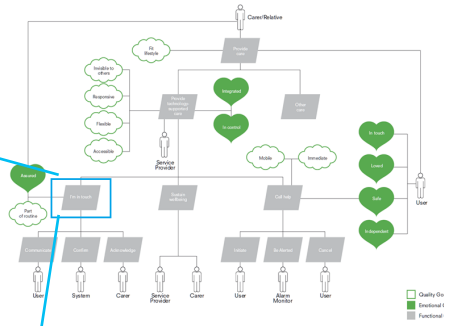


Figure 5.3 Goal model for emergency alarm use based on field study data for the specific functional goal "I'm in touch"(Pedell et al., 2012, p. 57)

This study shows that including (emotional) goals and interviewing the user group is very useful to increase the adoption of the product. The drawback is that this will cost a lot of time and therefore the value-goal model will be used to make this a simpler process. Therefore the emergency alarm case will be an example to show how the value-goal model can be used, which will give an idea to the product designer what the users want and decrease the number of possible goals. This will help the product designer to start a more concrete user study. Next to this, the emergency alarm case will be used for validating the value-goal model. If the value-goal model can show the same important goal categories as the goals that came up during the interviews, the possible existence of a link between values and goals is shown and the feasibility of the value-goal model is shown as well.

In order to validate the value-goal model, the goal map will be compared with the goal categories (identity, conversation, group, etc.) of the value-goal model by putting the goals of the goal map in the categories of the value-goal map, plus an extra category for the goals of the goal map that cannot be categorized according to the value-goal model. This comparison is shown in Table 5.4. The goal map of the emergency alarm case does not only include the goals of an older person, but the goals of the caretaker and the service provider as well. Since the user group for the value-goal model is chosen to be elderly people, only the goals of the older person in the goal map will be included in this validation.

Goal category	Goals of the Emergency alarm case	Number of matching goals
Identity	Safe (E) Independent (E) In control (E) Empowered (E)	4
Conversation	Communicate (F) Responsive (Q) Social (Q)	3
Sharing	In touch (E/F) Inform carer (F) Call help (F)	3
Amusement	Playful (E) Nostalgia (E)	2
Reputation	Invisible to others (Q)	1
Group	In touch (E/F) Loved (e) Engaged (E) Cared about (E) Connected (E) Social (Q)	6
Others	Curious (E) Unburdened (E) Anticipation (E) Accessible (Q) Flexible (Q) Fit lifestyle (Q) Attractive (Q) Mobile (Q) Part of routine (Q)	9

Table 5.4 Comparison of goal categories and goals from the Emergency alarm case

Section 4.1 explained that the value-goal model did not contain any quality sub goal, due to the fact quality goals explain how a product is (usable, convenient, fast, etc.) and this was not seen as a specific goal of social applications. In the comparison you can see that the goals from the emergency alarm case that are linked to the six goal categories, are mostly functional and emotional goals and the goals that are categorized in "Others" are mostly quality goals, so this confirms the prediction of section 4.1. The quality of the product is almost never the reason why a customer uses a product type with these specific functions and therefore is not set up as a goal in the value-goal model. More research could be done on if quality goals should be included in the value-goal model as well. However, there are some quality goals categorized in the goal categories from the value-goal model, such as *responsive*, *social* and *invisible for others*.

Since the goal map does not show the priorities, it is more difficult to compare the results of the value-goal model with the goal map. The third column of Table 5.4 shows the number of goals of the emergency alarm case that are sorted in a goal category. This indicates the importance of the goal category in the emergency alarm case. The list of most important goal category to least important goal category with the number of goals of the emergency alarm case in brackets is as follows:

1. Group (6)
2. Identity (4)
3. Sharing/Conversation (both 3)
4. Amusement (2)
5. Reputation (1)

The ranking is only qualitative and not quantitative. The difference between the ranks is not taken into account: *group* might be much more important than *identity*, while *amusement* and *reputation* might be almost equally important. An option would be to take the number behind brackets into account, which shows how many goals from the goal map, are belonging to a goal category. This shows the difference in importance between group and identity is bigger than the difference in importance between amusement and reputation. This could give more insight in the ranking of the goals, shown in the goal map. However, the differences between the number of linked goals to goal categories is small and therefore it is not certain these numbers can be used directly to show the quantitative importance.

Now the emergency alarm case is ready to be compared with the results of the value-goal model. The data will be described and the results of the value-goal model will be discussed in 5.3 and 5.4. Hereafter, the goal ranking of the value-goal model will be compared with the goals from the emergence alarm case to check the validity of the value-goal model in 5.4.

5.3 Method

This section will explain which data is selected. Since the ESS included 20 European countries, the right approach should be used in order to make the value-goal model usable for Australians as well. First an explanation will be given of which data will be selected based on the characteristics of the user group, followed by a description how to use Hofstede's cultural dimensions to select the right country which is most similar to Australia. At last, criticism on Hofstede's cultural dimensions will be discussed.

5.3.1 Characteristics

Different sources of data are available to find the average value ranking of a user group. The user group can be selected based on different characteristics, as these can influence the values of a user. For example, nationality; different populations have different manners, traditions and thoughts and therefore also different values. Another example of a characteristic is age; there are different studies showing the significant difference of value ranking between different age groups, this also applies to gender, income and education (Schwartz, 2006). The annual European Social Survey (ESS) contains all kind of questions from income to household and media usage and includes the measurements of the 10 values of Schwartz as well. The survey has been done in twenty countries in Europe (Europian Social Survey, n.d.). Next to this, the ESS includes many other characteristics like gender, health, religion, media use, their opinion about politics and immigration, education, household grid, job information. This can be very useful to get the ranking of values of a specific user group. The more specific and accurate the value ranking is, the more accurate the input for the model is and therefore the better the output of the model will be and thus a more correct result of the value-goal model will be given. The characteristics of the user group for the emergency alarm case were nationality, age and domicile information, and thus these three variables are selected for the validation of the value-goal model. However, if a product designer will use this value-goal model for another product or user group, he can filter the data on the variables corresponding to his user group. The average of the ranking of the user group will be used as input for the model.

