CHALMERS

Designing a User Interface for a Safety Service

Enabling people to receive assistance from volunteers

Master of Science Thesis in the Master Degree Program, Industrial Design Engineering

LOUISE JONSSON

CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2014

Department of Product- and Production Development
Division of Design & Human Factors

Master of Science Thesis

Designing a User Interface for a Safety Service

LOUISE JONSSON

SUPERVISOR: VIKTOR HIORT AF ORNÄS

EXAMINER: MARIANNE KARLSSON

CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2014

Department of Product- and Production Development
Division of Design & Human Factors

Master of Science Thesis PPUX05

Designing a User Interface for a Safety Service

Master of Science Thesis in the Master Degree Program, Industrial Design Engineering

Chalmers University of Technology

SE-412 96 Goteborg, Sweden

ACKNOWLEDGEMENTS

During this project I have been fortunate to meet and receive inputs from several persons that have contributed with their time and engagement to the result presented in this report.

Firstly I want to thank Henrik Essunger and Peter Thörnblom from Posifon AB for their involvement, knowledge and comments during the project.

A special thanks to my supervisor Viktor Hiort af Ornäs for always being alert to give guidance, feedback and encouragements whenever needed, and to my examiner MariAnne Karlsson for valuable inputs throughout the process.

I want to thank everyone that has participated during interviews, tests and surveys for sharing reflections, comments and contributing with valuable knowledge. Especially I want to thank my past neighbours from Klevevägen for their participation in focus groups and the parents that openly shared their everyday family life with me.

Last but not least, I would like to thank my family, friends and fellow classmates for inputs, support and cheers throughout this journey.

Thank you all!

Louise Jonsson

Gothenburg, 2014

ABSTRACT

In Sweden there are 200 000 users of personal social alarms, a device that enables the user to get in contact with caregivers. Since the alarm only functions within the home the user is unable to leave without risking their safety. Outside the user has to rely on emergency services, but as these only respond to emergencies they are not available during all situations. At the same time there are 9,5 million people living in Sweden, of which many are willing to give a helping hand. From this the idea of *Landräddningen*, 'Land Rescue', was created by Posifon AB. Through volunteers that are located close to where help is needed there is a possibility for everyone to take part in the life outside of their front doors.

The aim of this project was to make it possible for everyone to take part in society while feeling safe, confident and in control, achieved through the development of user interfaces that enables people in need to request and receive assistance. The goal was to develop concepts of the user interface that meet the requirements. This included the interface used by the alarm user, the volunteer and the call centre operator, who answers to the alarm and forwards the alarm to the volunteer or other suitable function.

Through interviews with experts and analysis of how similar non-profit organisations operate, overall requirements on Landräddningen were identified. Potential alarm users and the situations when these may require help were found. Thereafter potential alarm users, call centre operators and volunteers were interviewed. It was recognised that the alarm user needs to be able to easily alarm and to be given continuous information on their alarm. The volunteer wants to help when they are needed and to be well informed of the help they are asked to provide. The call centre operator requires an interface that promotes that necessary information is retrieved during interview, that help is distributed quickly and quick assessment of current alarm status.

Initial ideation generated multiple ideas to the problems that had been identified. This evoked an analysis that revealed the problems that were more important to attend to, which were securing that alarms can be activated, notifying the volunteer when help is needed and motivating help.

During the development of the call centre interface a reference was used. Potential usability problems were identified, which formed the basis for three concepts that were evaluated with operators. As a result, opportunities for improvement, both on Landräddningen in its whole and on the user interface, were found. Parallel to this, the user interface to a smartphone application that is used by the alarm user and the volunteer was developed. Based on identified requirements an initial design was established. Usability of the application was evaluated through user tests, which revealed an intuitive interface with opportunities for improvement. Feedback to the alarm user was assessed. Motivation to assist during an alarm and expression of the user interface were investigated in a survey. After this analysis, implications for a final concept were found. The final smartphone application concept provides an opportunity for everyone to take part in the society while feeling safe, confident and in control.

Keywords: Landräddningen, mobile safety alarms, welfare technology, assistive technology, volunteering, non-profit organisations, user interface design, smartphone application.

TABLE OF CONTENTS

1. INTRODUCTION

In this chapter the background, goal, aim and limitations of this Master's Thesis are described. Following this, the process of the project is described and the outline of this report is presented.

1.1 BACKGROUND

In Sweden there are 200 000 users of personal social alarms that are provided by the municipalities and handled by the home care services, where the users mainly consist of elderly and persons with disabilities (The Swedish Institute of Assistive Technology, 2013). In the need of unexpected care or emergency assistances, the user can by activating an alarm quickly get in contact with personnel. However, since the alarm only functions inside of the home, the user cannot leave without jeopardising their safety as they might be presented with a situation where assistance is needed but cannot be asked for. Furthermore, since current organisation of care assistances is established to only provide assistance in the home, assistance cannot be given even if the alarms functioned outdoors. At the same time there are 9,5 million habitants in Sweden, where many of them have an interest for helping others and some of them can likely be found close to a person that is afraid to leave their home.

From this knowledge Posifon AB, a company that currently distributes mobile safety alarms[1], developed the idea that volunteers could be asked to assist in situations that occur outside of the user's home and that do not require emergency services (see Figure 1). During the spring of 2013 Posifon AB, in collaboration with other organisations[2], aim to introduce *Landräddningen*, "Land Rescue", an organisation where people volunteer to provide personal assistance to other people in need. Their vision is that everyone, independent of age, family and ability should be able to feel safe and have an active life outside of the home, achieved through channelizing engagement and human compassion that exist in today's society. By registering to Landräddningen, assistance can be received by activating an alarm in a smartphone application. Through the application, people who have registered as volunteers are notified when their assistances are asked for and directed to the location where assistance is needed. To evaluate Landräddningen during a pilot study in 2013 the system and initial interfaces are currently being developed. However the company now seek to evaluate their idea from the end users' perspectives and to develop a concept from these findings.

[1] Mobile safety alarms are alarms equipped with communication technologies and positioning technologies to enable the person in need to explain their need and be found more easily.
[2] During this project Posifon AB has discussed Landräddningen with several organisations with the aim to involve these. However as some organisations have chosen to not become partners these are not declared in this report.

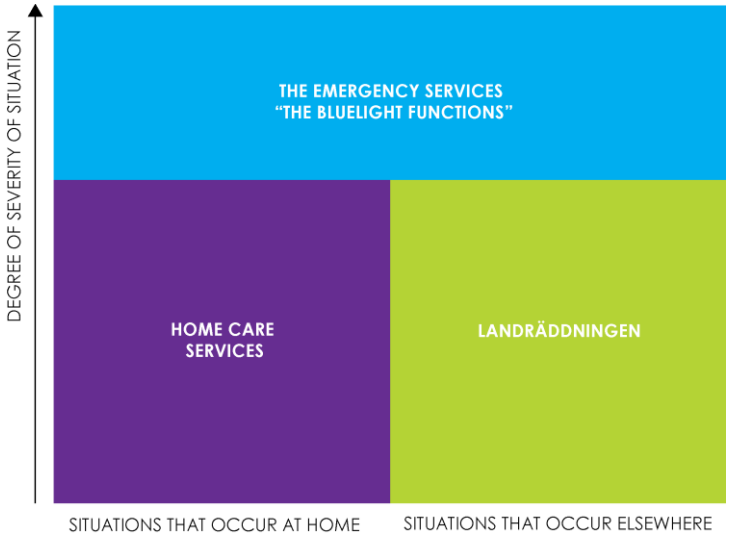


Figure 1. Positioning of Landräddningen's service.

Figure 2. Posifon's TM4. Photo: author.

1.1.1 The company

The concept of Landräddningen is developed by Posifon AB, a Gothenburg based company that distributes mobile safety alarms in Sweden. Given that the alarms are equipped with GSM and GPS technologies the user can, unlike the alarms provided within municipalities, trigger alarms outside of the home, thus enabling the user to move more independently. Despite this benefit the system has not reached the amount of users it could provide value to. One reason is that enabling activation outside of the home demands that assistance also can be provided outdoors, which is difficult to ensure for both private usage and within municipalities. Through the development of Landräddningen and the use of volunteers located close to where assistance is needed, assistance outdoors could also be given.

In short Posifon's mobile safety alarm (see Figure 2), called TM4, can be described as a mobile phone that has decreased functionality and can be used to communicate the user's position to a respondent. The device has six buttons that can be programmed after the user's choice. Through the three top buttons the user can call or send pre-written text messages to pre-chosen contacts. The orange button is an alarm button, where a click automatically calls and sends a text message to a respondent and the user's location can be identified in a user portal. The device can also answer and end incoming calls, trigger alarms when leaving predesigned areas and position the user. Currently the TM4 is mainly used by persons that due to cognitive disabilities have tendencies to runaway, difficulties orienting and for this reason may not find their way home, e.g. persons diagnosed with dementia or autism.

1.1.2 The service

Landräddningen aims to use voluntary efforts to provide assistance to people in need through specific a process (see Figure 3). When assistance is needed, the alarm user produces an alarm via a smartphone application. This enables the alarm user to receive contact with an operator at a call centre (step 1). At the same time the operator is presented with an interface that presents the alarm user's position and personal information such as name, age and language he or she speaks.

Through this, the operator is able to evaluate the situation and decide which measure that should be taken; if a volunteer could be asked to assist, if the alarm should be forwarded or if the alarm should not be handled at all. If the first alternative is found best suited, the operator is presented with the volunteers that are close to the alarm user. Thereafter the operator chooses the volunteer(s) that are found most suited, where these are sent a request to assist via the smartphone application (step 2). In the application the volunteer can then either accept or reject the request depending on their ability to assist during the specific time. If the request is accepted, further information is sent from the system to enable the volunteer to find and assist the alarm user (step 3). The users also interact with the service before and after the procedure of receiving or delivering services. Pre use, the application is installed and the alarm user and volunteer register an account within Landräddningen. Post use they both are asked to evaluate the execution of receiving respectively giving assistance.

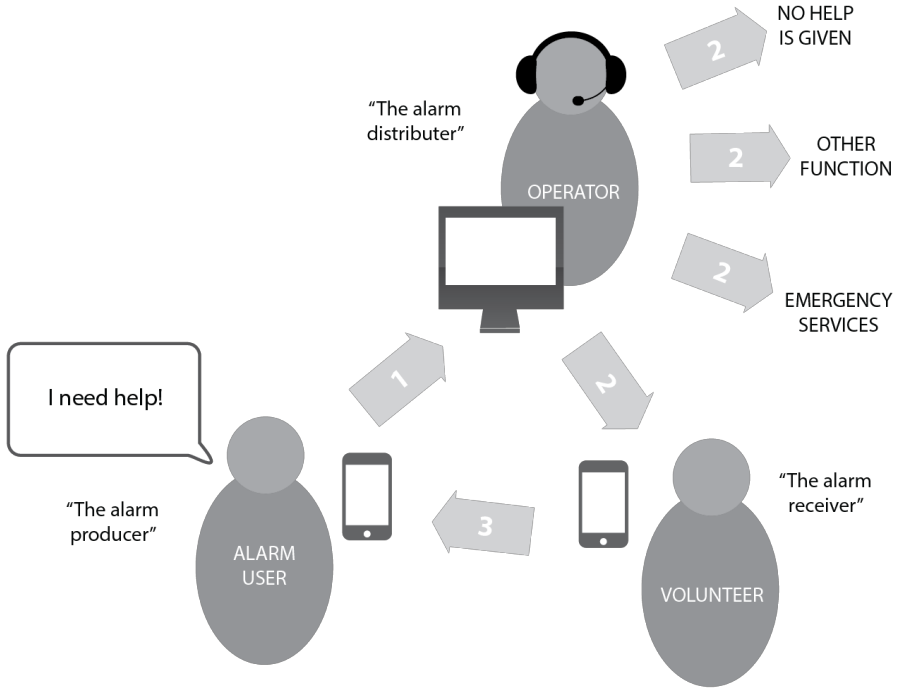


Figure 3. The process from an event where assistance is needed to a volunteer assisting. Firstly the alarm user produces an alarm via their application that creates contact with the call centre operator (step 1). Thereafter the operator decides which measure to take and forwards the alarm to suitable function (step 2). If a volunteer have been selected, he or she will be requested to help via the application. The volunteer communicates that he or she is able to assist and will then be directed to the alarm user to give assistance (step 3).

1.2 AIM, GOAL AND LIMITATIONS

1.2.1 Aim

The aim of this project was to make it possible for everyone to take part in society while feeling safe, confident and in control, achieved through the development of user interfaces to a service that enables people in need to request and receive assistance from volunteers.

Through this the project contributes to a more social, helping and secure society; and thus to social sustainability.

1.2.2 Goal

The goal of the project was to develop concepts of the user interface used within the service that meet the requirements. This included the interface used by the alarm user to produce alarms, the interface used by the operator to distribute alarms and the interface used by the volunteer to provide assistance. The ambition was to deliver user interfaces that are considered as intuitive, efficient and pleasant to use, thus enabling the user to successfully perform desired tasks and increasing the security.

To achieve this the project addressed the following questions:

- Who are the users of the service, such as the alarm user and volunteer?
- In which type of situations could the service be used and not be used?
- What requirements do the alarm user, the volunteer and experts set on the service?
- What requirements do the alarm user, the volunteer and the call centre operator set on the user interfaces?
- How should the user interfaces be designed to enable the alarm user, the volunteer and the operator to successfully perform desired tasks?

1.2.3 Limitations

The project had the following limitations:

- The project should focus on the process from alarming for assistance to receiving assistance, not the pre use phase or the post use phase.
- The project should not attempt to develop the organisation.
- Only representations of the interface concepts needed to be delivered.
- It was assumed that there is a market for utilising voluntary efforts to assist during situations that occur outside of the home.
- The concepts should be directed towards the Swedish market. Requirements from Swedish law and of the Swedish population had to be fulfilled. The concepts should be realisable with common operative systems of smartphones in Sweden, i.e. Android, iOS and Windows.
- As wished by the initiator the final concept should be possible to be used privately. In these cases the alarm would be distributed to e.g. a family member, friend or neighbour.
- According to the initiator there is a need to finance the call centre through charging the alarm users for the alarms they produce. During the project it was assumed that the service would be financed through this way.

1.3 PROCESS

The project's process can be divided into seven steps: Start-up, the Problem, Pre study, User study, Analysis, Ideation and User interface development (see Figure 4). The process was however highly iterative and several activities were also performed concurrently.

Figure 4. Project process.

1.3.1 Start-up

The project was initiated by defining the aim, goal and limitations of the project. The activities of the project were determined and planned. During this step preliminary use scenarios for Landräddningen were created to be used as a tool to identify requirements and potential user groups during the following phases of the project.

1.3.2 The problem

The problem of not being able to alarm and to be given help if something unexpected occurs outdoors was addressed. Through data retrieved from literature, experts within the field and online research the problem was discussed in relation to its background and future, potential solutions and the effects that these may have. This resulted in a discussion on the ethical aspects concerning the use of positioning technologies to find and help people in need, or who are believed to be in need.

1.3.2 Pre study

A Pre Study was constructed to identify the overall requirements on Landräddningen, which situations Landräddningen could provide assistance in and which the potential users are. To retrieve information on this, experts within e.g. assistive technology, personal social alarms and dementia were interviewed. About 10 participants were interviewed within this category. Existing non-profit organisations similar to Landräddningen was analysed via online research, interviews with representatives and research on volunteering. As part of the Pre Study current mobile alarm systems were also reviewed, where some of the systems available for smartphones are described in this report. During this analysis it was recognised that there are challenges in securing that the user can alarm using a smartphone application. The output of each activity that was performed within the Pre Study was analysed and implications for the project were identified. These implications were then used to create the upcoming list of requirements.

1.3.3 User study

Persons representing the three user groups; alarm users, call centre operators and volunteers, were interviewed. As potential alarm users nine seniors and four non-seniors were interviewed during focus groups and six parents to children with cognitive disabilities (and that have tendencies to run away and to be exposed to dangers) were interviewed separately. Three operators working at the call centre that was to be used for Landräddningen were also interviewed to understand their requirements on the call centre interface. Parallel to these interviews was the role of the volunteer assessed through informal interviews with potential volunteers, which involved 10-12 interviewees. After structuring the information retrieved during interviews implications were identified. These implications were then used to identify requirements.

1.3.4 Analysis

The information retrieved during the Pre study and User study was structured and analysed. Two categories of alarm users were detected, and one was selected for the continuance of the project. Potential alarms situations were analysed in flowcharts, which revealed implications on the system and the user interfaces. Critical steps in the process from alarming and being given assistance from the volunteer were found. Together with the implications that had been found during the Pre Study and User study, the identified implications were used to form the list of requirements that concludes this step of the project.

1.3.5 Ideation

To find ideas on how to ensure that helps reaches the alarm user, and specifically ideas the critical steps that had been identified, various ideation methods were used. This resulted in various ideas to the different steps of the alarm user's, the operator's and the volunteer's use. From this it was recognised that there was a need to prioritise which problems that were more important to attend to in this project. An analysis was carried out and identified which ideas that should be taken forward in the project. Some of these ideas were further evaluated and decided to incorporate into the user interfaces that were to be developed.

1.3.6 User interface development

The development of the user interfaces to the smartphone application and to the call centre interface was carried out parallel.

Concept development of the 'App'

The development was initiated by defining the aims of the application in terms of functions, use and expression. Based on the requirements that had been identified, an initial application was thereafter created. To evaluate the usability of the app tests were made with eight participants, which identified opportunities for improvement. Details on the application were also assessed trough interviews and surveys, which had seven respectively twelve participants. This included evaluation on how feedback on the alarm should be given, how the request should be

formulated to encourage helping and how the interface should be designed to communicate desired expression. Implications were identified, which lead to a final concept.

The call centre interface

Landräddningen's current interface was used as a starting-point during the development of the call centre interface. The user interaction was analysed through ECW, PUEA and layout analysis, which identified potential usability problems and opportunities for more intuitive and effective operating. These insights lead to the creation of three interface concepts. To assess these, and to verify the problems that had been identified, an evaluation were performed with three call centre operators and two other employees. As a result several problems were confirmed and possible improvements, both on Landräddningen in its whole and on the user interfaces, were identified.

1.4 REPORT OUTLINE

The structure of the report follows the overall procedure of this project. After this introductory chapter the problem of elderly not being able to receive help outdoors is elaborated in relation to possible solutions and their effects in chapter 2, Assistance Outside of Home. The following report was divided into three parts: Part 1: Identification of Requirements, Part 2: Designing the User Interface and Part 3: Discussion. Part 1: Identification of Requirements is initiated with chapter 3, Pre Study that presents overall requirements on Landräddningen. Following the user studies that were performed in the project are described in chapter 4, User study. The first part of the report is ended with chapter 5, Analysis, which analyses the results of the Pre study and User study and presents the requirements on Landräddningen. Chapter 6, Ideation, introduces Part 2: Designing the User Interface and describes the initial ideation processes. In chapter 7, Concept Development of the 'App', the development of a smartphone application that will be used by the alarm user and the volunteer is presented. Chapter 8, The Call Centre Interface, describes how the call centre interface was addressed and ends the second part of the report. In Part 3: Discussion and Conclusion, the project's process, method and results are discussed and recommendations for future work are identified in in chapter 9, Discussion. The conclusions of the project are given in chapter 10, Conclusion, which ends the last part of the report.

2. ASSISTANCE OUTSIDE OF HOME

The need for providing assistance outside of home to elderly and others was further investigated through literature studies, online research and interviews with experts. The problem's background, possible solutions and their effects were elaborated, and are described in this chapter.