5.3.2 Nationality

Due to the fact that nationality plays a big role in defining the values (Schwartz, 2006), this will be one of the characteristics used. The only problem with the ESS is the fact that the survey has only been done in European countries and this limits the use of the value-goal model. This also challenges the use of the Emergency alarm case to validate the value-goal model, because the emergency alarm case has been done in Melbourne, Australia. Data about the ten values of Australians is not openly available online and therefore another way to obtain the data for Australia has been chosen; since Australia is a Western country, there might be some similarities in the culture compared to the countries of the ESS. A way to compare these different countries and to choose which country is most similar to Australia, is the use of the cultural dimensions of Hofstede. The cultural dimensions are six points of how to describe a country (Geert Hofstede, 2001; Geert Hofstede, Hofstede, & Minkov, 2010) and are known for almost all the countries in the world.

When the culture of Australia is compared with the European countries tested in the ESS based on the six dimensions of Hofstede, the Australian culture is most similar to the United Kingdom, shown in figure 5.4. As can be seen, the dimensions *power distance, individualism, masculinity* and *indulgence* are on the same level for the United Kingdom and Australia. Australia and the United Kingdom differ however on the *long term orientation* and *uncertainty avoidance* dimensions. In order to see the effect of these dimensions on the values, another country is added, which has a bigger difference with Australia overall, but a more similar score on the *long term orientation* dimension: Ireland. Unfortunately such a country was not found for the *uncertainty avoidance* dimension. First the two differences between Australia and the United Kingdom will be discussed, followed by a comparison between Australia and Ireland

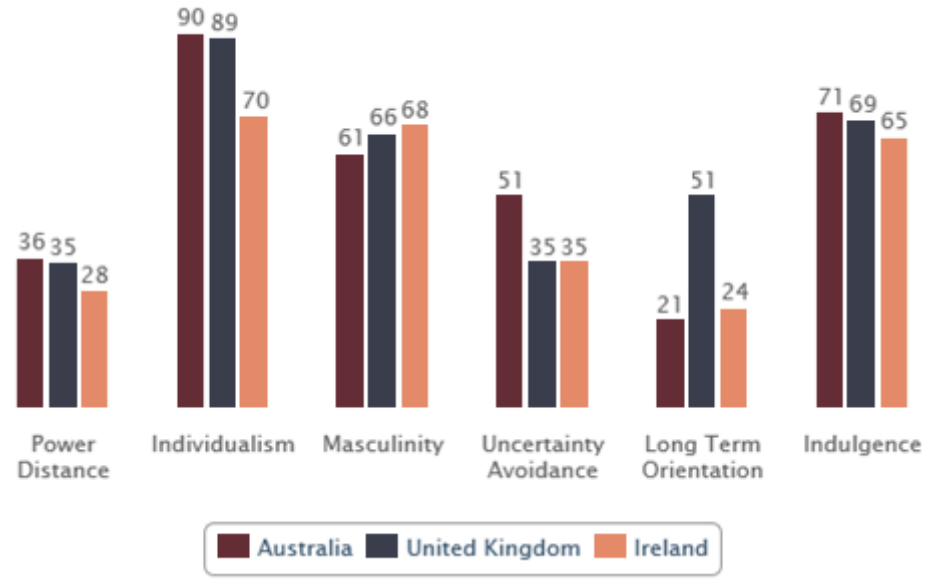


Figure 5.4 Hofstede's cultural dimensions for Australia, United Kingdom and Ireland (G Hofstede, n.d.)

The two differences between Australia and the United Kingdom are as follows:

- A relatively big difference can be seen between the Australian and British *long term orientation* dimension. This dimension represents the extent society stays connected with its own past while facing the challenges of the present and future (Geert Hofstede, 2001). This could mean that Australians are a bit more traditional, which might seem odd since the United Kingdom looks very traditional, but perhaps traditions will stick more to their traditions from home, since they are homesick. Next to this, the difference in the *long term orientation* dimension could mean that Australians try to respect and maintain these traditions, focus on having quick results and do not really focus on the far future, while British people score intermediate in this dimension and therefore do not have a dominant preference for the long term orientation (Geert Hofstede, 2001). Ireland is also included in the ESS and has a more similar score on the *long term orientation dimension.*
- Another smaller difference is in the *uncertainty avoidance* dimension, which represents the extent of how active the culture is in setting up institutions to avoid threads and decrease uncertainty. With the score of 35 the United Kingdom is a low *uncertainty avoidance* country, which means they are not worrying about ambiguous situations too much and are 'muddling through', a very British way of expressing this (Geert Hofstede, 2001). However, the rules that the British people do have, which is only a small number of rules, are very important for them. Australians have an intermediate score of 51, which means they are slightly more uncertainty avoiding.

These differences in Hofstede's dimensions could have an influence on the values. For example, if *long term orientation* and *uncertainty avoidance* would influence the values *tradition* and *security*, the Australians could rank the value *tradition* and *security* higher than British people. This is an estimation and no literature has been found saying that these values correspond to these specific dimensions of Hofstede. It is not known yet how a difference in cultural dimensions is shown in value ranking and therefore an estimation should be made in

this study. A way to estimate this is by making a comparison with a country that is less similar to Australia in total, but has a more similar score for the *long term orientation dimension* and/or the *avoidance dimension*.

Ireland is a country that is slightly less similar to Australia in total, but does have an equal level of *long term orientation dimension* and will therefore be included in the comparison. Ireland is quite similar to the United Kingdom and Australia, but the outstanding difference is the score on the *individualism dimension*, which shows Ireland is less individualistic than Australia and the United Kingdom. The value ranking of Ireland and the United Kingdom could be compared to see how the value *tradition* changed in ranking. This is done in section 5.4. The hypothesis is that Ireland should rank the value *tradition* higher, because Ireland scores lower on the *long term orientation dimension*. One point to address is the fact that Ireland and the United Kingdom had different score on two more dimensions (*Power distance* and *Individualism*) and this could influence the ranking of tradition again in an opposite way.

Unfortunately, there is no European country that has a similar score on the *uncertainty avoidance dimension* as Australia, without differing too much from the other dimensions of Australia and therefore there is no country to see if the value *security* will be more important if a country is more uncertainty avoidant. As it is not known which values are influenced by *long term orientation* and *uncertainty avoidance*, it could be that more values are different for Australians than for the British, besides security and tradition.

5.3.3 Criticism on Hofstede

There are some remarks on the cultural dimensions of Hofstede. Firstly Baskerville (2003) argues that Hofstede cannot just assume it is possible to equate nations with cultures. Next to this he argues you cannot simply quantify culture represented by cultural dimensions and matrices. He also claims the observer outside the culture can influence the results and he states that cultures can change and thus the cultural differences found in 1980, cannot be used anymore directly for recent research. Hofstede however did update the results between 1980 and now, 2017, which is latest done in 2010 (Geert Hofstede et al., 2010).