2.1 BACKGROUND

As for the global trend of population growth, the habitants of Sweden are increasing. In 2013 the Swedish population was measured to 9,5 million, in 2017 it is believed to reach 10 million and in 2040 it is estimated to reach 11 million (Statistics Sweden, 2013). There are several reasons for the growth of people, such as the increase of births and immigrations. Another reason is the increase of life expectancy, where the number of people aged over 80 years old will double from 500 000 to 1 million between 2013 and 2040 (Ibid).

At the same time measures are currently being taken to keep people living in their homes as long as possible through for instance modification of the physical environment, care from relatives and the use of home care services. Through home care services the individual can be assisted in their daily routines during planned visits. Sadly assistances that are not directly related to care have been limited as an effect of the financial cuts within the elderly care (Höjgård and Mossler, 2001). Given this, the possibility to be granted walks accompanied by caregivers has decreased since they are prioritised secondary in relation to care assistances (The National Board of Health and Welfare, 2007).

Since assistance may be needed during unexpected situations, both during severe and less severe situations, personal social alarms[3] are used that enables the user to alarm in need of assistance. These are used both by persons that live in their own homes and patients on nursing homes. In 2013 there were 200 000 users of personal social alarms that live at home, a user group that mainly consist of elderly and persons with disabilities (The Swedish Institute of Assistive Technology, 2013). However since these alarms only function within a limited range, typically covering the home, the user can only ask for assistance during situations that occur inside this area. To provide an opportunity to receive assistance outdoors there is a need for a system that function outside of the home and for an organisation handling these situations. Such an organisation does yet not exist and is costly for municipalities to develop and maintain. The effect is that the users are unable to leave their homes without risking that they might be presented with a situation when assistance is needed but cannot communicated nor given. Insecurity, perceived or real, may lead them to opt stay home and not take part in the life outside of their front doors.

[3] A personal social alarm typically consists of two items; a station that is connected to the telephone socket and a wristband with an alarm button. When assistance is needed the user presses the alarm button and through the station the user can communicate with a call centre operator, whom can forward the alarm to care personnel. The alarm button only functions within a limited range from the station, typically only covering the inside of the home.

2.2 SAFETY & POSITIONING TECHNOLOGIES

To alert that assistance is needed outside of home, the mobile phone is an obvious option to many. It has been found that seniors regard the mobile phone as a significant tool to increase security where the usage of mobile phones has increased rapidly in Europe over the years (Plaza et al, 2011). However the current trend is that the mobile phones are replaced with smartphones, a technology that offers possibilities for new applications and to further customise the interface to the specific user. Even though older habitants yet have not adopted the smartphone as massively as younger categories, the amount of smartphone users over 55 years old has increased from 12 % to 32 % between 2011 to 2013 (Our Mobile Planet, 2014).

Besides providing a possibility to alert that assistance is needed, mobile systems can be used for positioning of the user. Thereby there is a possibility to direct assistance to the location of the person in need. Three common methods used for positioning of smartphones are satellite positioning, cellular positioning and positioning through wireless networks. Satellite positioning, *Global Positioning System (GPS),* is based upon ranging the satellites that circulate the globe. Knowing the position of each satellite, when each signal is sent and that signals travel in the speed of light, provide the possibility to calculate the position of a GPS receiver through comparing the time delay between broadcast and signal reception of different satellites. Basic GPS receivers can achieve 7,8 meters approximate, 95 % of the time all over the globe (Federal Aviation Administration, 2012). However, as the accuracy is affected by the ability for the signal to travel, the positioning is more precise outdoors compared to indoors. Cellular positioning is carried out through the use of cellular networks such as GSM and 3G. This method measures the signal strength to surrounding base stations, where the measures are compared and the position is estimated through triangulation (Natt och Dag, 2010). Since the number of base stations is higher in urban areas the accuracy is more precise in these surroundings, where accuracy can range between 200 meters to a few kilometres depending on the mobile being located in a large city or on the countryside (Telenor, 2013). Positioning through wireless networks, such as *Wireless Local Area Network (WLAN)* and *Wireless Personal Area Network (WPAN),* is carried out in a similar way as for cellular networks. Using wireless networks, the signal strength to access points within the network is determined and used for calculation of the device's location. As position can be determined indoors, this method is often used to assist satellite positioning (Natt och Dag, 2010).

2.3 EFFECTS OF TECHNOLOGY

The possibilities to find a person has several social and economical benefits since people in need of assistance can be helped more quickly at a low cost. However, providing the possibility to locate the person during these events also enables that positioning data can be retrieved during other situations and for other purposes.

2.3.1 Positioning as violation of privacy

Since positioning provides information about a person's previous and current locations, the data can be used to interpret a person's life patterns and thus future behaviour (Clark, 2001), information that potentially could be used to control a person's views and independence (Zarsky, 2004). For this reason positioning technologies can be considered as a violation of a person's privacy and freedom, and thus of the Human Rights. The risk of violating personal integrity is another reason to why social personal alarms do not allow positioning.[4,5]

2.3.2 Positioning by companies

To restrict companies' possibilities to extract personal information such as location data from users without them knowing, the gathering must be approved by the users according to the *Personal Data Act (1998:204)*. This approval is often achieved through the *End User Licence Agreement (EULA)*, an agreement that the user often needs to accept to receive access to the system and that allows the company to use personal data according to the agreement. For an approval to be legitimate it firstly needs to be made by the person the data concern. Secondly, the approval should clearly state for which purposes the information would be used to enable the user to understand its implications. Thirdly the person needs to have a choice to determine whether their personal data may be handled (The Data Inspection Board, 2013).

The effect of the agreements can be questioned since many users do not fully understand the privacy implications of data collection (Falzone, 2013) and since it has been found that users, even privacy-concerned users, automatically accept agreements without examining them (Böhme and Köpsell, 2010). According to the findings by Sauro (2011), less than 8 % of users read the agreements before accepting them. Besides that the agreements often are experienced as long and dreary to read, the main reason for users accepting without examining the terms is that they know that the system cannot be accessed without the agreement (Ibid).

During recent years there have been several discoveries of how the quickly accepted agreements offer companies possibilities to retrieve information about the users without their knowledge. When it in 2011 was found that Apple gather location data that can be accessed by anyone in possession of the device, Simon Davis, director of Privacy International, commented: *"This is a worrying discovery. Location is one of the most sensitive elements in anyone's life – just think where people go in the evening. The existence of that data creates a real threat to privacy. The absence of notice to users or any control option can only stem from an ignorance about privacy at the design stage."* (Arthur, 2011).

2.3.3 Positioning to increase freedom

Even though positioning of users is perceived as a threat to the individual's privacy there are studies suggesting that the benefits of such as system should be considered before potential misuse. For instance it has been found that elderly regard safety and mobility as more important than privacy (Melander-Wikman et al, 2007). Given this, the debate of positioning being a threat

[4] Expert on personal social alarms that has worked with personal social alarms for many years in projects, as call centre operator and technician, during interview 2013-02-22.
[5] Occupational therapist and manager of a research project on technology for elderly, during interview 2013-02-25.

to privacy becomes less relevant. Among dementia patients it has been identified that positioning provides a possibility for the person to move more independently, thus increasing the experience of freedom (Lindahl, 2013). According to Sager (2008), the possibility to choose between to travel or not to travel is an essential part of freedom of mobility. Another part is the possibility for self-fulfilment as effect of travelling (Ibid). Hence if positioning provides a possibility to increase the freedom it may be considered to align with the Human Rights. As concluded by Lindahl (2013), at the same time as the person's ability to live more independent the risk of violating the individual's integrity increases.

2.4 CONTINUATION

Following this analysis of the problem, possible solutions and their effects, the first part of the project was initiated – to find the requirements that are set on the service, the system and the user interface in Part 1: Identification of Requirements.

PART **01**:
IDENTIFICATION
OF **REQUIREMENTS**

3. PRE STUDY

With the aim to find the overall requirements on the service, to identify which user groups the service should be directed towards and during which situations these may require assistance outdoors a Pre study was conducted. Assistance through volunteering was assessed through analysis of similar non-profit organisations to identify how these operate and which requirements that are set on their volunteers, and through reviewing research on volunteering. Experts were interviewed to find requirements on the service and identify potential alarm users. Some safety alarms for smartphones were analysed to find problems of current systems and to point to opportunities. Through the Pre study were overall requirements on Landräddningen and requirements on the user interface found. Potential user groups of the service were identified and were used to select participants to the upcoming User study.

3.1 ASSISTANCE THROUGH VOLUNTEERING

Altruism, the concern for others, in whole or in part, regardless to one's own interests (Natur & Kultur, 2013), is considered as a virtue in many cultures and as a core aspect of various religious traditions. It can further act as motivation for *prosocial behaviour;* the performing of deeds that are intended to benefit or help others (Afolabi, 2013). Currently every other Swede engage in volunteering (Harding, 2013) and there are numerous organisations available. In order to understand the practice of volunteering, find how safe assistances are achieved and identify requirements that are set on an organisation such as Landräddningen, similar organisations were analysed (see Table 1) and literature on volunteering was reviewed. The information was clustered and implications for Landräddningen and this project were identified.

Table 1. Description of analysed organisations.

ORGANISATION	DESCRIPTION
The Civil Defence League	The Civil Defence League is a defence organisation with focus on safety both for everyday and in times of crisis in society (Civilförsvarsförbundet, 2013). Among other activities, they educate, organise and develop voluntary reinforcement resources such as the Volunteer Resource Group, emergency teams and tracking groups.
The Mountain Rescue	The Mountain Rescue assist the Police in their work to search for and save people in the Swedish mountains (Fjällsäkerhetsrådet, 2013). Currently there are about 400 mountain rescuers that are divided in about 30 units, which are educated, equipped and lead by the Police during missions (The Swedish Police, 2012).
The Swedish Sea Rescue Society	The Swedish Sea Rescue Society is responsible for 70 % of all sea rescues in Sweden (Sjöräddningssällskapet, 2013). They have more than 75 000 members, where 2000 belong to the rescue crews. These live close to their stations and conduct training each month in order to provide assistance within 15 minutes or less.
Missing People Sweden	Missing People Sweden assists the Police and relatives to arrange searches when people are reported missing (Missing People Sweden, 2013). To join searches the volunteers signs up at the website and is sent text message when they are needed.
SMS-livräddare	SMS-livräddare is a research project that aim to increase survival of cardiac arrests through volunteering by people that are trained within *CPR*[6] (SMS-livräddare, 2013). When an alarm of cardiac arrest has been identified, volunteers that are located close are sent a text message to assist with CPR until ambulance arrive.

[6] Cardiopulmonary resuscitation (CPR) is an emergency procedure that is performed in order to restore cardiac activity and breathing during cardiac arrest (1177 Vårdguiden, 2012b).

3.1.1 Ensuring competence

Besides working in teams, following certain routines and being lead during missions, the Civil Defence League, the Mountain Rescue and the Swedish Sea Rescue Society educate and certify their volunteers before they are asked to assist as an action to secure safe assistances. To participate in searches in Missing People no education is required as the volunteers register themselves on the website. Until recently a need for assessing the suitability of volunteers within the organisation had not been identified, though due to recent events the organisation now plan to incorporate measures in this direction.[7] Similarly, to volunteer within SMS-livräddare the person register themselves on the website without securing that the volunteer possess the capabilities that they state. However, in the case of cardiac arrest where time until treatment is crucial for survival, all assistance is valued, even though it may be a risk of providing incorrect CPR (SMS-livräddare, 2013).

3.1.2 Characteristics of the volunteer

Given that physical and capability requirements are set upon the crewmembers within the Swedish Sea Rescue Society and the Mountain Rescue, not everyone fit their profile. Besides having a willingness to help others and being of age, physical requirements are also set on the sea rescuers (The Swedish Sea Rescue Society, 2013). Similar, but rather more physically demanding, requirements are set within the Mountain Rescue (The Swedish Police, 2012). Within the Civil Defence League the members represent a cross-section of the Swedish population and share the belief of citizen responsibility and the willingness to make change[8]. Similarly, volunteers within Missing People also represent the whole population and that want to engage in helping others. There further is research suggesting that personality traits affect keenness of volunteering, where e.g. extraversion and conscientiousness is found to enhance prosocial behaviour (Afolabi, 2013).

The ability to volunteer is affected by the individual's other commitments. The members of the Swedish Sea Rescue Society live close to their stations and their occupations allow them to perform their duties as sea rescuers (Sjöräddningssällskapet, 2013). In a report by Volontärbyrån, an organisation that connect volunteers with non-profit organisations, characteristics among volunteers were retrieved. The report showed that among the volunteers that responded 51 % work part time or full time, 25 % are students, 10 % are retired and 14 % are currently not working (Volontärbyrån, 2012).

3.1.3 Motivation for volunteering

The possibility to bring value to others was found as the most common motivation to volunteer in the survey by Volontärbyrån (2012). Following this, the opportunity for self-development and the willingness to make a difference in a specific field were frequent drives (Ibid). The reason for why people engage in prosocial behaviour such as volunteering has interested many researchers. Penner et al (2005) point to three main mechanisms that summarise most theories. Firstly, through operant conditioning and social learning we have been taught to help and to believe that these skills should be used to benefit others. Secondly, the development of social and personal

[7] Representative from Missing People Sweden, during interview 2013-02-26
[8] Representative from The Civil Defence League, during interview 2013-02-25

standards such as norms promote helping as people strive to maintain positive self-images. Thirdly, arousal and affect approaches suggest that helping is motivated by feelings of for instance guilt or empathy whereas feelings of fear or distress may cause inactivity. The study on *the identifiable victim effect* pointed to the power of affect by showing that people are more willing to help a person that is presented compared to an anonymous victim since it resulted in a more powerful emotional response (Small et al, 2007; Small and Loewenstein, 2003). Some researchers argue for evolution theories, where relatives are helped to ensure the survival of one's genes and strangers are aided in hope that they will receive help in return (Stürmer and Snyder, 2010). The influence of *the bystander effect* has also been found to affect the likelihood of helping, where it is proposed that observers fail to help due to social influence, evaluation apprehension and diffusion of responsibility (Latané and Darley, 1970 cited in Fischer et al, 2005). It is explained that an individual looks to other bystanders to define the situation, where the situation may incorrectly be interpreted as less critical if no one is acting upon it. The presence of others inhibits helping if the individuals fear that others may evaluate their helping as negative. Moreover, knowing that others are present leads to the individual feeling less responsible to help and remaining inactive.

3.1.4 Implications

The analysis resulted in identified requirements on the organisation, characteristics of the expected volunteer and implications for how to motivate assistance.

The organisation should ensure that the volunteers are suitable. Some organisations ensure volunteers' capabilities through training, whereas other organisations do not (see 3.1.1). Given that Landräddningen aim to have the operator select which volunteers to send to different situations based on their capabilities, it could be argued that the organisation also should ensure that the volunteers are suitable for the task. Furthermore as the volunteers, in contrast to the volunteers of the studied organisations, are asked to provide assistances on their own this may be even more important.

To be able to provide assistance during unexpected situations requires the volunteer to have other engagements hindering. In other organisations the volunteer have occupations that allow them to leave work, alternatively volunteering is carried out during planned forms (see 3.1.2).

Willingness to assist will likely originate from willingness to bring value to others, further develop oneself and/or to contribute in a specific field (see 3.1.3). These insights should be considered when developing the organisation.

Making the volunteer relate to the alarm user will increase probability of helping. Literature on volunteering suggests that making the alarm user identifiable to the volunteer, thereby creating a relation to the alarm user, evokes helping (see 3.1.3).

Confirming that assistance is needed, motivating assistance through e.g. referring to the goodness of the act and enabling the volunteer feeling obligated to assist, thus

counteracting bystander effect, increase probability of helping (see 3.1.3). To achieve this phrasing of the request plays an important role.

3.2 EXPERT INSIGHTS ON LANDRÄDDNINGEN

To identify users that may be in need of assistance outdoors, in which situations assistance might be needed and what requirements these situations set on the service, *interviews*[9] were carried out with experts within assistive technology, personal social alarms and dementia. This included interviews with e.g. occupational therapists within assistive technology, project leaders of projects within welfare technology, a nurse specialised within dementia, call centre operators and technicians of personal social alarms. Also representatives from three non-profit organisations involved in, or with knowledge of, Landräddningen were interviewed as they were regarded to be able to provide important inputs for the project.

For the interviews with experts and representatives, a semi-structured approach was used where each interview followed an interview guide compiled for the specific interview (see example in Appendix I). To aid discussion five hypothetical cases were created and used as a communicative tool (see Table 2). When developing the cases several aspects were considered; they should represent a broad variety of users, regard situations that are more likely to occur or that require additional attendance. The intent of this was to reveal requirements from different situations. The cases where also used to find the type of situations that help potentially could be given respectively not given within the service as this affects the user interface. The interviews were carried out individually, except for one joined interview, and were held either personally or via telephone depending on the possibility to arrange a physical meeting. The length of the interviews varied between 20-60 minutes. Notes and audio recording were used for documentation. The result was then analysed by the author comparing statements and compiling them into topics and implications.

3.2.1 Potential alarm users

During the interviews the participants identified a potential need for mobile safety alarms among persons who already has a health condition that may worsen, persons with physical disabilities and persons with cognitive disabilities, such as dementia or autism. It was believed that mobile safety alarms would provide value within families where there are children with cognitive disabilities. Also active seniors who walk outdoors on their own but still want the comfort of knowing that they are able to reach someone if they needed, was identified as a potential alarm user group. Furthermore it was believed that everyone with safety alarms in their homes today, most likely would want to have the possibility of using their alarm outside of their home.

[9] *Interviews* are the most fundamental method to gather data concerning what people feel and think since it provides the opportunity to achieve knowledge of people's experiences and reasoning. Interviews can be carried out in a structured, unstructured or semi-structured way, depending on whether quantitative, qualitative data or something in between is desired. Closed questions are asked during structured interviews, whereas open questions are used for unstructured interviews (Osvalder et al., 2008).

Table 2. Description of hypothetical alarm cases. Several aspects were considered when these were developed; that they should represent a broad variety of users, regard situations that are more likely to occur or that require additional attendance. The intention was to reveal requirements from different situations.

	DESCRIPTION	BACKGROUND
1	*"An older woman is on her way to the grocery store when she loses her balance and falls to the ground. She tries to get up but realises that she needs help from someone."*	The human body is affected physically as it ages, often resulting in decreased balance, strength, hearing and sight. This increases the risk of falling, an accident that every third person in Sweden over 65 years old experiences each year (1177 Vårdguiden, 2012a).
2	*"An older man with dementia is on his way home from his daily morning walk. When reaching the kiosk not far from his home, he suddenly does not recognise where he is or how to get home."*	Every fifth person over 65 years old suffers from dementia, which is a disease that is caused by brain damage (Demenscentrum, 2013). Usually it affects the person's ability to remember, to plan and perform everyday tasks. Another common symptom is that the person has difficulties orienting and therefore might have trouble finding their way home.
3	*"A young boy with Down's syndrome plays in the garden with his father watching from the terrace. Since it seems that the boy is completely occupied with his game, the father steps inside to grab a cup of coffee. Even though he is just inside for a minute, when the father steps out the boy is gone."*	From previous knowledge it was known that that children with cognitive disabilities might have tendencies to run away. From their condition they may have difficulties identifying dangerous situations, which makes them vulnerable and more important to quickly find.
4	*"A man who is on his weekly run in the woods when he accidentally slips over a tree-root, falls, and lands badly on his right foot. He knows that the foot probably is sprained and realises that he needs someone to help him home."*	Accidents can happen to anyone and make everyone become in need of assistances. As an attempt to attract the general population to the service, and through this potentially establish a solid volunteer basis, the fourth case was created. Another factor was that the use case should represent a mobile and active user, as these qualities are considered as valuable for volunteers.
5	*"A woman is walking home from her late yoga class. She crosses the lonely streets only accompanied by some streetlights. Soon she is about to enter the park where there have been several rapes during the past year. She is worried."*	That something terrible might happen when walking home during night is a common fear. As for the fourth case, this also can be considered as directed to the whole population, thereby making the service attractive to a wider user group.

3.2.2 Situations where assistance is needed

When the interviewees were asked to state in which situations assistance might be needed they mentioned fall accidents, unexpected illness or orientation difficulties. It was further questioned whether a person with severe dementia would be able use a self-triggered alarm function and suggested that these users require a system that automatically triggers an alarm and notifies caregivers when for instance leaving a predetermined area[10]. To enable a user with milder forms of dementia to trigger alarms, the system should be introduced early in the disease and it needs to be simple to understand and to activate[11]. However it was further explained that making the system too simple to activate could also result in a person misusing it, for instance if the person does not understand what it is for[12]. Situations such the ones described in the fourth and fifth hypothetical cases (see Table 1) were not mentioned among the interviewees when they were

[10] Dementia nurse, during interview 2013-02-21.
[11] Occupational therapist from the Swedish Institute of Assistive Technology, during interview 2013-02-14.

[12] Dementia nurse, during interview 2013-02-21.

asked to state potential users of the service. When specifically asked on these cases it was instead questioned whether young people would sign up if it would cost money to receive help.

The alarms produced within the home care services range between different degrees of severity such as the user feeling lonely, the user falling and needing help to get up or the user having trouble breathing[13]. Given that the users may be familiar to receive assistance during these varying situations the user may believe that they also will be able to receive assistance during similar situations if the situations are not clearly communicated.[14]

3.2.3 Risk of incorrect assistance

According to the organisation initiators, no specific requirements should be set on the volunteers since the service merely aims at enabling people to meet and help each and since requirements limit the possibilities for recruiting volunteers and providing assistance. Furthermore it was explained that if more demanding assistance services are needed the case should be forwarded to the emergency services. However given that volunteers might be presented with situations that enter the field of medical assistance, it was questioned among the interviewees whether the person in need will be given correct help if supplied by persons that lack proper training[15]. Another concern that was raised was that the organisation could attract users with unkindly intentions if the organisation is accessible to everyone[16].

Specifically, worries concerned whether a person that is not medically educated could handle a fall accident. For alarm users diagnosed with dementia or Down's syndrome, it was preferred that the person assigned to assist has knowledge of these conditions[17]. Besides the need for knowledge, instructions concerning how to recognise critical conditions, how to act during certain situations and how to act as volunteer representing Landräddningen were also identified[18]. Further it was explained that the organisation has a responsibility to prepare the volunteers for the situations that they may encounter.

Also a need for routines concerning how to handle different alarms within the organisation was identified. It was mentioned that there for instance could be a risk of a missing person's case not being forwarded to the right authority. It was explained that rules needs to be established concerning how long searches should proceed.[19]

3.2.4 Uncertain availability of volunteers

Since the service is based on voluntary efforts, it cannot be promised that there always will be volunteers available when assistance is needed. This was regarded as a weakness of the service, which may result in people in the target group not trusting the service enough to sign up as

[13] Expert on personal social alarms that has worked with personal social alarms for many years in projects, as call centre operator and technician, during interview 2013-02-22.
[14] Ibid.
[15] Occupational therapist from the Swedish Institute of Assistive Technology, during interview 2013-02-14.
[16] Ibid.
[17] Dementia nurse, during interview 2013-02-21.
[18] Occupational therapist from the Swedish Institute of Assistive Technology, during interview 2013-02-14.
[19] Ibid.

alarm users.[20] Based on experiences within their own organisation, it had further been discovered by an interviewee that at least three as many volunteers that are needed for a task should be addressed to ensure delivery of assistance.[21]

3.2.5 Problems related to technology

Another concern was the uncertainty of the performance of the technology used, such as positioning technologies not being completely accurate. The participants also mentioned problems of existing mobile safety alarms, namely that they often have poor sound qualities making it difficult to use them for communication and low battery endurance that sets higher requirements on the user to continuously charge the battery. Given that current users of mobile safety alarms mainly are users diagnosed with dementia, problems concerning remembering to charge and to put on the alarm are common. Another problem is that mobile safety alarms require extensive administration in order to set up the alarm to desired features, where the user often is dependent on someone else for assistance. [22]

It was further mentioned that current mobile safety alarms often are perceived as stigmatising, aesthetically unappealing and clunky, making them undesired to be worn.[23] In a study that investigated mobile safety alarms it was found that a competitor alarm to Posifon AB's TM4 *"resembled something that home care services distribute"* (Lindahl, 2013).

Besides the need for considering these aspects the future system was desired to be customisable, where it was suggested that for instance more important buttons could be enlarged and others hidden for visual impaired. Moreover it was believed that the system should be liquid and impact resistant to ensure that it can be used during rain or exposure to blood and after having been impacted as consequence to a fall.[24]

When discussing the use of a smartphone application as a mobile safety alarm, the idea was questioned among some. It was highlighted that it is important to consider how stress will affect the users ability to trigger alarms.[25] It was believed that touch screens are not suitable for everyone, such as persons who experience neuropathy.[26] Another participant highlighted that there is a difference in terms of technology maturity in today's society, which may require alternatives to be able to reach both experienced and less familiar users.[27]

3.2.6 Personal integrity aspects

The risk of violating privacy was mentioned as one of the main reasons for why mobile safety alarms have not become more common. Some experts were asked how they regard the use of positioning technologies for a person with dementia. To this question it was expressed that as

[20] Representative of an organisation that support relatives and relative carers, during interview 2013-02-18.
[21] Representative from The Civil Defence League, during interview 2013-02-25
[22] Occupational therapist and manager of a research project on technology for elderly, during interview 2013-02-25.
[23] Ibid.
[24] Ibid.
[25] Occupational therapist from the Swedish Institute of Assistive Technology, during interview 2013-02-14.
[26] Occupational therapist and manager of a research project on technology for elderly, during interview 2013-02-25.
[27] Expert on personal social alarms that has worked with personal social alarms for many years in projects, as call centre operator and technician, during interview 2013-02-22.

long as the intention is good and ethical standpoints have been established, the privacy is not violated[28]. It was also noted that if a person understands that there is a risk for him or her to not find their way home, they would likely want to be found.[29]

Even though it was preferred that the volunteer is given information of the alarm user's health to be able to provide appropriate assistance, the idea was also questioned. It was explained that since the information may be delicate the alarm user should preferably inform the volunteer during the specific situation.[30] To be able to retrieve, store and distribute personal information such as a cognitive disability it needs to be well communicated how the information is planned to be used (*The Personal Data Act 1998:204*), which may be difficult to achieve when the person has a cognitive disability. It was also noted that if health information is declared during registration to the service, the information might not be up-to-date when assistance is needed.[31]

3.2.7 Implications

The interviews with experts and representatives resulted in insights that were used to formulate initial requirements on the service, including the overall system requirements as well as specific requirements regarding the interfaces.

The organisation needs to ensure that assistance is available. The uncertain availability of volunteers was described as a weakness of the service (see 3.2.4). To ensure that assistance can be received, the organisation needs to develop a solid volunteer base that covers the areas where alarm users are located. However until the organisation has recruited sufficient amount of volunteers there is a risk that assistance cannot be given.

The organisation should ensure suitable assistance. There is a concern that the alarm user will receive incorrect assistance if the volunteers are not certified in terms of knowledge and mind-set and if routines concerning how different alarms should be handled have not been established (see 3.2.3). Moreover there is likely a need for instructing the volunteer how to act as volunteer and representative of Landräddningen.

The organisation needs to ensure that the integrity is not violated. Given that location data of users will be gathered it was suggested that ethical standpoints should be developed, which preferably should be integrated into routines (see 3.2.6).

The operator needs to be assisted to make correct evaluations. People that may benefit from being able to receive assistance include those who already have a problematic health condition, adults and children with physical disabilities or cognitive disabilities, active seniors and current users of personal social alarms (see 3.2.1). These may require assistance during different degrees of severity, which poses requirements on the operator being able to evaluate each situation correctly (see 3.2.2). This includes ensuring that information is successfully transferred between users.

---

[28] Representative of an organisation that support relatives and relative carers, during interview 2013-02-18.
[29] Occupational therapist from the Swedish Institute of Assistive Technology, during interview 2013-02-14.
[30] Representative from the Swedish Association for Seniors, during interview 2013-02-22.
[31] Ibid.

The system needs to be easily understood and triggered when assistance is needed and prevent activation during other situations. It was believed that persons diagnosed with severe dementia would probably not be able to use a self-triggered alarm function (see 3.1.2) but that persons with less severe difficulties could use a system if it is easily understood. It was also identified that the system needs to be simple enough to be activated during stress (see 3.2.5).

Precise positioning, sound quality and durability were regarded as important qualities for a mobile safety alarm. During the interviews, problems of current mobile safety alarms were revealed and should be considered (see 3.2.5).

Possibility for customisation was seen important to fit different users. It was suggested that the interface could be adaptable to different needs such as to users with decreased vision (see 3.2.5).

That the system is not perceived as stigmatising, ***aesthetically unappealing or clunky is important to ensure use.*** It had been found that these aspects are reasons for why users do not want to wear mobile safety alarms around their wrist (3.2.5).

3.3 SMARTPHONES AS SAFETY ALARMS

The experts addressed the importance of alarm activation being easily understood and triggered during need of assistance (see 3.2.5). According to Ulrich and Eppinger (2003), understanding of competitive products is critical in order to position a new product and it can also provide as a source of ideas. To identify solutions that currently exist, to distinguish problems of these solutions and to find requirements on the future system, safety alarms for smartphones were examined. The analysis also aimed to serve as inspiration during concept development.

The analysis identified that there are several smartphone applications that provides the possibility to trigger alarms during need of assistance. Activation can be carried out in different ways, ranging from the user pressing a button inside the application, using existing features of the phone or using additional products, to the system itself detecting when assistance is needed or through the alarm receiver detecting when assistance is needed (see Table 3).

Table 3. Functions of smartphone applications, divided into user-triggered and system-triggered alarm systems.

SMARTPHONE APPLICATIONS	FUNCTIONS							
	USER-TRIGGERED ALARMS				SYSTEM-TRIGGERED ALARMS			
	VIA APP	*VIA FEATURES*		*VIA PRODUCT*	*BY APPLICATION*		*BY ALARM RECEIVER*	
	Button "inside" app	Button on phone	Dead man's grip	Connect to another product	Detect move	Timer	Follow me	Share position
SoftAlarm	O	O			O	O		O
Larmappen	O							
MPS Överfallslarm			O					
PFO Shield	O		O	O		O		
bSafe	O						O	
WalkMeHome	O			O			O	
Glympse							O	
ZOMM				O				

3.3.1 Activation using button inside 'app'

For the majority of the applications, an alarm is triggered through pressing an alarm button inside the application. However they require different number of actions and types of interaction. In some applications an alarm is triggered through a single click on the alarm button, whereas in others the button needs to be pressed for a certain amount of time.

Given that several steps are required to activate an alarm (which e.g. could include the user firstly having to remove the phone from a pocket, activate the screen, unlock the screen, find the application on the desktop, open the application and press the alarm button), the procedure of triggering of alarm may be difficult during stress. The touch screen interaction may further be considered as especially burdensome as it might be difficult to perceive visual information during stressed situations. Moreover the design of the graphical user interface affects the simplicity of alarm activation, where e.g. the button's size and colour in relation to the background affects how simple the button is to perceive and press.

3.3.2 Activation using phone features

The Android version of SoftAlarm offers the possibility to activate a mode where double-click of volume buttons activates an alarm. This enables the user to trigger an alarm without having to go through the steps that is required when alarm activation is carried out inside the application. It can also be chosen to place an alarm button in the notification bar for quicker access.

PFO Shield and Överfallslarm have a dead man's grip solution where an alarm is triggered when the phone is dropped after being held in a specific manner. Common for these and for the

functions that require activation of a certain mode, is that the user can more easily trigger alarms. However they also require that the user activate a certain mode beforehand and for this reason are mainly suitable during situations where the user has identified a potential need for requiring assistance. Another drawback is that the user's ability to perform other activities concurrently or to use the phone's features for other purposes is restricted.

3.3.3 Activation using a separate product

Some applications can be connected with a separate product for simpler handling. In PFO Shield the user can, through activating a certain mode, trigger an alarm if a headphone cord is pulled out of its socket. The application can also be combined with a bracelet that is activated when the bracelet is pulled or thrown away. Similarly the WalkMeHome application can be connected to a Sony SmartWatch, where an alarm button can be placed on the watch's screen. There is also ZOMM who supplies separate alarm buttons with Bluetooth that can be used to trigger alarms.

3.3.4 System-triggered alarms

Several of the applications provide a function where a timer is set and if not deactivated within a certain time period, an alarm will be triggered and sent to chosen contacts. For some applications, such as in WalkMeHome and bSafe, also the position is given to enable the respondent to follow the user home and to offer the possibility for the respondent to detect when assistance may be needed. Similar functionalities are used in Glympse, where location and messages are sent to alarm receivers to enable tracking of the alarm user for a certain amount of time. The Soft Alarm's Android version has a function where an alarm is sent if the system recognises that the phone has not moved for a certain amount of time, which may indicate that something has happened and that the user might need assistance.

3.3.5 Implications

Through the competitor analysis were current solutions found that identified problems of currents solutions and requirements on the system.

To enable simple alarm activation it needs to be accessible, i.e. require few steps**.** For smartphone applications alarm activation is often carried out through pressing an alarm button "inside" the applications, requiring that the user perform several actions before the user has accessed the function and can call for assistance (see 3.3.1). The reason for this is most likely that this is the simplest way to implement a possibility to enable spontaneous alarms through an application. Though if activation is not achievable due to the numerous steps that are needed to access the button, one could question if this possibility actually is provided.

Alarm activation needs to be simple to recognise and execute. The design of the interface affects how easily activation is executed, where e.g. the design of the alarm button determines how easily it can be noticed and hit. During stressed situations this may be difficult to execute.

Alarm activation should preferably be achievable without focused vision. Some applications offer the possibility to use features of the phone (see 3.3.2) or to use separate

products (see 3.3.3) to activate alarms. Besides that these solutions emphasise the accessibility as key to be able to quickly trigger alarms, they promote decreased dependence on the user needing to perceive visual information from the screen that may be difficult to achieve during stress.

To enable spontaneous use the system should preferably not require pre-activation. A drawback of some of the identified functions is that they need to be activated beforehand, requiring the user to be aware that assistance might be needed. For this reason these are not suitable for unexpected situations, such as the man injuring himself on his run (see 1.2.4). Similarly the older woman who is on her way to the grocery store unlikely identifies a risk for falling unless she has a condition that increases the probability of it. Due to how these functions have been implemented, they are more suitable in scenarios such as walking home alone when it is dark. This is especially the case for the dead man's grip solutions that are simple to trigger but require effort to keep active and should for that reason only be used during shorter periods of time where the probability for needing assistance is high.

It should be noted that restrictions within operative systems of mobile phones and smartphones affects the possibility to utilise existing features of the phone, where currently Android offer greater possibilities for alternative activation compared to iOS (see 3.3.2). However the development of a successful alarm system for smartphones is not only depended on the opportunities of specific operative systems. Also the value that smartphone developers see in providing a system for simple alarm activation affects the need for providing alternative ways, where the need may be diminished if such a system is incorporated in the design from beginning.

3.4 CONCLUSION

The Pre Study identified several insights that were important for the continuation of the project. Potential alarm users and volunteers were identified, problems that the organisation needs to attend to were found as well as requirements on the service in its whole and in detail.

From the expert interviews it was found that mobile safety alarms may be of value to elderly that wants the comfort of knowing that they could be able to reach someone if needed, persons that have a problematic health condition or persons with physical or cognitive disabilities. Given that the experts did not mention situations similar to the fourth and fifth hypothetical scenarios and since their occurrence were questioned, it was not as evident that younger people would value being able to ask for assistance from Landräddningen. Considering that this group generally is healthier and more active they are also more capable of managing less severe situations on their own. Moreover, if assistance were to be needed it would more likely occur during more severe situations that demand assistance from emergency services. For these reasons it was decided to further investigate the needs of seniors and of persons with physical and cognitive disabilities, whom are believed to benefit the most from the service.

The interviews also pointed to several problems that need to be attended, such as that there is a worry that the alarm user will receive incorrect assistance if the volunteer is not certified. Considering that the organisation will distribute assistances and specifically will choose which volunteers to send to different situations, it could further be argued that the organisation also has

a responsibility ensuring that the volunteers are capable and of good intent. This may be especially important since the volunteers are asked to provide assistance on their own or knowing that the emergency services also are on their way, which is the case for some other organisations. It was further believed that routines concerning how different situations should be handled needs to be established to ensure that each situation is handled accordingly. The reliability of the service was also questioned since it cannot be certain that assistance is available when needed. Given that the number of volunteers increases as the organisation matures, the probability of volunteers being available will also become higher. However, to ensure that the volunteers are suitable, that assistance is available and that appropriate assistances are distributed are issues that the organisation itself needs to further address.

The analysis of safety alarms for smartphones revealed some solutions that can be used to that exist on the market, identified problems of these solutions that resulted in requirements on the alarm activation. It was identified that achieving simple alarm activation depends on restrictions in smartphone and settings that the user makes. It was found that some solutions that are simple to trigger may need to be activated beforehand that makes them unsuitable for unexpected situations whereas other solutions that do not need pre-activation instead are difficult to use. Besides these insights, the analysis served as inspiration for the upcoming phases of ideation.

With the aim to further to explore the needs among potential end users and their requirements on Landräddningen, the User Study and Analysis phase was initiated.

4. USER STUDY

The Pre Study indicated that there is a need for providing assistance for users that already have a health condition, adults and children with physical and cognitive disabilities and for elderly that wants the comfort of a mobile safety alarm. In order to identify situations where these require assistance, how they would perceive being assisted by volunteers and what their requirements on the service are, seniors and parents of children with cognitive disabilities were interviewed. To identify during which circumstances volunteers would be willing to assist interviews were held with potential volunteers. Studies were also carried out with operators to gain insight in their requirements on a call centre interface. The data collected during the User Study was then further synthesised in 5. Analysis.

4.1 FOCUS GROUPS WITH SENIORS

To retrieve information concerning if, and in which situations, seniors have a need for assistance outside of their homes, how they perceive the idea of being helped by volunteers and how they regard the integrity aspect, *focus groups*[32] were held with seniors. Two sessions were carried out with six respective seven participants where the author took the role as discussion leader. The first group consisted of five women and one man, and the second group of three women and four men. Nine of the participants were pensioners and aged between 72-82 years old, and the remaining four were not retired and were aged 31, 57, 61 and 62 years old. The participants knew each other since they lived in the same neighbourhood. The focus groups were semi-structured, following an interview guide to ensure that important themes were addressed (see Appendix II). Audio recording were used for documentation, where the transcripts was analysed by the author compiling statements into topics and implications.

4.1.1 Situations where assistance is needed

While the participants did not describe themselves as potential users that might need help, they identified the older population as a group who are more likely to be presented with situations where assistance is needed. In terms of situations that can occur outdoors, the participants mentioned that assistance might be needed if e.g. one falls, suddenly becomes sick or is assaulted. They stated situations such as walking home during night, walking in the woods and being outdoors when the ground is slippery as unsafe. The participants identified that being alone makes one more vulnerable. Not having someone waiting at home was also mentioned to contribute to an unsafe situation, as it may take longer time until someone notices that something has happened and that the person needs assistance.

4.1.2 How to get help today

The participants claim to always carry their mobile phones in the case that they may need assistance. During situations requiring assistance they preferably try to get in contact with

[32] *Focus groups* are interviews where a group of people, preferably 6-10 participants, are gathered to discuss specific themes that are moderated by a discussion leader (Jordan, 1998). The strength of the method lies in the different thoughts evoked among the participants when another participants speak, thereby providing the discussion with a multifaceted perspective on the questions addressed (Osvalder et al, 2008). Another asset is that participants may raise issues that the investigator may not have anticipated (Jordan, 1998).

someone they know or, depending on the severity of the situation, they call the emergency services. If they cannot reach anyone they know or have someone to contact, the alternative is to call a taxi or to shout and hope that someone hear them.