In addition, Fang (2003) questions the fifth dimension (*long-term orientation*), since Hofstede notes frequently that the fifth dimension is added as an Oriental contribution which is not common by Western cultures (Geert Hofstede, 1991). Furthermore, the fifth dimension does not have 2 opposing values at the two ends of the dimension, but rather has values which are closely related for the Oriental culture and therefore a culture can have characteristics from both ends of the dimension.

Although these critics do show the cultural dimensions of Hofstede are not perfect, the cultural dimensions still give a good view of the differences between countries. Next to this, the large amount of participating countries is an important factor to use Hofstede's cultural dimensions nevertheless. Since almost all countries are included, it is easy to compare the chosen country with a European country that is included in the ESS and the difference in values can be altered. Therefore, the cultural dimensions will still be used to compare countries of the user group with countries available in the ESS.

5.4 Execution

5.4.1 ESS data preparation

The ESS provides a large amount of data available for analysis. The variables used for this research are shown in Appendix A. Since characteristics of the user group for the emergency alarm case were nationality, age and domicile information, these three variables are selected for the validation of the value-goal model. The statistical program SPSS was used to process and analyse the data. In order to analyse the data, the data first had to be customized. The cases that contained missing data were deleted and cases that answered one of the questions with answers as 'refusal", "do not know" or "no answer" were deleted, because this data could not be used for the research.

In order to measure the human values according to the Schwartz Value Survey, the ESS asked 21 questions corresponding to the ten values. The documentation of the ESS gave the correct syntax to calculate the ranking of the values with these 21 answers and to centre the data to indicate the relative importance of each value in the value system, where lower scores signify that the value is more important (Schwartz, 2014).

5.4.2 Comparison of different cultures: Australia, the United Kingdom and Ireland

In order to use the model for Australia, the correct user group was selected, which means that the chosen participants are from the United Kingdom (due to the fact this country was most similar to Australia based on Hofstede's cultural dimensions), are older than 65 years (the youngest participant in the emergency alarm case was 66 years old), and live in the city centre or in the suburbs of a big city (as the interviewees all live in Melbourne). From the 15472 participants, 777 participants were left after selecting on these three criteria. The same is done with the data of Ireland. As explained, Ireland is similar to the Australian culture as well according to the cultural dimensions of Hofstede and therefore will be compared. The result is shown in Table 5.5.

	The United Kingdom	Ireland
Tradition	-0,3945	-0,3900
Conformity	-0,2870	-0,2613
Security	-0,6978	-0,7266
Self-Direction	-0,3381	-0,3260
Stimulation	1,0234	1,0250
Hedonism	0,6246	0,7094
Benevolence	-0,8144	-0,7874
Universalism	-0,6399	-0,6356
Power	1,0814	0,9829
Achievement	0,7624	0,7242

Table 5.5 Ranking of Schwarz values for people from the United Kingdom and Ireland who are 66 years and older and living in a (suburb of a) big city

The hypothesis was that Ireland should rank the value *tradition* higher, because Ireland scores lower on the *long term orientation* dimension. However, Table 5.5 shows the value

ranking for the United Kingdom and Ireland are similar and especially the ranking for the value *tradition* is equal. This could mean that the *long term orientation* dimension did not really influence the value ranking. Another reason could be Ireland and the United Kingdom had different scores on two other dimensions (*power distance* and *individualism*) and this could influence the ranking of tradition again in an opposite way. Therefore it is hard to say if the *long term orientation* dimension influences the value ranking. An explanation for the unchanging value *tradition* could also indicate that the criticism of Fang, described in 5.1.3, is well-founded and the *long-term orientation* is indeed not significant, at least not for Western countries, and should not be included in the theory.

As said before, Australia scored higher on the *uncertainty avoidance* dimension than the United Kingdom and Ireland. Since there is no country questioned in the ESS with the same score as Australia on this dimension, the values cannot be altered based on a similar *uncertainty avoidance* dimension. Neither is there literature found about a link between being *uncertainty avoiding* and the value *security*. Therefore this difference will be ignored, but taken into account in the discussion.

Based on these motivations the value ranking of the United Kingdom will be used in order to obtain the values of the Australian elderly for the emergency alarm case.

5.4.3 Results

The value ranking of the United Kingdom for the specific user group was used as input of the value-goal model of section 5.1 The results are shown in Table 5.6, ranked from most important goal categories to the least important goal categories.

	Ranking the United Kingdom
1	Group (-1,7522)
2	Identity (-1,4304)
3	Sharing (0,3895)
4	Conversation (0,5430)
5	Reputation (1,1623)
6	Amusement (1,6480)

Table 5.6 Ranking of the goal categories for people from the United Kingdom and Ireland who are 66 years and older and living in a (suburb of a) big city after using the value ranking in the value-goal model

The table shows the order of the importance of the goal categories where 1 means most important and 6 least important and the rates given to the goal categories (the values between brackets). This shows the score that was calculated for the goal categories based on the value ranking of the user group and the links between the values and the specific goal category.

5.5 Comparing the data

5.5.1 Qualitative comparison

In order to validate the value-goal model, the ranking of the goals obtained via the goal map of the emergency alarm case will be compared with the ranking of the goal categories

obtained via the value-goal model. This comparison however does not include the differences between the rankings. This comparison is shown in Table 5.7.

Ranking	Method	
	Value-goal model	Goal mapping
1	Group (-1,7522)	Group (6)
2	Identity (-1,4304)	Identity (4)
3	Sharing (0,3895)	Sharing/Conversation (3)
4	Conversation (0,5430)	Sharing/Conversation (3)
5	Reputation (1,1623)	Amusement (2)
6	Amusement (1,6480)	Reputation (1)

Table 5.7 Comparison of the ranking of the goals via the value-goal model and the goal map in the emergency alarm case

Further research is necessary to compare the different goal rankings properly, but an attempt will be made to compare the first results. If the rates given to the goals are neglected (the values between brackets), the ranking of the goals for the value-goal model is almost equal to the ranking of the goals found in the goal map. One difference is the fact that the goal categories *sharing* and *conversation* are for goal mapping equally ranked and for the value-goal model *sharing* is more important than *conversation*. However, the rates between those two goals are small (respectively 0,3895 and 0,5430), which shows they are also seen in the value-goal model as almost equal. A bigger difference is in the ranking of the goal categories *amusement* and *reputation*; with goal mapping *amusement* is more important, while with the value-goal model *reputation* is more important. The difference is not that small between reputation and amusement in the value-goal model (respectively 1.1623 and 1.6480), but when linking the goals of the goal map to the goal categories of the value-goal model, the goal category *amusement* is linked to two goals and *reputation* is linked to only one, which is only a small difference. This may be a reason why the importance of these goal categories are switched.