4.1.3 Realise and accept that help is needed

It was stated that it could be difficult for a person to realise that he or she might be presented with situations that needs additional assistance before actually encountering such a situation.

When discussing the use of home care services the author further received the impression that receiving help from home care services is something that everyone strives to avoid. According to Peeters (2000 cited in Wikman & Gard, 2006) older people does not like products that categorises them as old and refers to personal social alarms, which is used to alarm home care services, as a product that associates to sickness and independence and produces stigmatisation.

4.1.4 Reluctance to receive help from others

To investigate how the participants regard being assisted by someone they do not know, for instance if someone who by coincidence happens to be nearby at the specific time could be asked to assist. The participants initially answered that this could be beneficial for people who do not have anyone to contact. However the participants mentioned that the keenness to ask for help from others depends on the nature of the situation, how quickly help is needed and how important it is to receive help.

Furthermore it was mentioned by one participant that he would be reluctant to ask for help since he does not want to bother someone. He explained that he thought this is a cultural problem and that Swedes do not want to be a bother to other people and that this has made us even reluctant to ask neighbours for help.

4.1.5 Fear to meet unfriendliness

Some participants explained that they would have difficulties trusting someone they do not know because of all the bad things that happens today, where for instance burglars claim to represent the home care services. It was expressed by some participants that people today are more afraid compared to when the participants grew up and that people today does not have a sense for what is right and wrong and when enough is enough.

When asked about how the participants could feel more secure they claimed they would want to know who was coming and that the volunteer then would need to identify themselves. Also it was regarded as important that it was the organisation behind providing the name of the volunteer, to serve as a certification that the person coming can be trusted. To enable the user to feel more secure it was also explained that the organisation needs a good reputation. The participants claimed that they for instance trust the Swedish Sea Rescue Society since have proven their capabilities. However it was mentioned that since a reputation needs to develop over time it could be difficult to trust an organisation before they have achieved their reputation.

4.1.6 Expectations on the volunteer

Several characteristics that the volunteer ideally should have were identified. Firstly the volunteer needs to have the right mindset, meaning that the person should genuinely care for and want to help other people. This quality was believed to be rare, but that there are people that have these qualities from for instance their work. Also it was claimed that the volunteer should be unafraid to intervene, since the participants believed that people today are afraid to help others or that they for some other reason chooses to not to get involved. Furthermore it was claimed that the volunteer should be fit and have suitable knowledge.

4.1.7 Security of personal data

The participants were asked how they look on the use of systems that track people. To this question the participants claimed that they do not want a system or a person being able to see where they are since they do not want to feel watched. It was explained that high requirements are set on the organisation to ensure that the information is not retrieved and misused by secondary parties.

When asked how the participants perceive being positioned by a relative, the answers diverged. A woman explained that she could imagine having her husband following her via his phone when for instance walking alone during nights, with the condition that she could activate and deactivate her visibility. In contrast a man claimed that despite walking alone during nights could be considered as unsafe, he would not feel comfortable having his wife seeing his location.

The participants were also asked how they regard providing information concerning their health conditions. According to them, such information is necessary in order to receive correct help.

4.1.8 Simple handling & price

Simple handling and triggering of alarms was regarded as very important for older users. It was suggested by a participant that the product itself perhaps could detect if for instance the user falls instead of the user having to push a button.

Furthermore it was explained that assistive products are expensive, often too expensive for older users with decreased financial resources due to low pensions.

4.1.9 Implications

Several implications were found from the result of the focus groups with seniors. This included barriers to use the service, requirements on the organisation and on the user interface.

There is a difficulty to realise that help is needed and reluctance to seek assistance from others. The statements given during the interviews suggested that there is a need for providing a service such as Landräddningen, even though it may be preferred to firstly seek assistance from known (see 4.1.1 and 4.1.4). This, along with the difficulty to realise and accept that one needs may need help (see 4.1.3) and the reluctance to ask for help (see 4.1.4) may be barriers to register as alarm user within Landräddningen.

Creating a reputation is important to achieve trust. It was identified that it is important that the organisation has a reputation before it is trusted (see 4.1.5). The organisation needs to prove that they can provide suitable assistance when it is needed. Until this is achieved, Landräddningen may have difficulties attracting alarm users.

The unwillingness to be positioned by a system may be a barrier. The participants claimed that they do not want to be positioned by as system. This unwillingness may be another barrier to registering to Landräddningen, both when it comes to usage within Landräddningen and privately (see 4.1.7).

The system needs to secure the identify of users. Being able to identify the volunteer was seen a necessary measure to counteract potential misuse of the service (see 4.1.5).

The alarm user should be presented with the volunteer before meeting the volunteer. To know who is coming, thereby being able to identify the volunteer, was seen as a way to decrease worry of meeting unfriendliness (see 4.1.5).

The system needs to ensure the security of personal data. There is a worry that personal information could be retrieved from other parties (see 4.1.7).

The system needs to be simple to handle and inexpensive to fit older users (see 4.1.8).

4.2 INTERVIEWS WITH PARENTS OF CHILDREN WITH SPECIAL NEEDS

During interviews with expertise it was found that children and adults with cognitive disabilities are groups that may be of interest for this service. Given that problems concerning persons diagnosed with dementia already had been identified, it was decided to further focus on families of children with cognitive disabilities. In order to investigate in which situations assistance is required, what requirements these situations set and if Landräddningen could be used to handle these situations, it was chosen to interview parents of children with special needs. Six parents were interviewed, where five of these had children diagnosed with Autism and one parent had a child diagnosed with Down's syndrome. Two of the children with Autism also had an intellectual disability. The interviews were carried out in a semi-structured manner following an interview guide (see Appendix III). Notes and audio recording were used for documentation. The result was analysed by the author mapping statements into similar topics and implications.

4.2.1 Need for constant watch

During the interviews all participants explained that their child at some point had run away, though the frequency of this problem varied from child to child. One parent explained that this only had happened one time, whereas another parent expressed that this is a constant worry for them. It was explained among all parents that they at all times need to keeps an eye on their child to ensure that the child does not run away or does something that might injure themselves. It was further noted that this problem could be seen in most families with younger children, even without a child with cognitive disabilities.

4.2.2 Need for precise positioning and instant feedback

It was explained by a participant that several of the times that their son had runway he had not gone far away. The problem was that the he did not answer his name that made him more difficult to find. During these situations it was explained that positioning needs to be precise and notification of the child's absence is needed immediately to enable the parents to locate their child. However the need for instant feedback was also explained to depend on the child's physical abilities, where a mother described that her son would not have the capability to quickly run away.

It was further explained that if positioning is precise parents would manage finding their child on their own, but if the accuracy is poor the need from additional assistance increase.

4.2.3 Tracking is not enough

Given that children with special needs can be presented with dangerous situations tracking was seen as insufficient to ensure that the child is safe. Some parents claimed that they would want to be able to position their child as a precaution, but that they still would need to keep constant watch to ensure that the child is not harmed. Furthermore it was highlighted that since the positioning may not always work, the system could not be completely trusted.

The possibility to track a child was among the parents regarded as beneficial in case if something were to happen to the child and the parent would need to search for the child. This was seen as important for both a children with and without cognitive disabilities, as dangerous things can happen to everyone. However some parents explained that they would rather have their child informing of their whereabouts rather than the parents monitoring them.

4.2.4 Attitudes towards tracking

The interviews also addressed whether or not it is acceptable to place a device on a child for positioning. Among the interviewees, all believed that tracking of children with special needs is acceptable since they might injure themselves and that it is the parents' responsibility to ensure the child's safety.

Even though some interviewees argued that tracking of children without special needs is a violation of their integrity, some argued the opposite. It was explained that many parents are afraid that something dangerous could happen to their children and that it would be comfortable to know that the child can be found. It was further expressed that parents often are not interested in finding out exactly where the child is and what the child is doing, but instead that the parent is afraid that someone else could do something horrendous to the child.

4.2.5 Desired features

When discussing what type of device the parents want for their child, several of aspects were mentioned. A mother explained that she would like to have an application in her phone that she could connect GPS-trackers to and that could be placed on her child's glasses or on a bracelet. The possibility to attach the device on different places was appreciated by other participants. It

was further believed that the device should be discrete to not attract attention and that smartphones should not be used since they are attractive for theft. It was highlighted that the device should also be discrete to not disturb the child since there may be a risk that the child takes it off. To aid localisation of children that do not answer their names, it was asked if the device could make a sound. However a father explained that sounds probably would disturb his son, but that this may not be the case for all children.

4.2.6 Risk of attracting people with unfriendly intentions

Similar as the seniors, the parents identified a risk of attracting people with unfriendly intentions. This included persons who falsely claim to be in need of help and persons who would take advantage of a person in need. It was said by a participant that, even though she is a person that would like to help a person in need, it could not be assumed that everyone has as good intentions. In contrast it was explained by another parent that it neither could be assumed that everyone have unfriendly intentions and that it is more important to find a child with special needs compared to the risk of someone with wrong intentions receiving that information.

To be able to trust the service the parents explained that the system need to secure that the person triggering the alarm also is the person one meets. If this could be done, it was believed that people with unfriendly intentions unlikely would use the service.

4.2.7 Need for informing of disabilities

Among some participants it was explained that it is important to inform the person helping a child with special needs of the child's diagnosis since people are more tolerant to irrational behaviour if they know the background story. It was also believed that the person might incorrectly think that the child understands, making it difficult for the person to assist.

However a mother expressed that she would not want her child having something visible informing of his diagnosis since it would not feel ethical, but that such information could be shared if it truly was needed.

4.2.8 Implications

The interviews with parents of children with special needs led to the following implications.

There is a need for a system enabling parents to ensure their child's safety. The interviews confirmed that running away is a common problem among children diagnosed with Autism and Down's syndrome (see 4.2.1), requiring constant watch from the parents (see 4.2.3).

There may be a need for being assisted from others in order to locate the child, for instance via an organisation such as Landräddningen (see 4.2.2). However additional assistance mainly seem to be needed when private searches have not been successful.

To communicate the child's diagnosis is necessary. In the case of requiring assistance to locate a child with a cognitive disability, it was seen as necessary to inform the helper of the diagnosis to ensure that the child is helped in a suitable way (see 4.2.7)

The system needs to ensure the identity of the person. The fear of attracting people with unfriendly intentions was mentioned by several parents, although the risk of misuse was also believed to be less important than to not find a child with special needs. As mentioned during interviews with seniors, the risk of misuse was believed to be counteracted if the system could ensure that the person registered to the account also is the person the user meet (see 4.2.6).

4.3 INTERVIEWS AND OBSERVATION WITH OPERATORS

To handle incoming alarms, Landräddningen plans to use a call centre that currently handle personal social alarms for municipalities all over Sweden. In order to investigate the operator's role in the system, how different alarms may be handled and how the user interface should be developed to promote efficient handling, two operators were interviewed. A semi-structured approach was used following an interview guide (see Appendix IV) and was documented through audio recording and notes. During the visit at the call centre one operator was also studied during an *observation*[33] where the author sat beside listening and observing when incoming alarms were handled. Between the alarms the operator explained how she worked and the author asked questions to understand the procedure. The information retrieved during interviews and observation were structured into topics, where implications for Landräddningen's call centre user interface were identified.

4.3.1 The operator

The main role of the operator is to answer, handle and distribute alarms that arrive at the call centre. The operators are all assistant nurses with experience from working within the health care for elderly and disabled. They all have had to pass a monthly long training period to learn the working procedures that involves being an operator. This includes learning the overall process, how to operate the software and how to interview the alarm user to retrieve necessary information. It was explained that the operators are not permitted to make medical judgements and that the operators mainly act as a distributor of alarms.

4.3.2 Working procedure

The overall procedure when handling an alarm involved seven main activities (see Figure 5).

[33] During an observation the researcher observes a specific procedure that is of interest for the study (Karlsson, 2007). Observations can be carried out in field in order to capture situations when a product is actually used or during clinics. Observations are performed either closed or open. During a closed observation the subject is studied without their knowledge whereas an open observation allows interaction with the observer (Osvalder et al, 2008).

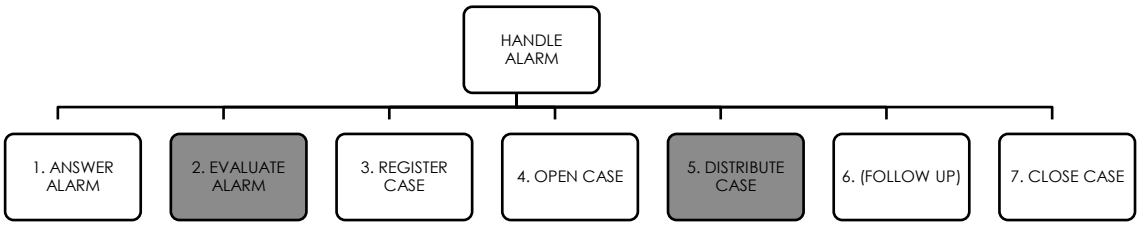


Figure 5. The steps involved when the operator handles an incoming alarm. In the interface the operator can see the number of alarms waiting to be answered. To answer an alarm the operator presses a specific key and greets the alarm user (1). Thereafter the operator interviews the alarm user in order to evaluate alarm and decide which measure to take (2). The alarm is then registered (3), opened (4) and distributed to the caregiver (5). In some municipalities the operators also follow up the alarm (6) before the operator closes the case (7). Step 2 and 5 are the most difficult respectively time-consuming tasks.

In the interface the operator can see all alarms that have arrived and that currently are being handled. To answer an alarm the operator uses a specific key, where contact with the alarm user is automatically achieved. After answering to the alarm the operator aims to identify what has happened during interview. Through their experience they know which questions to ask and how to classify the situation. As explained by the operators, everyone has their own interview technique and they do not follow an interview guide. The operator also has access to information concerning for instance the user's medical history and previous alarm record, which is used when evaluating the alarm. The alarm is then registered in the system, enabling all operators to continue handling the case. Depending on the severity of the alarm it is either handled directly by the operator or "put down" for later completion. Thereafter the alarm is once again opened where the operator investigates how the alarm should be handled, for instance whom they should contact and how. The alarm is then distributed to the caregiver, where the operator's tasks often are ended. For some municipalities the operators are also required to follow up on alarms before closing them.

According to the operators, the handling of an alarm often takes between 10 seconds to 3 minutes where most time is spent talking to the user. The second most time-consuming task was stated to be distribution of alarms to caregivers since the they do not always answer the call, which further was regarded as very stressful during situations when assistance is needed instantly. It was explained that evaluating alarms is the most difficult task since the user does not always explain to the extent that is needed. A related problem is that the sound quality often is lacking, which makes it difficult for the operator to identify the need of the situation.

4.3.3 Different routines for different alarms

During handling of alarms the operator follows pre-determined routines for different types of situations. These routines the operator has learned from their experience, but they are also attainable from the software.

More than half of the alarms do not require assistance from a caregiver. These include those where the user only wants to talk to someone, to leave a message to caregivers or to ask a question that can be answered by the operator.

Common alarms are those where the user wants help with ordinary tasks such as help to the toilet, to get up from a chair or to go to bed. These are always distributed to the caregiver.

Alarms are also triggered during more severe situations that require assistance from emergency services. During these situations the operator is assisted by a colleague that alarms to the emergency services while the operator remains in contact with the user. It was explained that these situations are stressful to the operator who knows that they cannot help the user in another way than to forward the alarm.

Silent alarms, which are alarms when there is no one answering when the operator tries to get contact, also occur. This means that the operator cannot identify what has happened and there is a need for identifying the need of the situation through another way. Most commonly the operator tries calling the user on their home telephone number and if contact is not reached the alarm is directly distributed to home care services, since this may suggest that the user is in need of assistance but unable to speak.

Handling of mobile safety alarms is becoming more familiar to the operators, even though they are still uncommon. Currently the call centre only handle alarms that are triggered when a user leaves a certain area rather than the user themselves actively trigger it when needing assistance, which are the two main functions of most mobile safety alarms. During these alarms the operator is presented with a map displaying the position of the user to enable the operator to explain the alarm user's position to the caregiver. However as these alarms have yet not been integrated in their software, the alarms need to be manually registered.

4.3.4 Implications

Through analysis of the result from the interviews and observation were implications for the call centre interface found.

The operators seek efficient handling. Observing the operators made it evident that they seek efficient handling in terms of working procedures, enabling them to quickly distribute assistance to where it is needed. Efficiency is created through the operators having experience in retrieving information during interview, knowing how different situations are handled and the use of tabs, hot keys and abbreviations.

The operator needs to be supported during interview. Given that the operator is unfamiliar in handling alarms that occur outdoors, which questions that need to be assessed may not come as natural. There may be a need to ensure that all necessary questions are asked, which e.g. include checking that the alarm user is located at the position that is calculated by the system.

Routines for how different alarms should be handled need to be established. The operator follows pre-determined routines concerning which alarms that are distributed (see 4.3.3). To enable the operator to know how to handle different alarms within Landräddningen, routines need to be formulated by the initiators.

The operator needs to be informed of current status. To not get hold of the caregiver was regarded as very stressful (see 4.3.2). It is likely to believe that similar experiences could arise if

volunteers do not answer requests. To decrease stress current status needs to be communicated. Also the operator needs to be reminded to review requests when suitable time has passed, enabling the operator to assess the possibility to provide assistance.

Inexperienced volunteers demand richer information. There is a difference in current distributing of alarms compared to alarms that will be distributed within Landräddningen, namely that the volunteers may be unfamiliar to receiving alarms and providing assistance. Due to this inexperience among volunteers there is a need to distribute richer information, which potentially will counteract the efficiency that the operators seek.

4.4 INTERVIEWS WITH POTENTIAL VOLUNTEERS

During the interviews with seniors and parents it was found that the volunteer should have the right mindset, possess suitable knowledge and be fit to be able to provide assistances (see 4.1.6). A fear that the person asking for assistance has unfriendly intentions was also identified (see 4.2.6). To investigate how volunteers perceive providing assistance through volunteering and during which circumstances they are willing to assist, informal interviews were carried out with potential volunteers. Approximately ten[34] interviewees, which included men and women aged between 23-58, were asked to answer questions that aimed to identify factors that affect their willingness and ability to assist. During the interviews notes were taken. The findings were structured into topics and implications by the author (see 4.4.1-4.4.6).

4.4.1 Worry from uncertainty of situations

It was expressed as uncomfortable to not know what to encounter as volunteer and what is expected of volunteers. This uncertainty was identified as a barrier to register as volunteer. It was claimed that for instance Missing People has a clearer specification on the situations where the volunteer will be asked to assist that makes it easier for the individual to decide to volunteer.

Not knowing which situations the volunteer will be asked to assist in implicates not knowing if they will have the ability to assist. This was identified as a worry by several interviewees where some expressed fear of being directed to situations where the alarm user's life is depended on their performance. During discussion it was further recognised that the name Landräddningen, which translates 'Land Rescue', has a connotation that contributes to an impression that the volunteer will be asked to assist during situations where the alarm user needs to be rescued.

Being asked to assist on one's own was regarded as uncomforting by an interviewee. It was believed that the experience would be less uncomfortable if the volunteer would be able to communicate with other volunteers that have been assigned to assist.

[34] As these interviews were executed in a less structured manner during informal settings with friends and family the exact number of participants is difficult to give.

4.4.2 Situations when the volunteer could assist in

The interviewees expressed that they would only want to assist during situations that are relevant, which were explained as situations that bring value to the well-being of the alarm user. However it was commented by an interviewee that the situations where volunteers are willing to assist in depend on priorities that may vary between individuals, societies and over generations.