5.5.2 Quantitative comparison

As said before, the differences between the rates given to the goal categories are not taken into account. In order to give an idea how this could be done, an example of a possible way to do this is given. Further research will be necessary however on how to compare these rankings. For both models the ranking of the goal categories is defined based on a number given to a goal category. For the value-goal model this is the number that is calculated based on the value ranking of a person and the possible link between the value and goal. For the goal map, the number of found goals that are linked to a certain goal category, is used.

Since the rates given to the goals obtained from the value-goal model and the goal map are not comparable right now, a scale should be set up to compare the differences. There are however different possibilities to set up the scale. The range of rates for the goal categories in the value-goal model are between -1.8 and 1.6 and for the goal map between 1 and 6. The most and least important goal should be on the end of both scales. Therefore the scale for the value-goal model will be from -1,8 with *group* until 1,6 with *amusement* and the scale for the goal map will be from 6 with *group* until 1 with *reputation.* This is shown in Table 5.8.

Value-goal model		Goal map	
Rates	Goal category	Rates	Goal category
-1,8	Group	6	Group
-1,4	Identity	4	Identity
0,4	Sharing	3	Sharing Conversation
0,5	Conversation		
1,2	Reputation	2	Amusement
1,7	Amusement	1	Reputation

Table 5.8 Quantitative comparison of the rating for the goal categories obtained via the value-goal map and the goal map from the emergency alarm case

Table 5.8 shows the rates between *group* and *identity* is smaller in the value-goal model than in the goal map. *Sharing* and *conversation* are almost on the same level and *amusement* and *reputation* are switched and have a fairly big difference.

Since the differences between the rates of the goal categories based on the goal map are small and the rates are defined based on an estimation (a number of goals seemed to belong to a goal category and this number defined the rate of the goal category) there is relatively big room for error and therefore using this rate for validation is not possible. Next to this, the rates of the goal categories calculated in the value-goal model, are based on the links between the values and goals, which are not completely based on literature. Therefore you cannot say that based on Table 5.8 the value-goal model is valid or not. A solution could be to ask the authors of the emergency alarm case if they could sense the importance for different goals or they can be asked for the documentation of the interviews, perhaps the importance is more discussed in there.

5.6 Conclusion

This chapter showed the weighted sum model could be used to implement the link between values and goals in an Excel model in a simple, yet effective way. This resulted in a value-goal model that could be used to calculate the ranking of goal categories based on the value

rating of the user group. The value rating could be obtained with the European Social Survey, and by combining this with the cultural dimensions of Hofstede, an estimation of the rating of the values of Australians could be made. This did however show more research was necessary on how Hofstede's cultural dimensions influenced the value rating of a country.

By dividing the goals found in the goal map of the emergency alarm case, an estimation could be given of how important the goals were found in the goal map, according to the elderly that were interviewed. When comparing the goal ranking in a qualitatively way, the goal ranking obtained via the value-goal model was quite similar as the gaol ranking obtained via the goal map of the emergency alarm case. However, when comparing the goal ranking in a quantitative way, the difference between the goal priorities were bigger and showed more research is necessary.

This chapter showed the existence of a link between values and goals. By knowing the drivers behind the goals of users, the goals can be better identified and therefore better products can be designed.

6 Conclusion

This chapter will conclude the research and discuss the findings in section 6.1. Next, the findings will be related to previous work and the theoretical and political implications will be described in section 6.2. In section 6.3 the limitations and the problems that arose during the research of will be discussed. At last, the recommendations for future research will be explained in section 6.4.

6.1 Recapitulation of purpose and findings

The goal of this study was to answer the following research question:

"To what extent can a model be created to link the values of a user group to its goals for social applications based on the Goal-oriented Requirements Engineering and Emotional Goal Theory?"

This study showed with a proof of concept that links are possible between values and goals. The emergency alarm case showed the value-goal model would point the product designer in the right direction, since the value-goal model identified similar goals as was shown in the goal map, obtained by interviews. This shows that after more research is done and the value-goal model is properly validated, the value-goal model could substitute the first interviews and give the product designer a better idea what the users want.

The Schwartz Value Survey was found to be the most suitable value system to model the values. Schwartz includes external factors and the survey is applicable for all cultures. Next to this, Schwartz Value Survey only has ten values, while the well-known Rokeach Value Survey has 36 values, which is hard to remember for participants to rank. Another advantage is that the Schwartz Value Survey lets the participant rate the values based on over 20 statements. In the Rokeach Value Survey the participant has to rank the values and here it is not possible to indicate that two values are equally important. The participant has to choose one value over the other. This will give an inaccurate result. The Schwartz Value Survey also is frequently used and data is available for different user groups, which is not the case for the List of Values.

There was chosen to categorize the goals for social applications by using the theory of Kietzmann and this resulted in the following goal categories: Show and keep your own identity (Identity), Have a conversation (Conversation), Share information (Sharing), Amuse yourself (Amusement), Show your reputation (Reputation) and Feel part of a group (Groups). The ten values of Schwartz are linked to these six goals. Literature showed a number of links were already found in empirical studies, but many links were not. However, a number of links could be made based on logic reasoning. These links were used to create the value-goal

model in Excel, which has the values of a user group as input and has a list of most important goals of this user group as output.

The method of Hofstede could be used to compare cultural dimensions of different countries. Because of the similarities between countries the European Social Survey can still be used to obtain data about the values of a population, even when the specific country is not included in the European Social Survey.

When comparing the priority of the goal categories, which are obtained via the emergency alarm case and via the value-goal model, in a qualitative way, it can be seen that there are many similarities. Comparing the priorities of the goal categories in a quantitative way, the differences were bigger. Therefore, more research is necessary to validate the links and to increase the usability. However, this study has shown that creating links between values and goals is possible and that, after more research is done and the value-goal model is properly validated, the value-goal model can be used by product designers to know the wishes of the users faster.