It was claimed that volunteers should not be asked to assist during situations that may interfere with the responsibilities of the home care services, the emergency services or other social functions. It was believed that if many alarms are distributed to volunteers, thereby implying a need for being assisted outdoors, there is a social function that needs to be developed rather than a function based on volunteering.

4.4.3 Ability to assist at a specific time

The ability to provide assistance was regarded to be depended on the volunteer's possibility to leave their current activity and on the effort in terms of time and assistance that is required by the volunteer. It was claimed that the volunteer may not want to provide assistance when they are on their way to an important meeting, whereas they are more keen to assist during other circumstances.

4.4.4 Willingness to assist at a specific time

It was stated that the type of situation affects the volunteer's willingness to assist, where more severe situations makes the volunteer more keen to assist compared to being asked during less severe circumstances. However it was also expressed that critical situations could have the opposite effect where the volunteer is afraid of not being able to assist and for that reason does not dare to intervene. An interviewee further stated that he would not want to know of the situation before answering the request since he does not want to feel guilty from declining if he is not able to assist.

The willingness to assist was stated to also depend on the availability of other volunteers that are located more close and that could be asked to assist, especially during situations of lower degree of severity. When the volunteer is located far away from where assistance is needed it was believed that there likely are other volunteers positioned more closely or that someone passing would assist before the volunteer has arrived.

4.4.5 Willingness to volunteer

It was believed that a person needs to feel valued and needed to be willing to volunteer and remain active for assignments. It was further stated that it is important that the volunteer is only asked to assist during situations that are relevant, to not be taken advantage of.

The pricing of the alarm function was questioned since it was believed that assistance should be given free of charge since they are provided through volunteering. By charging the alarm user the organisation was believed to make profit from the volunteers' willingness to help others.

4.4.6 Implications

The result from the discussions with potential volunteers identified several implications.

The situations in which volunteers are expected to assist need to be well considered and communicated. Achieving this ensures that the volunteers feel needed and willing to assist instead of exploited and unwillingness to participate (see 4.4.1, 4.4.2, 4.4.5). This further increases the likelihood that the person chooses to assist when receiving a request.

There is a fear among volunteers of not being able to provide suitable assistances (see 4.4.1). Not knowing which situations they will be presented with and which assistances they will be asked to may be one reason. Another is absence of training to situations they will encounter. Besides the need to inform of situations beforehand, thereby diminishing the first reason, it may be needed to prepare volunteers to the situations they may be exposed to. Though, to ensure that the volunteer possess necessary capabilities remain to the organisation to solve (see 3.4).

The specific situation affects the willingness to assist and should be communicated. Severity generally increases motivation to assist and potentially could make someone, who initially estimates themselves as unable to assist, to change their mind and assist (see 4.4.4). However given that willingness to assist also depends on the volunteer's current activity there is not reason to believe that less severe situations would not result in helping. For this reason volunteers should be informed of the situation in the request***,*** providing the volunteer with the decision to assist or not to assist during the specific situation.

Volunteers are less keen to assist if someone closer could be asked to assist (see 4.4.2). It is important that the volunteers are only asked during situations when their effort is needed, and that this is communicated to the volunteers.

Changed need to be communicated as soon as possible. Given the possibility to reject a request, it cannot be certain how many volunteers that need to be asked to ensure that assistance reaches the alarm user. Probably there is a need to address more volunteer than the situation requires, which may result in volunteers that have agreed to assist are no longer needed.

The system should enable interaction between volunteers. It was stated that it could be uncomforting to provide assistances on one's own, an experience that could be counteracted through enabling interaction between assigned volunteers (see 4.4.3).

4.5 CONCLUSION

This phase identified requirements that are set on Landräddningen by the alarm user, the operator and the volunteers.

There might be a need for providing opportunities to be assisted outdoors, even though it may be difficult to realise need of assistance. It was found that there may be reluctance to seek help from unknown others, which primarily originates from a fear of meeting unfriendliness. Other

contributing factors are a desire to manage on one's own, a resistance to bother others, or a belief that the common person taking the role as volunteer is unqualified to assist.

During handling of alarms the operator normally use their experience to identify correct need. Given that the alarms within Landräddningen likely will not to be similar to the alarms the operators usually handle and since they occur outdoors, there is a need to support the operator until experience has been achieved. It was found that the operator seeks efficiency and desires an interface that allows them to quickly distribute assistance to the person in need.

It was found that volunteers fear being unable to provide assistance, which derives from not knowing which assistances they may be asked to provide and absence of training. The specific situation affects the willingness to assist where severity increase motivation to assist to some degree but critical situations may produce fear to intervene. The volunteer should be informed of the assistance they are asked to provide before deciding to assist.

5. ANALYSIS

After the user studies, a phase of analyses was performed. First was the result summarised, followed by an analysis of the alarm user that acknowledged the various systems different alarm users require and evoked a selection of the type of use to further focus on. The following analyses included assessing the characteristics of the users, the journeys of the users and the necessary functions of the system. Through examining different situations that the user may encounter requirements on the system and the user interface were found. Along with the requirements that previously had been identified, these were structured in a list of requirements. The requirements were discussed and in the final section the chapter is concluded before the next phase of the project is introduced: Part 2: Designing the User Interface.

5.1 SUMMARY OF RESULTS

To map findings of the Pre study and User study and to identify how different aspects of the service contribute to the complete experience when using the service as alarm user or volunteer, the process of use was analysed and visualised through *customer journey canvases*[35] (see Appendix V). Through this it was believed to point to requirements on the whole service; the organisation, the system and the user interface. A summary of the results is presented bellow.

Difficulty to realise and accept that assistance is needed and to admit need to others. Before considering using a service such as Landräddningen the person firstly needs to have realised that they may be presented with situations that requires assistance from others. Thereafter the person has to accept that they need assistance and admit their need to others, which is the indirect consequence of asking for assistance, before determining to search for a service that can deliver such services.

A need to clearly communicate the service to users. To clearly communicate which situations Landräddningen aim to handle enables the potential alarm user to decide if they would value being assisted outdoors by volunteers. Potential volunteers will also be able to determine if they are willing to assist during these situations, which further increases the likelihood that they accept received requests.

Creating a reputation is important to achieve trust. It is uncomforting to ask assistance from unknown people that lack training, why creating a reputation for the organisation is important to achieve trust and to stimulate people to decide to use the service. Reputation is created through the organisation, and thus the volunteers, proving their capabilities and their stories reaching the individual.

That assistance cannot be assured until a volunteer has agreed to assist creates worry. Besides resulting in discomfort during use this may be reason for deciding to not use the service at all, especially if the alarm user needs to pay for their alarms without knowing that they will receive assistance.

[35] A *customer journey canvas* is a tool to visualise the experiences achieved when using a service. They illustrate how expectations, experiences and satisfaction/dissatisfaction are achieved through the user's interaction with a service at different touch points before, during and after using the service (Stickdorn & Schneider, 2011).

The alarm user may need to wait substantial amount of time until assistance arrives. This includes that the alarm user firstly will need to explain the situation to the operator who is to estimate the situation, declare information to volunteers and send a request. Thereafter the request needs to be seen by the volunteer, accepted and, depending on their current location, it may take time until the volunteer has relocated. Depending on the type of situation, the experience of time may be considered as even longer and more uncomfortable. This especially concerns environments that are perceived as threatening, for instance deserted places in night.

Willingness to assist depends on the specific situation. The type of situation where assistance is needed, the type of effort that is needed from the volunteer and the current activity of the volunteer affect the willingness to assist.

Volunteering will likely produce positive experiences from the act itself. Thus the experience from other elements of the service such as the interface may be insignificant in relation to other experiences that are achieved.

The experience depends on the situation in which assistance is needed. More severe situations evoke less pleasant experiences, both for the alarm user and the volunteer.

The experiences depend on the person(s) the user encounters through the service. Meeting an open, service-minded person that has past experiences from similar situations is more likely to contribute to positive experiences compared to meeting someone with opposite characteristics. An unpleasant meeting may be the reason for why one person chooses to unregister.

5.2 SELECTION OF ALARM USERS

Several groups would benefit from access to assistance outdoors. This project has identified some of those groups.

From the interviews with experts it was found that mobile safety alarms may be of value to elderly that wants the comfort of knowing that they could be able to reach someone if needed, persons that have a problematic health condition, or persons with physical or cognitive disabilities. The focus groups with seniors confirmed that there might be a need for providing assistance outdoors, especially to those who do not have anyone to contact in need of support. The interviews with parents also confirmed that children with special needs might face situations where assistance is needed, mainly due to their tendency to run away and difficulty to identify dangerous situations. When comparing these results with the findings from the pre study it became clear that children with Autism or Down's syndrome and persons with dementia share similar behaviour such as the tendency to wander away, to not find their way home and to not recognise dangerous situations. This insight led to the identification of the two categories of users that need assistance outdoors: (1) the user that can identify that he or she is in need of assistance and (2) the user that requires a system, or another person, to identify these situations for them. Compared to the first category that needs a system that they can activate themselves in need of assistance, the second category of users needs a system that can recognise situations that

are dangerous and when assistance is required as well as to activate the alarm. These diverging demands imply two different systems, and it was acknowledged that a selection had to be made.

For this project it was decided to continue developing the service for users that are capable of identifying when assistance is needed, given that the service idea was more in line with this category of uses. As older users are more likely to face situations requiring support from others, it was decided to focus on creating possibilities for seniors to alert for assistance during situations that occur outdoors.

5.3 ANALYSIS OF USERS

The service primary involves three types of users; the user that produces the alarm – the alarm user, the user that distributes assistance – the call centre operator, and the user that is requested to assist – the volunteer. The characteristics of each user were described through *user profiles*[36], which then formed the background for three *personas*[37] that aimed to communicate the users visually (see p. 44). It should be noted that besides these users there are also secondary users and side users that are affected by the service without having registered to it. These for instance include social functions, relatives to the alarm user or the colleagues of the volunteer.

5.3.1 User profile: the alarm user

Background: The alarm user is the primary user of Landräddningen. This user may be anyone who identifies a need of receiving assistance, which means that the potential user group is heterogeneous in terms of age, sex and educational background. Since the alarm user likely is a person that has increased risk of needing assistance, such as physical disabilities from aging, the expected user group will primarily include people aged over 65 years old. This group contains users of varying degree of decreased functions from barely noticeable to very apparent.

Use: Familiarity with using smartphones and applications vary within the group. The situations in which these users require assistance also differ, where healthier users are believed to use the system mainly during severe situations and users that are less well are believed to portray a wider range of situations. The frequency of use also varies between rare to often.

[36] A *user profile* is used to present data from studies of users. The profile involves six components: background, use, influence and responsibility, emotional relationship, type of interaction and activities, goals and motives of use (Osvalder et al, 2008)

[37] A *persona* is a fictitious, specific and concrete representation of a target user that can help organisations to design for a specific set of users, where the personas for instance can be used to generate ideas, evaluate concepts and making suitable decisions (Adlin & Pruitt, 2010). Personas are often used together with *scenarios*, which are specific stories in which the personas interact with the system that is to be developed. The scenario can for instance be used to highlight problems of an existing solution or the impact of a design on the target user (Ibid).

Influence and responsibility: There are no other services that can deliver assistance outdoors, hence the user has no other choice than to turn to Landräddningen. Delivery of assistance is depended on volunteers agreeing to assist.

Emotional relationship: The alarm user wish to not need to use the service since he or she would rather want to be healthy enough to manage on their own. However, due to own or environment's recognition that the person may face situations requiring assistance, the service has been employed. The user does not desire to signal to others that they use the service.

Type of interaction: Both physical and cognitive interaction, i.e. handling that requires the user to physically interact with the product respectively to use their ability to think to understand how to use the product. Given that smartphones are used, the system may be difficult to use by persons with decreased visual, haptic and tactile sensory. Interaction with volunteers and communication with the operator.

Activities, goal and motive: The user's goal is to have the possibility to, in a simple manner, alert for and receive assistance outdoors if such a situation occurs. This means that the user will be able to remain active, to move independently and to take part in activities outside of the home, while feeling safe.

5.3.2 User profile: the operator

Background: The call centre operator, who is employed to handle incoming alarms, is a co-user of the service that interacts with the alarm user and volunteers through a call centre interface. They are assistant nurses with previous experience from the field and aged between 18-65.

Use: The operators will use their interface frequently and become expert users of their system. But now, when the interface still is new to them, the operators are inexperienced.

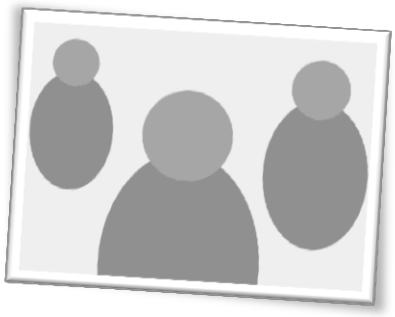
Influence and responsibility: Since the operators are employed to handle incoming alarms through the interface they have not influence on the system that is used, nor do they have responsibility for the product.

Emotional relationship: The operator are only users of the system, they are not owners. The interface is part of their work, where they experience both positive feelings from being able to help people in need but also stress from knowing that they are unable to actually intervene.

Type of interaction: Physical and cognitive interaction during handling of the interface. Communication with the alarm user.

Activities, goal and motive: The primary goal of the operator is to handle incoming alarms and distribute these to right function. A secondary goal is that the handling is carried out efficiently, promoting that assistance is distributed quickly and that the operator can start helping others.

5.3.3 User profile: the volunteer



Background: The volunteer is a secondary user who has joined Landräddningen to be able to provide assistance to people in need rather than to receive assistance on their own. The volunteer may be anyone who has interest in helping others and thus illustrate a heterogeneous group in terms of sex, age and educational background. The volunteer should preferably not have responsibilities that hinder their ability to assist.

Use: Since it is unlikely that the volunteer will be asked to assist often, the volunteer needs to be well instructed during the times where they are asked to provide assistance. The volunteer may be inexperienced in providing of personal assistance.

Influence and responsibility: The volunteer is not employed, but the service is depended on the volunteer's services. Even though the volunteer is not required to always be available, the volunteer will feel responsible if they are asked to assist.

Emotional relationship: The volunteer may wish to communicate that they are volunteers within Landräddningen. Through the service positive experiences are achieved via the act of helping. Negative experiences may also be evoked, for instance if the volunteer is exposed to severe situations.

Type of interaction: Both cognitive and physical interaction through the application. Also interaction with the alarm user.

Activities, goal and motive: The primary goal of the volunteer is to provide assistance to people in need. The volunteer hopes to be able to bring value to the person and to achieve positive feelings from volunteering. However the volunteer does not desire to be asked to assist during all types of situations or that their current responsibilities are affected.

Rune *is 85 years old and lives in a small house, alone since his wife past away. He has walking distance to necessities such as the grocery store, pharmacy and – at least what Rune recognises as important – the football pitch where he sees his granddaughter play every weekend. She is also his go-to when it comes to his smartphone. She has helped him to download apps such as radio, weather and newspapers, although Rune finds his ordinary radio, TV and morning paper as simpler to use. Throughout his life he has been very healthy; something he believes comes from his forty years as a bicycling postman. However recently Rune has experienced dizziness that has made him afraid to fall. This has yet not occurred, but he fears that it's just a matter of time. Since Rune does not want to trouble his son at work he decided to register to Landräddningen, of course with support from his little helper.*

Figure 6. Rune. Photo: author.

Figure 7. Jenny. Photo: Geloo (2009).

Jenny *is 32 years old and works as an operator at a call centre that manages social personal alarms all over Sweden. She is single and lives in a small apartment near the city centre and cafés, clubs and the gym. Jenny has worked at the call centre for three years and, similar as her co-workers, she also has experience from working within the home care services. Jenny enjoys her work since it allows her to help people in need. The work is very stressful as times, especially when something severe has happened and help is needed quickly. The call centre has recently taken the task to handle alarms from Landräddningen, which are managed in a separate interface. Jenny, who is quick learner, has been chosen to handle these.*

Hannah *is 42 years old and works as a science teacher at an upper secondary school. She lives with her husband; also teacher, and their cat in a 3-room apartment just outside the city centre and near the school where they both work. On her spare time Hannah likes to explore the nature and to photograph, which are two interests that she also likes to combine. Hannah is a warm-hearted person who always has enjoyed working with people and helping others, which is why she decided to teach – and to become a volunteer within Landräddningen. Through Landräddningen she hopes to be able to help people in need.*

Figure 8. Hannah. Photo: Ariel da Silva Parreira (2009).

5.4 ANALYSIS OF SITUATIONS

The situations where seniors need assistance outdoors may be of different nature and varying severity, ranging from the user feeling lonely and wanting company to the user having a cardiac arrest and requiring instant medical treatment. Even though emergency services should be contacted directly during critical situations, there is reason to believe that the alarm user will use the system during these situations and that the operator will need to respond to emergencies. The system thus needs to allow activation during situations of varying severity. However the situations when volunteers should be asked to assist remain uncertain. Even though findings from the user studies suggest that volunteers are neither keen to assist in situations that are unharmful to the alarm user's well-being nor during situations that are very dangerous (see 4.4.6), which further suggests a span of situations between these two extremes, it was concluded that these situations should be determined by the organisation. As wished by the initiator of Landräddningen, assistance should be given during various situations that occur in the everyday life. It is also believed that volunteers potentially could be asked to support until emergency services arrive during severe situations, although these situations obviously depend on the nature of the alarm. For this reason it was concluded that it is needed to identify requirements that will be set on the system during situations of varying severity.

To identify necessary functions and requirements that different situations set on the system six scenarios of different severities were created. These scenarios involved situations of dizziness, fatigue, fall accident, cardiac arrest, orientation difficulties and heavy grocery bags. The analysis identified the steps that the users take during their use journeys and which steps that are more critical. It also pointed to the need of providing the users with continuous information on the alarm throughout the journeys, enabling these to adapt to the current situation (see Figure 9).