6.2 Relation with previous research

The results from the value-goal model are in line with those of Miller et al. (2015) and Pedell et al. (Pedell et al., 2012). The value-goal model includes functional goals as well as emotional goals. This shows the emotional goals are important for the users, just like Miller et al. (2015) Pedell et al (Pedell et al., 2012) argue.

My study offers suggestive evidence for the fact that a link between values and goals exists.

This model can be used by businesses that want to design a new product or improve an existing product. By using the EGT in combination of GORE, the product designer will get a better understanding of the wishes of the user and therefore create a product that better suits the needs of the user. The use of GORE and the EGT are already proved to be useful in many cases. This value-goal model will give a framework for social application product designers to know which goals their users could have. In this way, they will have a better systematic approach to select the right goals and therefore select the right requirements.

6.3 Reflection

This section will describe what could have been done differently during this study and will discuss the limitations of the study, problems that arose and choices made during this study. This will be discussed per phase; 6.3.1 will discuss the setup of the links between values and goals, 6.2.2 will describe the value-goal model and 6.3.3 will discuss data issues.

6.3.1 Links

One of the biggest challenges was to find the right argumentation to connect the values with the goals. There was no literature found that linked all ten specific values of Schwartz to these six specific goals. An alternative was to search for literature describing a possible link to one single value and one single goal category in a broader sense, such as somebody who wants to be a leader, also wants to show off to his friends. Now the value *power* and the goal *reputation* can be linked. Although with this method more links were found, there was still no argumentation for some of the links, while these made sense. These links are still included in the value-goal model based on common sense, and although the comparison with the

emergency alarm case shows the value-goal model is not wrong, still a proper validation is necessary to justify the use of the value-goal model. One of the validation methods is asking other experts to take a look at these links, ask them if they would make the same link between the values and goals and see if they give the same arguments for the link. Next to this, an empirical research will be of great help to find the real relation between values and the goals.

The second dilemma is that only one link is labelled as negative, which states that if you rank conformity high (one does not want to upset others) you will avoid conversations, so you will not have the chance to upset anyone. This link was based on literature, but there was no empirical research made for this link. No other link was seen as negative, because in most cases when a person ranked a certain value as high, he was motivated for a goal or he was just not interested in a goal, avoidance of the goal was not really interpreted. But this is mostly based on logic reasoning and therefore the actual links might be different and this can influence the value-goal model. A possible resolution is the empirical research as described above. This will not only show if there is a link and how strong the link is, but also if the link is positive or negative.

6.3.2 Value-goal model

In 5.4.3 the rating of the goals was shown, which were rates between -1.7522 and 1.6480. This shows how important the user group thinks the goal is. In this study, the focus was more on the order of the ranked goals and less on the rating of the goal. A simple quantitative comparison is made in 5.5.2, which showed bigger differences between the priorities of the goal categories than was shown in the qualitative comparison. Therefore more research could be done on how this issue is solved at other multi criteria analysis.

Another limitation of the use of this value-goal model is the fact that the model is made for social applications, which can make the value-goal model too general to get really specific goals, such as the goals shown in the goal map of the emergency alarm case. While the goal map in the case study showed specific goals like, *social, engaged, in control, invisible to others* and *responsive*, the goals of the value-goal model were limited to higher level goals, like *identity, reputation* and *group.* When using the value-goal model, the product designer still has to specify the goals to reach lower level goals that are more useful to the product designer.

On the other hand, the value-goal model is only made for social applications and when designing a television for example, other goals are necessary and therefore other links have to be created that connect the ten values to the goals for watching television. This shows another limitation of the value-goal model: a direction for the goals was already chosen in order to create the value-goal model. For the emergency alarm case, they did not know prior to the interviews that communication and being connected with their close ones was this important and the goals that the researchers would think of were much more focused on the functional requirements; the alarm should send an alarm to the hospital if something happens and no more than that. Due to the interviews they looked much further. This might happen as well when a similar value-goal model is made for another product category, other than social media. A solution for this might be to create a survey containing enough topics, to make the value-goal model bigger and broader and for more products, so product designers can look outside their scope and see other important goals they can incorporate in their product design.

When the goal categories were set up, the (sub) goals only included functional and emotional goals and no quality goals. The reason why no quality goals are found in the value-goal

model is because quality goals are about the way a product works (such as the usability, quality and sped of the application). The quality of the product is almost never the reason why a customer uses a product type with these specific functions and therefore is not set up as a goal in the value-goal model. However, the goal map of the emergency alarm case showed many quality goals, since these are still important for the user. Although a number of these quality goals were logic, such as accessible, attractive, flexible, mobile and part of routine, other quality goals were a bit surprising and important to take into account: fit lifestyle, invisible to others, responsive and social. More research could be done on whether quality goals should be included and how to include them better in the value-goal model as well.

Another choice that had to be made was how to represent the ranking of the values. In the first examples of the value ranking in this study, the values were ranked from 1 to 10, where 1 is the least important value and 10 is the most important value. However, the ranking can for example also increase linearly or exponentially, which increases the weight of a value due to the fact it is more important. Since Schwartz's values were rated, this rating was used, which probably showed the best representation of the importance of the values for a person, since these are the true values, while a ranking is relative and the difference between the ranks are not known. As the available values are already ranked, this method of ranking was kept for the value-goal model.

6.3.3 Data

The biggest problem with the data was finding the right dataset, which included Schwartz Value Survey, but also gave the option to select a specific user group. This was found in the European Social Survey, the drawback was however that this information was only for 20 European countries. In order to adjust this data for the emergency alarm case, Hofstede's cultural dimensions were used to compare Australia with the 20 countries of the ESS. The countries that were most equal to Australia were the United Kingdom and Ireland. The only difference was that Australia had a higher *uncertainty* avoidance and a lower *long term* orientation. As said before, the *uncertainty avoidance* dimension could represent the value of security and the dimension of *long term orientation* could represent the value of tradition. An option could be to use the ranking of the United Kingdom and to decrease the ranking of *tradition* and increase the ranking of *security*. If this is a correct way of reasoning, a choice has to be made on how much this should be in- or decreased. However, the results of the value-goal showed that for the Irish people the rate of the value *tradition* was equal to the ones of British people, which was unexpected, since they had a different score for the *long term orientation dimension*.