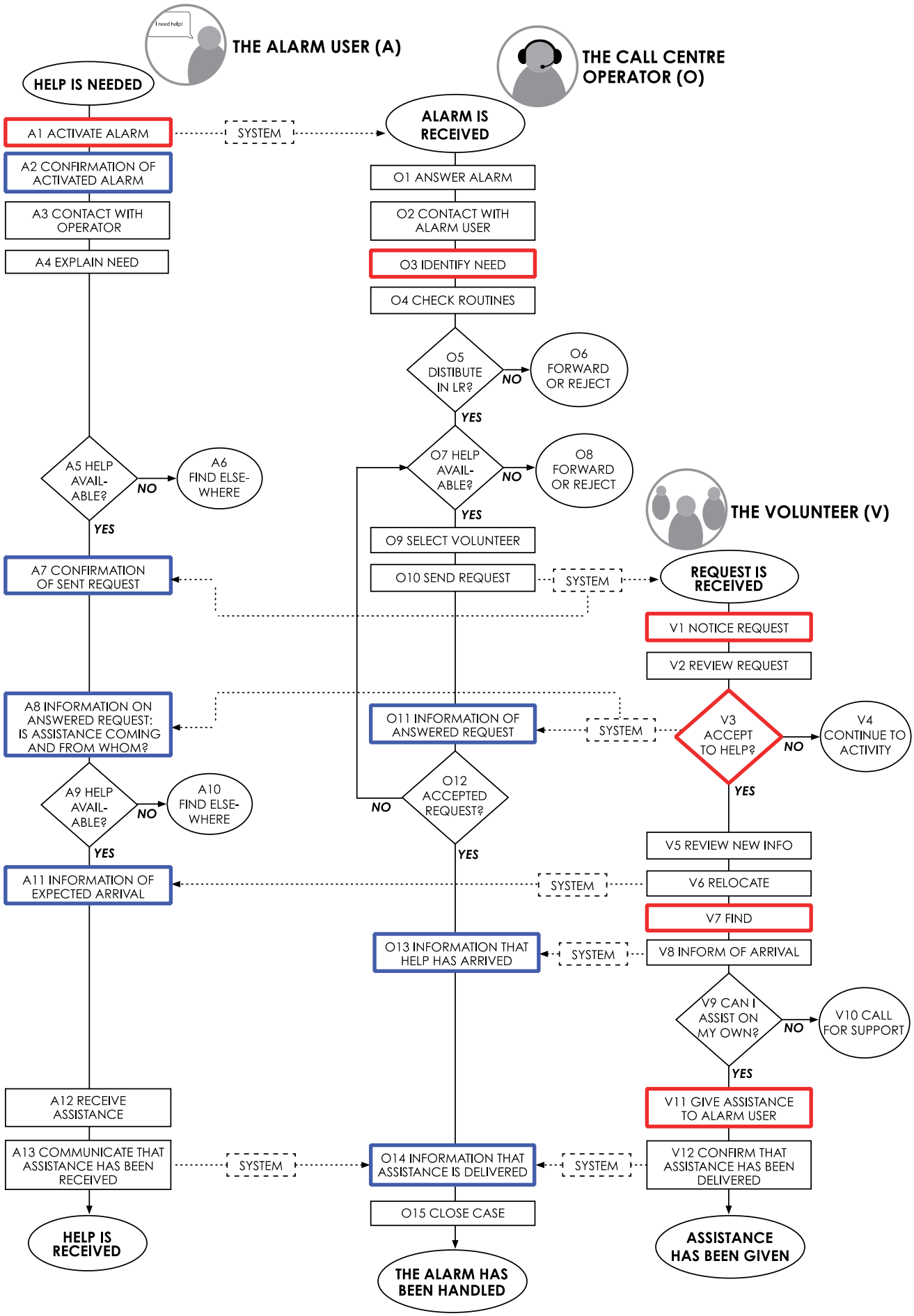


Figure 9. The process of an alarm. Critical steps are marked red and include A1, O3, V1, V3, V7 and V1. Need for information from the system include A2, A7, A8, A11, O11, O13 and O14, and are marked blue.

5.4.1 Critical steps

To ensure that assistance will reach the person in need six critical steps were identified in the customer journeys of the alarm user, operator and volunteer.

Activate alarm

The first step towards receiving assistance is to inform that one is in need for assistance, which requires some sort of alarm activation (A5). To enable activation of alarms during different degrees of severity, ranging from less severe situations to very severe situations, there is a need for a very simple procedure of activation. It needs to ***be easy to recognise, access and execute***. This means that the method of operation needs to ***be intuitive, require few actions and demand low physical effort***. Preferably activation should be ***possible without the user having to use their vision***, as maintaining gaze during stressed situations may be difficult.

Identifying need of situation

In most situations the alarm user will be able to tell what they need (O5). To promote that correct need is identified the interface should ***support the operator during interview***.

However there are situations where the user may have difficulties speaking or does not wish to speak, for instance during cardiac arrest respectively an assault. Since an alarm without response also could be activated by mistake it may be difficult to distinguish situations requiring assistance from false alarms without contact with the alarm user. For this reason there may be a need to ***provide alternative ways for identifying the need of alarms***.

Notify the volunteer

It is essential that the volunteers are informed when they are asked to assist (V5). Since the volunteers may be occupied with various activities there is a risk that they fail to notice their requests when they arrive. As assistance is needed immediately there is a need for ***promoting immediate perception of the request***.

Motivate assistance

After the volunteer has noticed the alarm, he or she needs to decide upon whether to provide assistance or not (V6). From interviews with potential volunteers (see 4.4.4) and literature (see 3.3.3) it was found that both the content and the presentation of the information declared in the request affect the likelihood that the volunteer accepts. It was concluded that ***the situation and estimated assistance*** should to be declared. Also ***time for providing assistance*** and ***distance to where help is needed*** should be given, as these factors also affect the person's ability to assist in the specific situation.

Since phrasing affects the likelihood of helping the request should be formulated to evoke helping. To achieve acceptance the request should ***be explicit, steering and directed to the volunteer***, though without luring the volunteer into agreeing.

Find the alarm user

To ensure delivery of assistance the volunteer needs to be directed to the alarm user (V11). Due to inaccuracy in positioning it may be difficult for the volunteer to find the alarm user if only relying on a position communicated in a map. For this reason there may be a need to ***support locating the alarm user.***

Another reason for not finding the alarm user may be that the alarm user already has been assisted, for instance by another volunteer, and for that reason has left the location. This needs to be communicated to volunteers that have agreed to assist.

Support during assistance

Depending on the situation and on the capabilities of the volunteer it may be more or less difficult to provide suitable assistance. Even though these issues may be taken care of if the organisation decides to set requirements on the volunteers' capabilities, there still may be a need to ***provide support to the volunteers.***

5.4.2 Need for information and feedback

Since the user mainly interacts with the service using their interfaces the need for feedback is very important to enable the alarm user feeling in control of their situation and to enable the operator and volunteer to adapt to current situation.

Confirm of activated alarm

There is a need for ***confirming that alarms have successfully been activated*** (A6). Otherwise the user may believe that the device does not function, resulting in the user either continuing trying to trigger an alarm and becoming more and more frustrated, or the user not using the alarm function. Furthermore if no confirmation is given, the user may incorrectly believe that they have successfully triggered an alarm when they have not, creating false security. Moreover by confirming the alarm, the likelihood that false alarms reach the call centre decreases.

Continuous information of alarm

From explaining the need of a situation to receiving assistance, there are several times when it can be found that assistance cannot be given. It may be that the situation does not fit the service, that no volunteers are located close or that the selected volunteers reject their requests. To decrease worry of not being given assistance it is important to communicate that the process of distributing assistance is ongoing by ***providing continuous information of the status of the alarm.*** This includes informing that (1) assistance is being looked for, (2) that assistance will come and (3) when assistance is expected to arrive.

To provide the alarm user with information on the outcome of specific requests is not ideal. In the event of assistance being unavailable, the information should be communicated when all requests have been rejected. It is judged that it is insufficient to communicate such news only through the application's graphical interface since it may go unnoticed and since the alarm user may need to be assisted by the operator in another way. Therefore it should lie within routines that the operator communicates inability to give assistance directly and orally.

To enable the operator to monitor requests, resend requests or communicate that assistance is unavailable, the interface needs to ***inform of current status of alarms*** and ***provide continuous information of alarms***. This includes that the operator should be able to recognise to which extent the alarm has been handled, which action that was carried out most recently and when this action was performed. The operator also needs to be informed of answered requests, arrival of assistance and finished alarms.

Being informed about current status of alarms is also important to the volunteer since it e.g. may be found that the alarm user already has been assisted by another volunteer, someone passing by or emergency services (if the volunteer was asked to support until they arrive). Hence, the ***current status of alarms should be communicated*** to volunteers.

To be able to provide continuous information of alarms, the information needs to be retrieved by the users reporting their activities. Hence the system needs to ***allow the users to report on their activities and promote that the users provide such information.***

Information on other users

To know who is coming for assistance is necessary to decrease worries from meeting someone unknown (A13, V9). It is important that both alarm users and volunteers are able to identify the person they are to be assisted by respectively assist.

Knowing of other volunteers that are assigned to assist and having the possibility to communicate with these is believed to decrease worry of providing assistance. Hence the users need to be ***informed of the users that are involved in the alarm***.

5.5 REQUIREMENTS

Based on the findings from the Pre study, the User study & Analysis, implications were found and requirements on Landräddningen were formulated (see Table 4)[38]. This includes requirements on the organisation, the system and the user interfaces.

The project identified requirements that could be set on an organisation that aim to provide assistance outdoors through volunteering. This included ensuring that assistance is available and that suitable assistance is distributed, as well as securing the users safety and privacy. These issues will however not be further investigated in this project, which instead will attend to the development of the user interfaces.

Moreover there are requirements on the user interfaces that will not be addressed in this project since they depend on the technology that is used. This includes ensuring position accuracy, which is affected by the environment the users are located in, and fulfilling the requirements on durability, aesthetics and price, which primarily depend on the phone that is used.

[38] It is known that an accurate list of requirements should be specific, measurable, attainable, realistic and traceable. However in this project, at this stage in the process, it was judged that such specification would not give value in relation to the effort it requires to further specify the requirements.

Table 4. Identified requirements on Landräddningen, divided into requirements on the organisation and the user interfaces. Each requirement is specified as requirement or wish.

	REQUIREMENTS ON LANDRÄDDNINGEN	TYPE	NOTE
1.	REQUIREMENTS ON THE ORGANISATION		
1.1	Provide assistance	Requirement	
1.1.1	*- Ensure availability*	Wish	This includes ensuring that there are volunteers available.
1.2	Distribute suitable assistance	Requirement	This includes creating routines, certifying volunteers, instructing volunteers them how to act.
1.3	Ensure security of users	Wish	
1.3.1	*- Control personal identity of users*	Requirement	
1.3.2	*- Follow Personal Data Act*	Requirement	
2.	REQUIREMENTS ON THE ALARM USER'S INTERFACE		
2.1	Promote intuitive method of operation	Wish	Follow usability guidelines.
2.2	Enable activation of alarm	Requirement	
2.2.1	*- Provide simple alarm activation*	Wish	
2.2.1.1	*- Be simple to recognise method of activation*	Wish	Follow usability guidelines.
2.2.1.2	*- Require few steps for activation*	Wish	As few steps as possible.
2.2.1.3	*- Demand low physical effort*	Wish	
2.2.1.4	*- Possible to execute during stress*	Wish	
2.2.1.5	*- Possible without focused vision*	Wish	
2.2.2	*- Enable activation during unexpected situations*	Wish	Not require pre-activation.
2.2.3	*- Prevent activation by mistake*	Wish	
2.3	Enable contact with operator after alarm activation	Requirement	
2.4	Enable explaining of need	Requirement	
2.5	Provide continuous information of alarm	Requirement	
2.6	Provide information of volunteers	Requirement	
2.7	Be perceived as appealing by users	Wish	
2.7.1	*- Not perceived as stigmatising*	Wish	
2.7.2	*- Be not perceived as clunky*	Wish	
2.8	Be durable	Wish	E.g. impact and liquid resistant.
2.9	Give accurate positioning	Wish	
2.10	Be inexpensive	Wish	
2.11	Be compatible with current operative systems	Requirement	iOS, Android, Windows
3.	REQUIREMENTS ON THE CALL CENTRE INTERFACE		
3.1	Promote efficient handling	Wish	
3.1.1	*- Promote intuitive method of operation*	Wish	Follow usability guidelines.
3.1.2	*- Follow of routines*	Wish	Routines of how alarms should be handled.

3.2	Enable contact with alarm user	Requirement	
3.3	Enable identification of alarm's need	Requirement	
3.3.1	*- Assist during identification of need*	Wish	
3.3.2	*- Assist during evaluation of alarm*	Wish	
3.4	Assist during selection of measure	Wish	
3.5	Assist selection of suitable volunteer	Wish	
3.6	Provide continuous information of alarm	Requirement	
3.6.1	- Remind the operator to perform their tasks	Wish	
4.	REQUIREMENTS ON THE VOLUNTEER'S INTERFACE		
4.1	Promote intuitive method of operation	Wish	Follow usability guidelines.
4.2	Notify when request is received	Requirement	
4.2.1	*- Promote efficient perceiving of request*	Wish	
4.3	Provide information to enable decision of request	Wish	
4.3.1	*- Motivate acceptance of request*	Wish	
4.4	Give instructions on how to assist	Requirement	
4.4.1	Support delivery of assistance	Wish	
4.5	Direct to the location of needed assistance	Requirement	Direct to position/address.
4.5.1	*- Assist locating the alarm user*	Wish	
4.6	Enable interaction with other volunteers	Requirement	
4.7	Provide information of alarm user	Requirement	
4.8	Provide continuous information of alarm	Requirement	
4.9	Be compatible with current operative systems	Wish	iOS, Android, Windows

5.6 CONCLUSION

This phase identified two groups of potential alarm users, of which one was selected. The users of Landräddningen were assessed via user profiles, which lead to the creation of three personas that present the alarm user, the call centre operator and volunteer and will be used during the upcoming creative processes.

Requirements on the system were derived through analyses of situations the alarm user may use Landräddningen. Critical steps before it can be assured that help can be given to the alarm user were identified. These include ensuring that alarms can be activated, that the need of the situation can be identified, that the volunteer quickly is notified that their help is needed, that the volunteer decides to help, that the volunteer finds the alarm user and that the volunteer knows how to help the person in need. That assistance cannot be ensured results in concern of not being assisted and it was found that there is a need for continuous feedback to counteract this.

The requirements that were listed in the end of the chapter presents the requirements that were retrieved throughout the initial part of the project. These requirements will then be used in the next phase of the project, Part 2: Designing the User Interface.

PART **02**: **DESIGNING** THE USER **INTERFACE**

6. IDEATION

This chapter describes the ideation that aimed to find solutions to the problems that had been identified during previous steps. Initial ideation encompassed the whole journeys of the users and then the sessions focused on the critical steps that had been identified. Through a combination of ideation methods multiple ideas for these steps were generated. Given the amount of ideas and diversity of these ideas it was seen necessary to select which to take further, which initiated an analysis that identified the problems that were more important to address. Some ideas were selected for further evaluation and implementation into graphical user interfaces.

6.1 EARLY IDEATION

The initial ideation sessions addressed the complete journeys of the users to find ideas for the different steps as well as for the whole journeys (see Figure 10). Then the sessions focused on critical steps that previously had been identified. This included finding ideas to activate alarms, to identify need, notify of received alarm, to motivate assistance, to locate the alarm user and to support during delivery of assistance. These were formulated as questions such as "In which ways can alarms be activated?" where *brainstorming*[39] and creativity techniques such as *analogies*[40], *random entry*[41] and scenarios were used to generate ideas. This resulted in multiple ideas (see Appendix VI). After initial selection and refinement some ideas were identified.

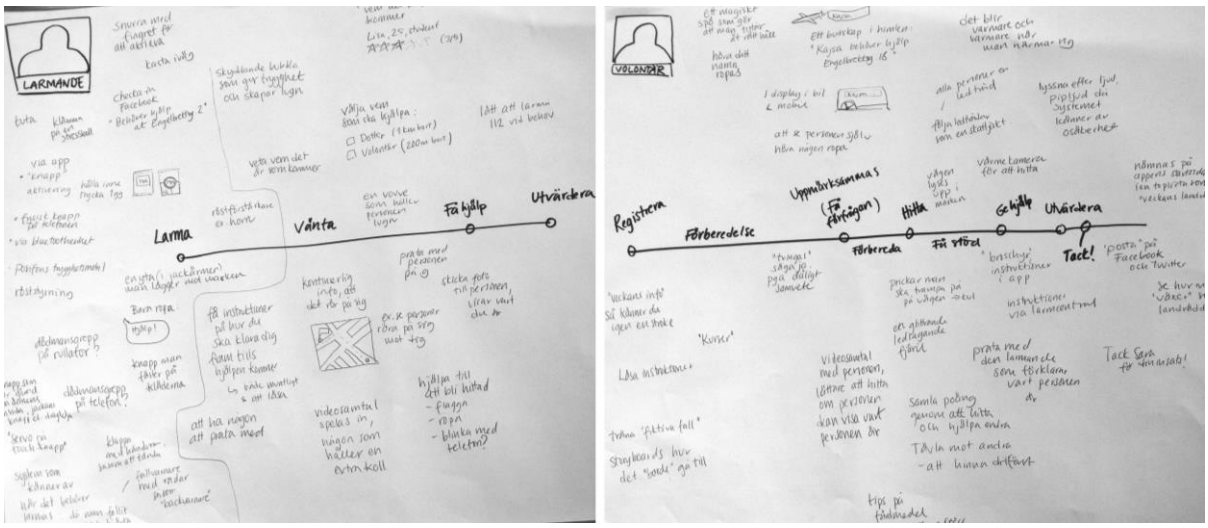


Figure 10. Ideas.

[39] *Brainstorming* is used to generate a large number of ideas within groups but can also be used individually (Ulrich & Eppinger, 2003). A large quantity of ideas is wanted and crazy ideas are welcomed. No criticism is allowed as negative statements kill spontaneity and creativity. Before initiating a session the problem that is to be solved need to be carefully formulated; narrow statements limit creativity whereas undefined ones give vague ideas (Cross, 2000).

[40] *Analogies* are used to liberate from accustomed ways of thinking (Österlin, 2007). Cross (2000) lists four categories: *direct analogies* that find existing solutions to a similar problem, *personal analogies* where the participants imagine how they will perform a task if they were the product, *symbolic analogies* where metaphors are used to relate aspects of a product into aspects of another and *fantasy analogies* where the participants imagine how things are solved by magic.

[41] *Random entry* uses unrelated stimuli to encourage new ideas (Ulrich & Eppinger, 2003). These entries could e.g. be attained from words found in a newspaper or from objects that could be found in a specific environment.

6.1.1 Activating alarm

The most common way for activating an alarm using smartphone application is to push a button "inside" the application. This functionality should also be included in the application of Landräddningen. However to activate an alarm button inside an application is difficult to achieve during situations when the user may be stressed and have difficulties focusing on the screen. To simplify the activation of alarms various ideas were created. After initial selection based on accessibility, effort required to activate, degree of user control, compatibility to different phones and technical feasibility (see Appendix VII) five ideas were identified (see Figure 11).

Home button

The idea *Home button* uses the smartphone's home button for alarm activation. By pressing the button for a few seconds an alarm is activated. Benefits of this solution are that the home button often is placed at the centre, it is larger than other buttons and, compared to touch screens, it requires haptic interaction. Hence it is simpler to find and hit. The button could be made even simpler to locate by attaching a sticker with a contrasting colour to the button, which also offers the possibility to personalise.

Phone case

To enable accessible alarm activation without the user having to take out the phone the idea of *Phone case* was created. A mobile phone case is equipped with large buttons on each side, enabling the user to activate an alarm through gripping and slightly squeezing the phone or by pushing any button on the case. The alarm is than transferred through e.g. Bluetooth.

Notification bar button

In the idea *Notification bar button* a button is placed in the notification bar or the control centre, enabling the user to access the alarm button without having to enter the application.

Bluetooth button

A separate button equipped with Bluetooth enables an easier way for activating alarms. As it has a clip it can be attached to e.g. clothing, a wristband or handbag. Besides enabling the user to activate an alarm by pushing the button through their fingers, if worn around the wrist it could be activated by e.g. bumping the wrist in the ground.

Pull cord

Through using a cord with a connection that fits the headphone socket, an alarm is activated by a pull. The cord could e.g. be a security strap that has a handle similar to the ones on life vests, a mobile phone bag that is worn around the neck or a standard headphone cord.

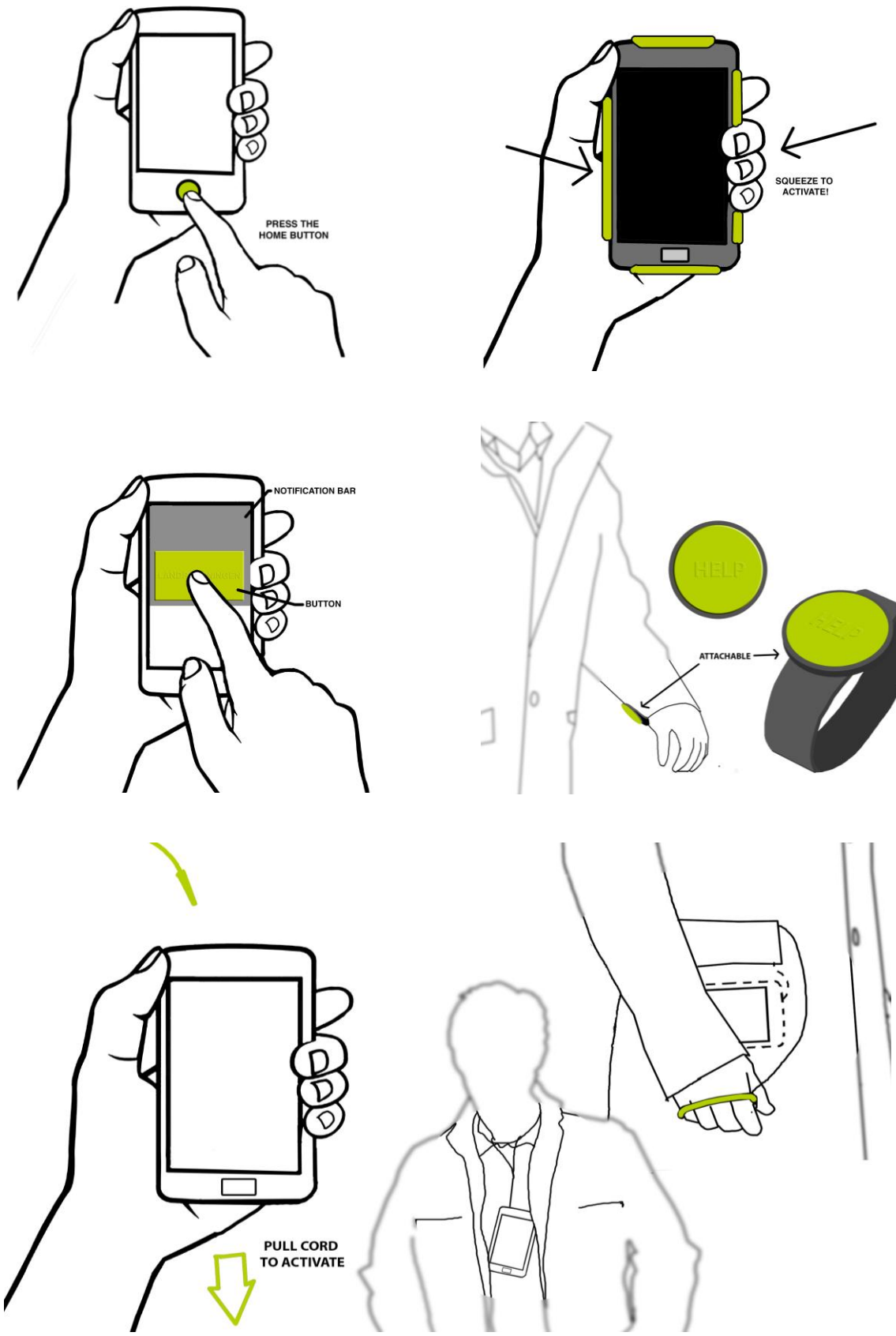


Figure 11. Five ideas on how alarms can be activated through a smartphone. In the top left corner Home Button is portrayed and to its right Phone Case is shown. In the middle Notification Bar Button and Bluetooth Button are presented. In the bottom Pull Cord is displayed, which shows different ways on how the design of the cord could be made.

6.1.2 Identifying the need of alarm

To enable the call centre operator to identify the need of the situation the call centre operator will communicate with the alarm user through a telephone call. However during some situations the alarm user may be unable to speak, for instance during critical situations that need to be forwarded to emergency services. Since absence of response also may be the effect of an alarm by mistake it is difficult for the operator to distinguish which action to take, which calls for alternative ways to identify the need.

Video interview

Instead of an ordinary telephone interview the interview is held via video. Besides enabling the operator to see the alarm user, which increase opportunities to recognise the type of assistance that is needed, the alarm user can also feel more comfortable by seeing the person helping them.

Look through camera

During silent alarms the operator can activate the alarm user's camera and use this to observe and identify need of the situation.

Multiple choice

If the alarm user is unable to speak the interview can be held through a multiple-choice mode, where the alarm user answers the operator's questions by selecting alternatives. E.g. the alarm user can be asked to select which body part that is hurting and then to rate their pain.

Chat

The alarm user and operator can communicate through chat messaging.

6.1.3 Notifying of request

The aim of the notification is to inform the volunteer of that their assistance is needed. This should primarily be carried out through an auditory notification as it enables detection without the user having to see the phone or directly interact with it. The notification should promote immediate detection, convey that assistance is needed and encourage the volunteer to assist. Four ideas for how to notify the volunteer were identified and two ideas to increase the chance that the request is detected quickly were also created.

Help!

The volunteer is notified that their assistance is needed by the telephone shouting "Help!".

Call on volunteer's name

The volunteer is notified by hearing their name being called and that their assistance is needed, enabling the volunteer feeling that the request is directed to them and making them feel obligated to assist. When a request is received the application calls out *"[Volunteer's name], your assistance is wanted within Landräddningen"*.

Warning signal

To enable the volunteer to understand that something is not right and that assistance is needed, the volunteer is notified through a warning signal where sound and vibration is used together with flashing light.

Standard notification

The volunteer is notified through a standard notification, encouraging the volunteer to check their phone where they then see their request on the screen.

The Landräddningen signal

The volunteer is notified through an auditory signal that is recognised as "the Landräddningen signal". It can be seen as a combination between a standard notification signal and warning.

Disarm notification

As the volunteer may not be near the phone when the request is received there is a risk that the request will go unnoticed. From this insight the idea that the notification should continue until the volunteer has interacted with the screen was identified, similar to how alarm clocks wake up sleepers. By requiring disarming the volunteer will be "forced" to notice the request.

Pre-notification

To promote that volunteers perceive the request quickly a pre-notification is sent immediately when an alarm user in the nearby area triggers an alarm. This will notify the volunteer that they may be asked to assist and should be "stand-by". Meantime the operator will have time to interview the alarm user and prepare instructions to the volunteer.

Multiple channels

The volunteer can choose to receive notifications through additional channels such as e-mail, text message and various displays. Notifying through multiple channels increases the possibility that the notification is perceived quickly.

6.1.4 Encouraging assistance

Ensuring that the alarm user receives assistance requires that the volunteer decide to assist. To find ideas on how motivation can be achieved were ideation sessions held. After initial screening it was discovered that some ideas primarily encourage the volunteer to register, to remain available or to assist when request are received, whereas some may motivate on more than one level. As it was assessed that ensuring that the amount of volunteers meets the need remains to the organisation to address it was decided to focus on stimulating acceptance of request, where five overall ideas were found.

Everyday hero

One of the most common motivations to volunteer is that the person wants to grow as a person (Volontärbyrån, 2012). "Everyday hero" is based upon this motivation where an illustration of the volunteer is portrayed in the application. After each time the volunteer assists the figure takes

another step into becoming a hero. The figure, depicting the volunteer's status, can then be shown in social media to further motivate current volunteers and new volunteers to join.

Help a grandma to help your grandpa!

Since there is research implying that assistance is preferably given to persons the individual feels affiliated to (Penner et al, 2005), the idea of "Help a grandma to help your grandpa!" was created. By helping someone else's grandmother the volunteer earns points that can be used to finance another alarm user's account, for instance the their grandfather's.

The identifiable alarm user

Based on the research suggesting that a person is more motivated to help an identifiable victim compared to anonymous victims (Small et al, 2007), the volunteer is presented with the person asking for assistance. In the request name and photo of the alarm user is shown, making it more difficult for the volunteer to neglect assistance.

Your help is needed!

Through directing the request to the volunteer by specifically declaring that they should assist, thereby indicating that it is the volunteer's responsibility to solve the situation, the likelihood that the volunteer accepts should be increased according to theory on bystander effect (Latané and Darley, 1970 cited in Fischer et al, 2005.)

Difficulty to reject

Besides phrasing the request in a manner that evokes guilt of not providing assistance, it was identified that the actual selection could be used to steer the volunteer into agreeing to assist. By e.g. labelling the buttons used for selection with "Yes, of course I'll help out" respectively "No, I don't want to help", the volunteer would be steered into agreeing as he or she most likely do not want to declare that they are unwilling to help.

6.1.5 Locating the alarm user

To communicate specific positions maps are commonly used and can also be complemented with directions and suggestions for transportation. To use a map to communicate the position of alarm users and volunteers will likely also work smoothly in this context. However as positioning accuracy may not be precise there is a need for providing the volunteer with alternative tools to ensure that they reach the alarm user. Ideation sessions were carried out that aimed to find alternative ways to relocate to the position where assistance is needed.

Guiding signal

To aid locating the volunteer can activate a signal in the alarm user's phone, where an audial signal is sent from the alarm user's phone that enables the volunteer to use their hearing to locate the person. This enables finding the alarm user during situations where the alarm user is unable to speak and could therefore be used during silent alarms.

Guiding camera

To aid locating, the volunteer can see the location of the alarm user by accessing the image that can be viewed through the camera of the alarm user's phone. As previously mentioned idea, by using the camera to locate the alarm user there is no requirement on the alarm user being able to communicate. Though, compared to previous idea, the idea is depended on the camera having clear sight of view.

Call the alarm user's name

When arrived at the position and the volunteer finds that the alarm user is not located at claimed spot, the volunteer tries calling for alarm user and hoping for response to guide them.

Call and ask

By enabling the users to communicate the volunteer can directly ask the alarm user of his or her location, thus mitigating the effect of lacking positioning.

Description in request

To ensure that the position of the alarm user is calculated correctly, the operator can be assigned to ask the location of alarm user during interview.

6.1.6 Supporting the volunteer

Along with detailed information of the location of the alarm the volunteer need to be given information of what they are expected to assist with. This will primarily be achieved through the operator declaring the information in text. However the volunteer may need to be supported in other ways. Hence some ideas were created to support the volunteer during assistance.

First aid instructions

First Aid instructions are integrated in the interface to help the volunteer during assistance. The instructions could also be read between alarms to increase the volunteer's knowledge.

Critical condition checklists

In the application the volunteer can review a checklist as a tool to identify critical conditions that require need from emergency services. It can for instance be declared how to recognise strokes but also how to recognise if a fall accident is severe through simple step-by-step tests.

Find help

Through the application the volunteer can search for nearest emergency room, medical centre and pharmacist as well as nearest heart defibrillator and first aid kit, where the volunteer also can be directed through the map. If this function also is displayed to the alarm user, he or she will more easily be able to find help in case of assistance not being available.

Telephone support

In the application there is a phone list with the important telephone numbers to emergency services, medical counselling, the Police and Landräddningen's call centre, enabling the volunteer to consult with personnel. Also the other volunteers connected to the alarms will be listed, to enable the volunteers to collaborate and prepare to their upcoming task.

6.2 PRIORITISATION OF PROBLEMS

During initial ideation several ideas on different steps of the customer journeys were generated. Since it was seen necessary to prioritise which of the ideas that were more important to take forward the ideas a *Failure Mode Effect Analysis*[42] *(FMEA)* was performed (see Appendix VIII) to identify which problems that were more important to attend to. The analysis focused on the problems that the ideas aimed to solve where the cause, effect and detection of the problems were analysed. It was identified that several problems primarily need to be addressed by the organisation and it was therefore decided to not further elaborate on these. These included issues related to silent alarms and ensuring that correct assistance is distributed. Among the problems that were seen more important to address are: ensuring that alarms can be activated, promoting that the volunteer quickly becomes aware of their alarm and encouraging that the help is given (see Figure 12).

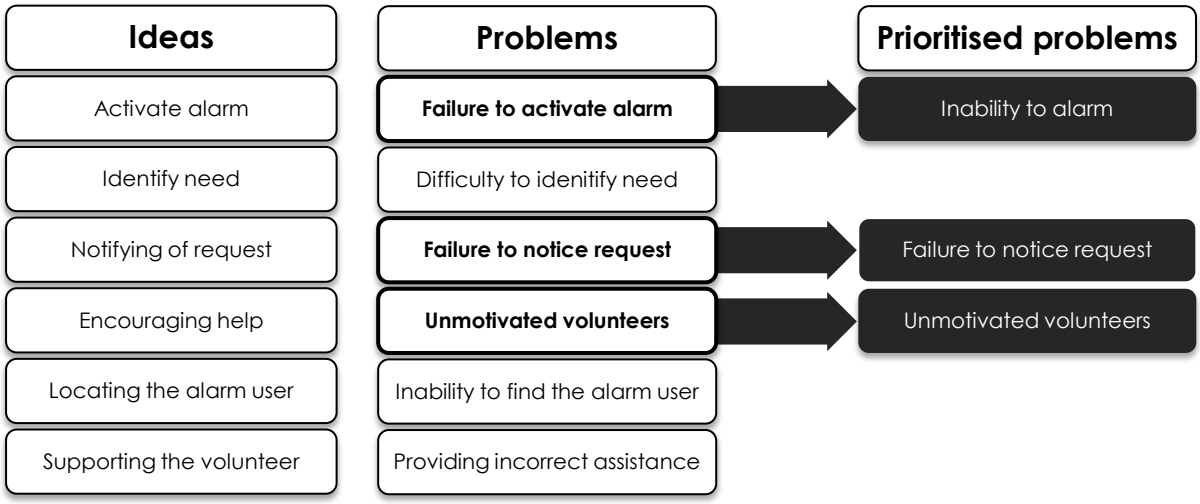


Figure 12. Prioritised problems. Failure to activate alarm, failure to notice request and unmotivated volunteers were assessed as more important to address in this project.

6.2.1 Failure to activate alarm

Even though the situations in which the alarm user is unable to activate alarm may be few, the system needs to be able to handle situations of low to high severity. It is thus necessary to find ways for the user to activate alarms through a simple procedure. The ideas on alarm activation were thus evaluated (see 5.3.1).

6.2.2 Difficulty to identify need

It was acknowledged that the need for developing alternative ways to identify the need of a situation than just through telephone interview depend on how Landräddningen aims to handle alarms without response. Within home care services silent alarms are always sent to caregivers

[42] *Failure Mode Effect Analysis (FMEA)* is used to analyse potential failures, their effects and causes. By estimating a failure's probability of occurrence, degree of severity to the user and probability of detection, a risk priority number is achieved through multiplication that can be used to prioritise which failure to attend to (Osvalder et al, 2008).

(see 4.3), whereas within emergency services they are often not forwarded since it was not possible to establish the type of assistance that is required.[43] Moreover it was acknowledged that the alternative ways are not feasible in terms of integrity and ease of use. Instead it was decided to not further elaborate on problems related to silent alarms. It will be assumed that the operator is able to perform an interview with the alarm user over a telephone call.

6.2.3 Failure to notice request

It is important that the volunteer immediately understands that their assistance is wanted, especially during situations where assistance is needed quickly. Despite the evident benefit of designing the notification to secure that the volunteers quickly perceive the request it was decided to not further elaborate on the design of the notification due to two main reasons. Firstly, the ideas likely evoke different understandings of the situations the volunteer will be asked to assist and since these situations yet have not been decided it was judged as unsuitable to adapt the notification to a specific type of situation. Secondly, it is also evaluated that the occurrence that all volunteers miss to notice their requests at the same time as the operator fails to see that the requests have not been answered, thus the likelihood that the alarm user has to wait substantial amount of time before learning if assistance is available or not, is low. Given the limited time available it was decided to not pursue the track to design the notification. For the continuance of this project it is assumed that a standard notification will be used to alert the volunteer that their assistance is needed.

6.2.4 Unmotivated volunteers

Promoting that the volunteer decides to assist is essential to secure that assistance can be distributed to alarm users. After reviewing the problem of volunteers rejecting assistance it was recognised that the volunteer, whom already have registered to Landräddningen and agreed to their conditions, likely do not need to be significantly motivated. Especially the ideas of using incentives to encourage help, such as to earn points or being portrayed as a hero, are estimated to have little effect on the decision. Also there is research suggesting that incentives lead to reduced helping in the long run (Bénabou and Tirole, 2006). Hence it was decided to not take these ideas further.

However the ideas that did not involve incentives to that encourage helping were believed to have greater potential. These included those of presenting the alarm user, directing the request to the specific volunteer and making it more difficult to reject assistance through labelling of the buttons. These ideas were further assessed during development of the application (see 7.5).

6.2.5 Inability to find the alarm user

Given that positioning may not be accurate the volunteer may need additional tools to aid localisation of the alarm user. This resulted in various ideas that either enabled the volunteer to communicate with the alarm user or to communicate with the alarm user's phone, where the second type of ideas primarily aimed to solve localisation without the alarm user's involvement.

[43] Björn Skoglund, business developer within SOS Alarm, during e-mail correspondence 2013-10-04.

However, similar to identification of need, poor positioning is mainly a problem during critical situations when the alarm user is unable to speak. These situations were previously excluded (see *Inability to identify need*). It was concluded that the simpler and more conventional methods such as to communicate location over a telephone call, by responding to their name or by calling for help themselves fulfil the requirements.

6.2.6 Providing incorrect assistance

To support the volunteer during assistance, ideas to incorporate instructions for how to identify critical conditions, perform first aid, and to locate nearby help centres were created. During analysis it became clearer that inability to provide correct assistance primarily origins from the volunteer being sent to unsuitable situations alternatively from the volunteer not being trained appropriately. Relevant competences should not be achieved only through the application. There are benefits of providing functionalities such as how to identify a stroke, stop a bleeding or find nearest emergency centre. However as it was found that such functionalities are available in existing applications (see e.g. *Förstahjälpen* by the Red Cross and *Rädda Hjärtat* by the Heart- and Lung foundation) it was decided to not integrate similar functions in the application, at least at this stage in the development.

6.3 EVALUATION OF IDEAS

The ideas of activating alarms and motivating the volunteer to help were evaluated to assess which ideas that have greatest potential for implementation. The evaluation of the alarm function is presented in this chapter. Though it was decided to assess the ideas on motivation as part of the development of the application (see 7.5).

6.3.1 The alarm function

The ideas of the alarm function were compared through a *Pugh matrix*[44] that e.g. addressed accessibility, technical feasibility and compatibility to different smartphones (see Appendix IX). Among the ideas *Bluetooth button, Pull cord* and *Phone casing* were identified as the most promising. These were assessed to better fit with various types of phones and operative systems compared to the other ideas. Compared to *Bluetooth button* and *Pull cord, Phone casing* requires a specific case for specific mobiles whereas the two others fit with all phones that have Bluetooth respectively a head phone socket.

Figure 13. Mock-up of idea Phone Casing. Tape was used to mark the position and form of the alarm buttons.

The three ideas were then also evaluated with four participants. After being shown representations of the ideas and asked to

[44] In a *Pugh matrix* concepts are listed on one axis and requirements on the solution on the other. Each concept is ranked as better (+), same (0) or worse (-) relative a reference. As some requirements may be considered as more important than others, the requirements can also be weighed to create a more truthful and complete evaluation. The scoring is then summed and can be used as guidance during concept selection (Ulrich & Eppinger, 2003).

imitate the action of alarming using these (see Figure 13) they were asked to give their comments. The participants ranked *Bluetooth button* as the simplest solution amongst the three since it enables the user to easily alarm when needed while avoiding that alarms are activated by mistake. That the button was possible to attach to various clothing was also appreciated. *Pull cord* was favoured second since it was perceived to be simple to pull out the plug and that the risk of alarm by mistake was low. During testing it was acknowledged that the phone needs to be held still while the cord is pulled in opposite direction to release the plug from the socket. This could be difficult to achieve during some situations and requires further investigations on how to secure that the phone could be held still as the user pulls the cord and activates the alarm. *Phone casing* was regarded as simple to alarm with and it was appreciated that the user also could alarm by "bumping" the case to the ground. However it was believed that the buttons would be too easily pressed, which evokes that alarms are activated by mistake. Though it was also believed that requiring higher forces is not suitable since this would make activation difficult for users with reduced hand strength, which may be the case for many alarm users. It was further found during the tests that the user might not understand that the case could be squeezed to activate alarms, where two participants claimed that they more likely would press a button with a finger similar to how the push other buttons. Moreover it should be acknowledged that *Phone casing* requires different cases for different smartphones, which likely results in higher costs compared to using more universal features such a headphone socket or Bluetooth communication.