Therefore the ranking of the United Kingdom was not changed and was used for the case study, and thus the used value ranking might be slightly different than the real value ranking of Australia. Therefore a study to the relation between Hofstede's cultural dimensions and Schwartz Value Survey is necessary. Since both Hofstede cultural dimensions and Schwartz Value Survey are well known frameworks, it would make sense to think a link already has been made between those frameworks in literature and it would be no problem to adjust the United Kingdom value ranking to the Australian value ranking based on the differences in Hofstede's cultural dimensions. However, Schwartz also came up with the cultural dimensions to describe a culture instead of an individual and the main focus is on the comparison between Hofstede's cultural dimension and Schwartz cultural dimensions instead

of Schwartz Value Survey. Neither is there a clear comparison between Schwartz Value Survey and his cultural dimension.

Due to the fact Australia is a Western country just like the European countries, it was easy to find a country that was participating in the ESS. However, if a designer wants to use the value-goal model for a user group from a less Western country/less similar to one of the countries studied with the ESS, the data of the ESS cannot be used and a different solution has to be found. One solution is to use the dimensions of Hofstede to set up the ranking of the values. Every cultural dimension of Hofstede will have a relation with the values of Schwartz. The ESS can still be used to see how a characteristic like age, income or education might affect the values of a person in one of those 20 countries. This correlation can be used to recalculate *the population specific value ranking* with these specific characteristics. In this way, the model can also be used for other, less Western countries.

A limitation of the study is that only one case study is done. The reason for this was that no other case studies were available yet on social application products that included goals. Using other case studies as well, will increase the validity of the value-goal model.

6.4 Recommendations

In general, the value-goal model showed the existence of a link between values and goals. By knowing the drivers behind the goals of users, the goals can be better identified and therefore better products can be designed. Therefore the existence of these links shows this is an interesting direction for further research. The recommendations will be given for the links, the value-goal model and the data.

6.4.1 Links

The most important next step is to do a quantitative research on the link between the values and the goals. This research will ask statements about both the values and goals of the participants and the relation can be calculated. This will also make it possible to give an index of how strong the link between a certain value and goal is, which makes the model more accurate. Next to this, a survey can check if the negative link between the value *conformity* and the goal category *conversation* exists and if there are more negative links between the values and goals.

Another way to make the links more valid, is to ask different experts to create links based on literature and their own thoughts as well. If the list of links is the same as the one of this study, the links are more valid. An expert can be for example somebody who is working with values at his work or using GORE to design products. They have expertise on the situation and have worked with these concepts for a long time.

In this study, the other possible drivers behind goals were neglected and seen as outside the scope of the study. It would be interesting to see if including other factors together with the Schwartz Value Survey, might give more valid results. A possibility is to include the personality traits as described in section 1.1.2 or another system to describe a person.

6.4.2 Model

A possibility for future research is to create a model for other products than social applications. Since the link between values and goals seems to exist, this could be useful for other sectors as well. An option can also be to create a broader model, useable for more types

of products. If the proposed empirical research between values and goals, contains a large amount of different goals, more goals can be used in the value-goal model and thus the scope of the model can be bigger and for more product types. A challenge will still be to keep the goals specific enough to be useful for the product designer.

More research is necessary on how the ranking should be represented. In this study the rating of the values of the ESS was used, but maybe this rating has to be altered to be able to compare the ratings with other ratings. This study did not investigate this and perhaps other multi criteria analyses have a solution for this. Thus a research on other multi criteria analyses is needed. Another possibility to rank the values is with relative ranking instead of absolute ratings. For example the most important goal is numbered with 1 and the least with 10. Or the ranking is exponential. The effect of this difference in representing the ranking of the values, can be done as further research.

6.4.3 Data

One of the most interesting things to investigate in more details is the links between the cultural dimensions of Hofstede and the values of Schwartz. In order to make the value-goal model applicable to all countries, there has to be a way to obtain the values of a culture in a systematic way, without data about the SVS for that specific country. An option could be to do a quantitative research that asks the values of people that have different cultural dimensions. In this way the correlation of the different cultural dimensions on the values can be calculated and based on the cultural dimensions of a country the *population specific value ranking* can be determined. Since the ESS data can be used to calculate the correlation between certain characteristics and the values, the *population specific value ranking* can be adjusted to the user group based on their characteristics.

Another possibility for further research is to use multiple case studies to validate the value-goal model. This could be case studies from the same area (Australia) to see if there is any variety between different user groups and if the value-goal model can cope with this variety. In addition, a case study from the UK or another Western country included in the ESS, could be used, since the values of this country is known. Another option could be to use case studies from other countries that are different than the (Western) culture of Australia and the European countries, for example a Middle East country or an African country. This could show if the value-goal model is also suitable for non-Western countries.

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Appendix

A. Selected values in the ESS

The following cases are selected to include in the dataset used to obtain the ranking of the values as input for the value-goal model:

- Country
- Respondent's identification number
- TV watching, total time on average weekday
- Personal use of internet/e-mail/www
- Most of the time people helpful or mostly looking out for themselves
- How often socially meet with friends, relatives or colleagues
- Religion or denomination belonging to at present, United Kingdom
- Gender
- Year of birth
- Age of respondent, calculated
- Ever had children living in household
- Domicile, respondent's description
- Doing last 7 days: retired
- Household's total net income, all sources
- Personally have mobile telephone
- Highest level of education, United Kingdom: Up to 2 or more A-levels or equivalent
- Values
    - Important to think new ideas and being creative
    - Important to be rich, have money and expensive things
    - Important that people are treated equally and have equal opportunities
    - Important to show abilities and be admired
    - Important to live in secure and safe surroundings
    - Important to try new and different things in life
    - Important to do what is told and follow rules
    - Important to understand different people
    - Important to be humble and modest, not draw attention
    - Important to have a good time
    - Important to make own decisions and be free
    - Important to help people and care for others well-being
    - Important to be successful and that people recognize achievements
    - Important that government is strong and ensures safety
    - Important to seek adventures and have an exciting life
    - Important to behave properly
    - Important to get respect from others
    - Important to be loyal to friends and devote to people close
    - Important to care for nature and environment
    - Important to follow traditions and customs
    - Important to seek fun and things that give pleasure

Improving the Emergency Alarm Products for Elderly: Using Values to Obtain the User Goals

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Abstract

Although emergency alarm systems could be very useful for the elderly, still a large number does not use the alarm. Therefore Pedell et al. tried to design an emergency alarm by including the emotions of the user into the design process, which resulted in a higher use of the emergency alarm. The only drawback is that obtaining the emotional goals is time consuming and expensive and thus another method has to be created. This is done by creating a value-goal model by a literature study, which links the values of the users according to Schwartz Value Survey to goal categories of social applications, so the product designer can identify the most important goals based on the values of users. The value-goal model was validated with the emergency alarm and showed to select the same goals as the researchers did via interviews. The next step is to test these links empirical.

Author Keywords

Emotional Goal Theory; Goal-Oriented Requirement Engineering; Schwartz Value Survey; emergency alarm

ACM Classification Keywords

D.2.1 Software: Software Engineering: Requirements

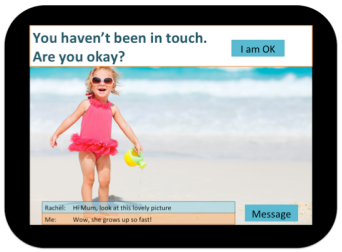

Figure 1 Example of screen of the iPad Emergency alarm application, based on Pedell et al. [7]

Introduction

Most of the eHealth systems are interactive systems to update the caretaker or relative about the status of the elderly person. Although these systems provide great benefits, still many elderly refuse the use of these systems due to all kind of problems and due to the fact the wishes of the users are not well defined [1,2]. Therefore Pedell et al. [7] tried to design an emergency alarm by including the emotions of the user into the design process. This was done by interviewing the users, which was a time and cost-inefficient method. Therefore, a model was needed to point the product designer in the right direction and filter the wishes of a user.

The emergency alarm

The basis of obtaining the wishes of the users of the emergency alarm was the Goal-Oriented Requirement Engineering (GORE) method [11], which uses goals of the users to define the requirements for a product. The goals can be functional or qualitative that drives respectively the functional and non-functional requirements. Miller et al. [6] argued that when using a GORE method the designers fulfill the requirements as they themselves would like it to be, instead of fulfilling the desires of the users, which lead to a failure of the product. Therefore, Miller et al. [6] argues the GORE method should be improved and Miller et al. [6] suggests doing this by including emotional goals, next to functional and quality, in order to incorporate all goals, which is called the Emotional Goal Theory (EGT). This will help the designers to obtain a better understanding of the other goals.

The GORE method in combination with the EGT is used for the design of the emergency alarm by Pedell et al. [7]. They made a goal map, which is an illustration of the goals the different users have for this product, including the functional, qualitative and emotional goals. After sketching the initial goal map, they interviewed the elderly and made a new goal map. The new goal map showed that the initial goal was missing a large number of emotional goals, for example feeling attached, feeling in touch, in control and loved and this could explain why the initial product was not used by the elderly people.

Including these emotional goals in the design of the emergency alarm, resulted in an iPad that showed pictures of their relatives and friends (Figure 1), and interaction with this iPad meant that they were okay and did not need any help, which is the main function of an emergency alarm system. This product was more popular and answered the needs and wishes of the elderly in a better way [7]. Thus by including emotional goals, the product design was improved.

Problem statement

However, the process of obtaining these goals, which is by having interviews with the potential users, is cost and time inefficient. To address this issue we present a model to predict the goals of the users and therefore it should be known what drives a goal. The hypothesis of this study is that people have different goals, because people are different and unique. Although there are many different systems to characterize people, there has been chosen to characterize people based on their values, because in this study a group of users will be characterized and the value system focuses on classifying groups, while the other classes focus more on classifying an individual. This study will try to create a link between the values and goals of the users.

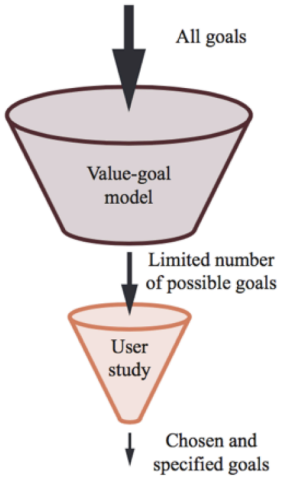

Figure 2 The use of the model of the link between values and goals as a filter before a user study

The link between the values and goals could be used to filter the user goals, as shown in Figure 2. When a product designer has to identify the goals and requirements by a user study, the number of possible goals are countless. This link between values and goals could give the product designer a direction of preferred goals by the users of the specific product. The number of possible goals can be filtered by this link, giving the product designer a smaller amount of goals to use as input for the user study. This value-goal model will be a proof of concept and will thus demonstrate the feasibility of the idea to link values to goals.

Method

Value system

Different systems are available to define a person's value, but for this study there has bene chosen to use Schwartz Value Survey (SVS), since it is applicable for all cultures, it is frequently used and therefore much data using the SVS is online available, and it includes external factors [9]. The SVS argues there are 10 important values for a person and a participant gives a rating to every value. This study will link the values defined by Schwartz to the goals.

Goal categorization

In order to set the scope for the model, there has been chosen to make the value-goal model for social applications specifically. Goal categories will be set up to make the value-goal usable for more than just one product. As the value-goal model will link values to goals, a list of goals is needed, which the values can be linked to. These goals should be social application specific. Kietzmann, Hermkens, Mccarthy, & Silvestre [5] created a honeycomb explaining the functions of social media, in order to make social media more understandable, to explain the various forms it can take and to show how to engage with social media. Next to the functions of Kietzmann et al. [5], the goal amusement is also added, since it is an important factor in motivating people various use social media to achieve a sense of leisure and amusement [3,8,10].

The five functions of Kietzmann et al. [5] and the added goal of amusement, are transformed to the following goals:

1. Show and keep your own identity (Identity)
2. Have a conversation (Conversation)
3. Share information (Sharing)
4. Amuse yourself (Amusement)
5. Show your reputation (Reputation)
6. Feel part of a group (Groups)

Value-goal model/ links

When the value system and the right goal categories are defined, the links between these values and goal categories are created.

Different literature was found to link values to goal categories. However, not all links that would exist according to common sense, is found in literature. An example of this is the fact that if you prioritize the value *achievement*, you will also try to show your reputation to the people around you. This link is not found in literature, but should be included in the model. Therefore a couple of links in the model are not investigated yet. As long as these thoughts are correctly motivated, these will also be included in the value-goal model.

In order to use the value-goal model, data is needed to know the value ranking of a certain user group. The

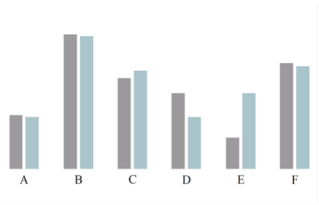

Figure 3 Hofstede's Cultural Dimensions for Australia (grey) and United Kingdom (blue) [10], in which:

A: Power distance
B: Individualism
C: Masculinity
D: Uncertainty Avoidance
E: Long Term Orientation
F: Indulgence

European Social Survey (ESS) [4] asks participants from twenty European country about their SVS values and next to this collect data about other topics, such as social demographics, gender, age and income. This data can be used to select the right user group to obtain the right values, which can be used as an input for the value-goal model. If the user group is from a different country than is included in the ESS, the cultural dimensions of Hofstede will be used, which compares cultures with each other, to choose the country from the ESS that is most similar to the country of the user group. The cultural dimensions of Hofstede showed Australia was very similar to the United Kingdom except for one dimension: the Long Term Orientation. But this dimension seems to have a minimum influence on the values of a person.

The value-goal model is modeled as a multi criteria analysis In the ESS, a value is more important to a person if the value's rating is negative. The score for a goal category is the sum of the ratings of the values that are linked to that goal category. The lower the score, the more important the goal category is.

Results

The emergency alarm case is an example to show the use of the value-goal model. Next to this, the emergency alarm case is used for evaluating the value-goal model as a proof of concept. If the value-goal model can show the same priority of goal categories as the goals that came up during the interviews in the emergency alarm case, the possible existence of the link between values and goals is shown and the feasibility of the value-goal model is shown as well.

Since the user group of the emergency alarm case lived in the city of Melbourne and had an age of 66 years and older, these characteristics are also selected in the ESS. Therefore the average is taken of the value ranking of people in the UK only living in a (suburb of a) big city and with an age of 66 years and older. This average ranking is used to calculate the goal ranking in the value-goal model and the results are shown in Table 1 in the second column.

In order to compare the emergency alarm case with the value-goal model, the goals from the goal map will be compared with the goal categories of the value-goal model (identity, conversation, group etc.) by putting the goals of the goal map in the categories of the value-goal map, which resulted in a list of most important goal category to least important goal category with the number of goals of the emergency alarm case in brackets. This is shown in Table 1 as well in the third column.

	Method	
	Value-goal model	**Goal mapping**
1	Group (-1,8)	Group (6)
2	Identity (-1,4)	Identity (4)
3	Sharing (0,4)	Sharing/Conversation (3)
4	Conversation (0,5)	Sharing/Conversation (3)
5	Reputation (1,2)	Amusement (2)
6	Amusement (1,6)	Reputation (1)

Table 1 Comparison

Further research is necessary to compare the different goal ranking properly, but an attempt will be made to compare the first results. Qualitative comparison shows the goals are almost equally ranked, except for amusement and reputation, which are switched.

Value-goal model		Goal map		
Rates and Goal category		Rates and Goal category		
-1,8	G	6	G	
-1,4	I			
		4	I	
		3	S	C
0,4	S			
0,5	C			
		2	A	
1,2	R			
1,7	A	1	R	

Table 2 Quantitative comparison of the rating for the goal categories obtained via the value-goal map and the goal map from the emergency alarm case (G=group, I=identity, S=sharing, C=conversation, R=relationship, A=amusement)

A first attempt is also made to compare the methods quantitatively. Since the rates given to the goals obtained from the value-goal model and the goal map are not comparable right now, a scale should be set up to compare the differences. The most and least important goal categories are used as ends of the scale.

Table 2 shows the rates between *group* and *identity* is smaller in the value-goal model than in the goal map. *Sharing* and *conversation* are almost on the same level and *amusement* and *reputation* are switched and have a fairly big difference.

Since the differences between the rates of the goal categories based on the goal map are small and the rates are defined based on an estimation (a number of goals seemed to belong to a goal category and this number defined the rate of the goal category) there is relatively big room for an error and therefore using this rate for validation is not possible. Next to this, the rates of the goal categories calculated in the value-goal model, are based on the links between the values and goals, which are not completely based on literature. Therefore you cannot say that based on Table 5.8 the value-goal model is valid or not.

Discussion

It was difficult to find the right argumentation to connect the values with the goals. Since there was no literature found that linked the specific values of Schwartz to these specific goals, other literature and common sense is used. Asking experts about their opinion and an empirical research will be of great help to find the real relation between values and the goals. This will also make it possible to give an index of how strong the link between a certain value and goal is, which makes the model more accurate.

Another limitation of the use of this value-goal model, is the fact that the model is made for social applications. A drawback is that on one hand it is too general to get really specific goals, like the goals in the goal map of the emergency alarm case. On the other hand, it is too specific, because the model can only be used for specific products. A solution for this might be to create a survey containing enough topics, to make the value-goal model bigger and broader and for more products, so product designers can look outside their scope and see other important goals they can incorporate in their product design. A possibility for future research is to create a model for other products than social applications, but for example a system that gives information about a patients record or medicine use. Since the link between values and goals seems to exist, this could be useful for other product sectors as well. An option can also be to create a broader model, useful for more types of product. The empirical research could give as much information as the researcher wants and the link between the ten values of Schwartz and a large number of goals can be determined and therefore more goals can be used in the value-goal model and thus the scope of the model can be bigger and for more product types. A challenge will still be to keep the goals specific enough to be useful for the product designer.

A limitation of the study is that only one case study is done. The reason for this was that no other case studies were available yet on social application products that included goals. Using other case studies as well will increase the validity of the value-goal model.

Conclusion and future research

The value goal model showed to be a good help to identify the goals of the users for the emergency alarm for the elderly. There seems to be a link between the values of Schwartz and the goals, but more research is necessary to understand this link better. With this link, the needs of the users of homecare and other health care products can be identified and thus a better product can be created.

Another interesting possibility for future research is to investigate in more details is the links between the cultural dimensions of Hofstede and the values of Schwartz. In order to make the value-goal model applicable to all countries, there has to be a way to obtain the values of a culture in a systematic way, without having to trust on the availability on data. This can be done by quantitative research that asks the values of people that have different cultural dimensions.

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