The evaluations points to that *Bluetooth button* is the solution that may be the most simple to activate alarms with and to develop, and for this reason more suitable to take further. However it was decided leave this opportunity to the initiators of Landräddningen to proceed with and to instead initiate the development of the user interfaces to the smartphone application.

6.4 CONCLUSION

Even though there are several critical steps in the process of receiving, distributing and giving assistance, not all of these will be further addressed in this project.

Several ideas to how alarms could be activated without having to operate the application were found. It was decided to not take any of these ideas further since it was prioritised to initiate the development of the user interfaces to the smartphone application and the call centre interface. It will be assumed that it is possible to connect an additional product to the application and that these do not need to be pre-activated.

Various ideas were found on how need of a situation can be identified during silent alarms. Though it was recognised that the handling of silent alarms firstly needs to be addressed by the organisation before such functionalities are integrated in the user interface.

Similarly it was decided to not pursue on the ideas on ways to locate the alarm user when positioning is low and the alarm user is unable to speak.

Even though there are evident benefits of ensuring that the notification is quickly perceived, thereby promoting that help is quickly distributed to the person in need, it was decided to not continue on this path due to the limited time available.

It was concluded that ensuring suitable competence remains to the organisation to solve. Additional support through e.g. first aid instructions may be appreciated but was decided to not be integrated as such functions can be attained through existing applications.

It is assumed that the volunteers that have registered likely would not need incentives to assist. However it was identified that helping could be evoked through making the volunteer relate to the specific situation, which will be investigated in the next chapter: Concept Development of the 'App'.

7. CONCEPT DEVELOPMENT OF THE 'APP'

The development of the 'app' was initialised with declaring the goals of the app in terms of functions, features and other attributes. An initial setup of the app was achieved and efforts were made into creating the application from a platform design point of view to enable the organisation to easily adapt the application in the future. Ease of use was evaluated through usability tests that showed that the application in its whole was intuitive to use but that there were opportunities for improvement. Details such as how to communicate alarm status to the alarm user, how to encourage help and how to ensure coherence to Landräddningen's graphical profile were investigated and evaluated with help from potential users. In the end a final concept of the application was achieved.

7.1 GOALS OF THE APP

Before initiating the development of the 'app', the requirements on the alarm user interface and the volunteer interface (see Table 4 in 5.5) were translated into goals of the app user interface. These were defined in different aspects: main functionalities, handling and expression and style.

7.1.1 Main functionalities

To enable use both as an alarm user and as a volunteer the app needs to be adapted to both situations. This leads to the following main functionalities:

- A possibility to alarm in need of assistance. The application should also offer a possibility to connect additional products to make activation easier.
- A possibility to disarm the alarm when assistance has been provided and/or when assistance is no longer needed. Likewise, there need for a possibility for the volunteer to report their delivery of assistance.
- A possibility to view one's current alarms. For the alarm user this includes basic information such as the time and location of the alarm, information on the volunteers in terms of name and photo, and feedback on current status. For the volunteer it contains information on what assistances they are asked to provide and to whom, the location where assistance is requested and information on current status of the alarm.
- A possibility for the user to communicate with other users that are involved in the alarm. This includes that the alarm user should be able to communicate with the volunteers and vice versa, as well as the volunteers are able to communicate with each other.
- A possibility to register to Landräddningen and change user information and settings. If the application is downloaded before an account has been created, the user should preferably be guided to registration directly.

Moreover the application should:

- Be simple. The app should only supply the most important functions and information in way so it is available to the user through few steps.
- Encourage that assistance is given to the alarm user.
- Promote an experience of security, safety and confidence among the users.

7.1.2 Intuitive handling

Since the application primarily will be used during stressed situations where the user's mental resources may be limited the need for ease of use, or high degree of *usability*[45], is fundamental. It is important that first time users, especially alarm users, understand how to alarm and how to retrieve information. The need for intuitiveness is also important to the volunteers since they will likely not need to respond to alarm frequently and will thus seldom use the app.

The Components of Usability

Usability is affected by the user's experience of the interface, where Jordan (1998) has described the change of level in task performance through repetition by five components:

1. *Guessability* is the effectiveness, efficiency and satisfaction with which specified users can complete specified tasks with a particular product for the first time.

2. *Learnability* is the effectiveness, efficiency and satisfaction with which specified users can achieve a competent level of performance on specified tasks with a product, having already completed those tasks once previously.

3. *Experienced User Performance* is the effectiveness, efficiency and satisfaction with which specified experienced users can achieve specified tasks with a particular product.

4. *System Potential* is the optimum level of effectiveness, efficiency and satisfaction with which it would be possible to complete specified tasks with a product.

5. *Re-usability* is the effectiveness, efficiency and satisfaction with which specified users can achieve specified tasks with a particular product after a comparatively long period away from these tasks.

Even though it can be assumed that the alarm user will test the application and learn how it is operated before being presented with a situation requiring alarm activation, the user may be stressed, have difficulties maintaining focus or remembering how the interface is operated. Thus it is critical that the application promote *guessability*. It is also important that the system potential is kept low, enabling the alarm user to more quickly alarm. For volunteers whom may be asked to assist several times but with long periods away, *re-usability* is important.

---

[45] *Usability* is defined by the International Standards Organisation (ISO) as *"…the extent to which a product can be used with effectiveness, efficiency and satisfaction by specific users to achieve specific goals in a specific environment"* (ISO DIS 9241-11). In the definition *effectiveness* refers to the extent to which a goal is achieved, *efficiency* to the amount of effort required to accomplish that goal and *satisfaction* to the level of comfort the users feel when using the product and achieving their goal (Jordan, 1998).

Principles for usable designs

When designing for usability several aspects should be considered. Jordan (1998) has formulated ten characteristics associated to usable designs:

1. *Consistency* means designing a product so that similar tasks are done in similar ways.

2. *Compatibility* means designing a product so that its method of operation is compatible with user's expectations based on their knowledge of other types of products and the 'outside world'.

3. *Consideration of user resources* means designing a product so that its method of operation takes into account the demands placed on the users' resources during interaction.

4. *Feedback* means designing a product so that actions taken by the user are acknowledged and a meaningful indication is given about the results of these actions.

5. *Error prevention and recovery* means designing a product so that the likelihood of user error is minimised and so that if errors do occur they can be recovered quickly and easily.

6. *User control* means designing a product so that the extent to which the user has control over the actions taken by the product and the state that the product is in is maximised.

7. *Visual clarity* means designing a product so that information displayed can be read quickly and easily without causing confusion.

8. *Prioritisation of functionality and information* means designing a product so that the most important functionality and information are easily accessible to the user.

9. *Appropriate transfer of technology* means making appropriate use of technology developed in other contexts to enhance the usability of a product.

10. *Explicitness* means designing a product so that cues are given as to its functionality and method of operation.

Even though all principles need to be considered to achieve ease of use, *consistency*, *compatibility* and *explicitness* are specifically important to achieve simple operation. This means ensuring that the method of operation fits with the user's previous experiences, that suitable cues are given and that the application is operated in a similar way for similar tasks. To ensure that the user is able to use critical functions and perceive important information, *visual clarity* and *prioritisation of functionality and information* are especially important. This means ensuring that the most important functions are easy accessed and that the graphical user interface design is discrete to keep the information in focus as well as ensuring that the information is readable.

7.1.3 Expression and graphical style

To achieve a desired expression of the graphical interface primarily three aspects were addressed:

1. Although the fears of not being given assistance when needed and of meeting unfriendliness (see 4.6) need to be counteracted through e.g. routines, certification of volunteers and providing the user with continuous information, also the expression of the application also plays a role to enable the users feeling secure. It is thus aimed that the application is perceived as *informative, functional, reliable* and *serious*.

2. Landräddningen's core values are *Security*, *Active life*, *Engagement* and *Significance*[46]. These values should also be communicated through the application's user interface. To further emphasise that Landräddningen is about people helping each other it was also concluded that the application should to express *human compassion* and *kindness*.

3. Parallel to the execution of the thesis, the graphical profile of Landräddningen was determined by initiators of Landräddningen. This included logotype, website and guidelines for colouring and typography (see Figure 14). These elements were used as guidelines during development of the graphical user interfaces to ensure coherence.

[46] Translations made by the author. In Swedish they are called Trygghet, Aktivt liv, Engagemang and Betydelsefull.

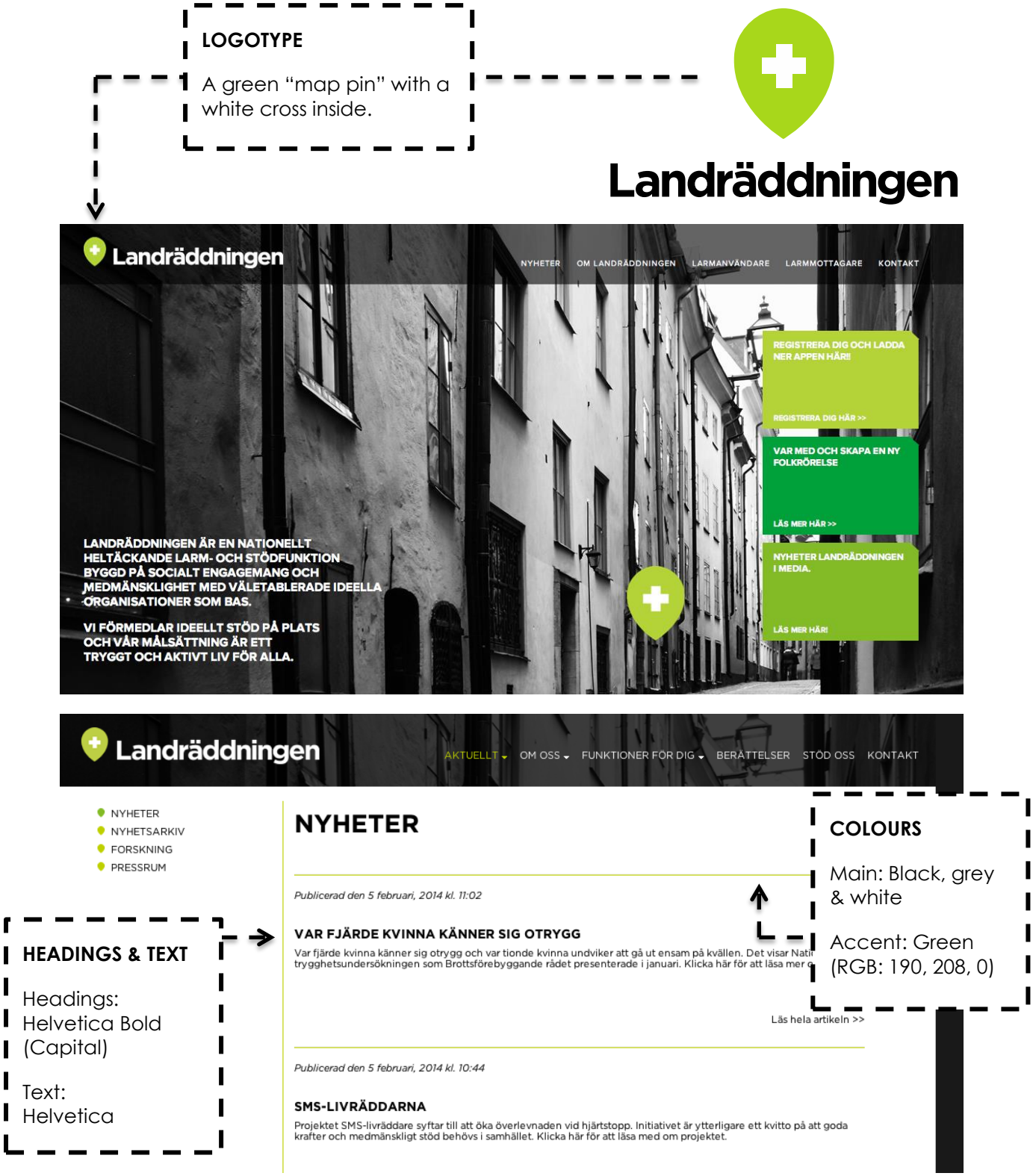


Figure 14. Graphical profile. In top right corner the logotype is presented, illustrating a cross inside a map pin to communicate that help is given at any position. The images bellow are screenshots from Landräddningen's website.

7.2 INITIAL DEVELOPMENT

The initial development of the application involved parallel processes. This included exploring functions that should be integrated, determining menus and creating the structure of the application. Primarily quick sketches on paper and post-its were used to visualise the different ideas of design and structure, which further made it possible to easily adapt the design and structure of the application. Thereafter the development moved in to digitalisation were real dimensions were used to ensure that all elements fit.

7.2.1 Initial set-up

An initial setup of the application was achieved through implementing the main functions into the interface of an application. After some iterations three main menus and four views of each alarm was achieved.

Main menus

Since the user may have multiple alarms in the system at the same time it was concluded that these should be listed in a separate menu, from which each can be entered and viewed. To enable the user to easily alarm it was determined that the function should be available on a separate menu. To enable the user to change their account information a settings menu was also decided upon. These functions produced a set up of three main menus:

1. *Alarm List.* Here are all alarms listed in similar way as an inbox of e-mails. When entering an alarm from the list the user is presented with the alarm, and can go back to the list by a return button in the top left corner.

2. *The Alarm Function.* On this view is an alarm button shown. This can be pressed when assistance is needed, which initiates countdown where the alarm can be disarmed before it is sent to Landräddningen. After having successfully activated an alarm the alarm will be registered in the Alarm List, from where it can be entered afterwards.

3. *Settings.* In this view the user can view their profile, change settings and sign in/out from the application.

Views of the alarm

The primary functions that need to be available to the volunteer during an alarm are (1) information of the alarm (e.g. the identity of the alarm user and instructions on how to assist), (2) the position of the alarm user, (3) that the volunteer is able to communicate with the alarm user and other volunteers and (4) that the volunteer is able to report when the alarm has been handled. It was decided that each function should have separate views, which resulted in a set-up of four main views:

1. *Information.* In this view the volunteer is shown the alarm user with name and photo, the position/address of the alarm user's current location and instructions on how to assist the alarm user. On the corresponding page of the alarm user's application the alarm user is instead shown the status of their alarm, the time of the alarm (enabling them to determine how much time that has passed) and their location.

2. *Map*. The user is shown their position in relation to the position of the other users. From the map can also road directions be retrieved.

3. *Presentation of the users/Telephone List*. The alarm user and volunteer can see the other users of the alarm and can call these if needed. This for instance enables the volunteer to ask the alarm user for guidance, to calm the alarm user by informing that he or she is coming to assistance and the volunteer to collaborate with other volunteers before meeting up.

4. *Report*. In this view the alarm user can inform that they have received assistance or that they for some other reason no longer need assistance, and the volunteer can report that they have given assistance to the alarm user.

Structure of app

The menus are ordered Alarm List – Alarm Function – Settings, which makes the most important function, the Alarm Function, to be centred (see Figure 15). When entering the application from the phone's desktop the user will be directed to the menu Alarm Function, which enables the user to enter the function directly if a situation of need occur. The volunteer that primarily interacts with the application when a request has been received is directed to the alarm in the Alarm List directly from their notification.

The views of the alarm are ordered Information – Map – Telephone List – Report. This was believed as the most natural order since it was assumed that the user first would want to review information on the alarm, then the map and lastly to communicate that the alarm can be closed, which leaves Telephone List to be ordered third. Hence a left-to-right order was applied. When wanted the user can return to the Alarm List through a return arrow in the top left corner.

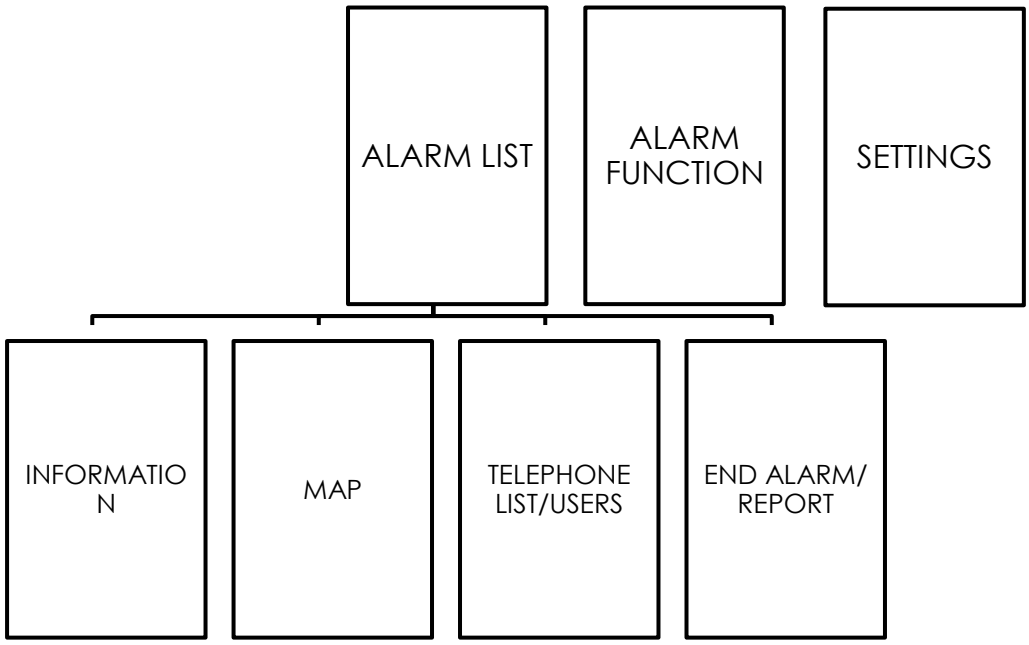


Figure 15. Structure of application. After activating an alarm it appears as an alarm in the Alarm List. From the Alarm List all alarms can be entered and include four views: Information, Map, Telephone List/Users and Report.

7.2.2 Platform design

Parallel to the development of menus and functions attempts to fit suggestions into a common platform were performed. This was aimed for to provide opportunities to the organisation to e.g. add menus and views later on without affecting the overall structure. After some iteration was a final platform design achieved that include the overall layout, such as the placement, form and colouring of the different elements (see Figure 16).

Main menus

For smartphone applications menus are commonly placed in the bottom of the screen, enabling the user to easily change menu with their thumbs when holding the phone. In the top a headline is often displayed that informs of the function of the menu or of the name of the application. Between headline and menu the function of the specific menu then is placed. It was decided to design the application in the same manner with the menu buttons in the bottom, a headline on top of the screen and the function displayed in the middle.

Alarm views

To communicate that all views are connected it was decided to resemble the alarm as a folder with four tabs that each represent a specific alarm view. As folder tabs often are placed in the top it was decided to place the menu of the alarm views in a similar way. To save room for the function of the view it was decided that the tab icon should function as the headline of the view, which also explains the top placement. The function of the view is placed in the middle. For the application this include the information in the first view, the map, the telephone list and the report function. In the bottom of the display potential buttons can be placed, enabling easy access and manoeuvring.

Headings & text

Following the graphical profile of Landräddningen it was decided that the headings should be formatted Helvetica-Bold-Capital and that the text should have standard format of Helvetica. It was determined that the default text size of the headings should be 16 and the text 14, but that it is possible to change text size given that the alarm user and volunteer likely have different demands on the text size and the amount of information that needs to be presented.

Buttons

The buttons were formed as to aesthetically fit with other elements of the screen and to ensure that it is easily pressed. This resulted in a rounded rectangle form with the same width as the function above and height as the menu buttons. Besides their labelling the buttons were coloured to communicate it's meaning – red to convey closure and green for confirmation.

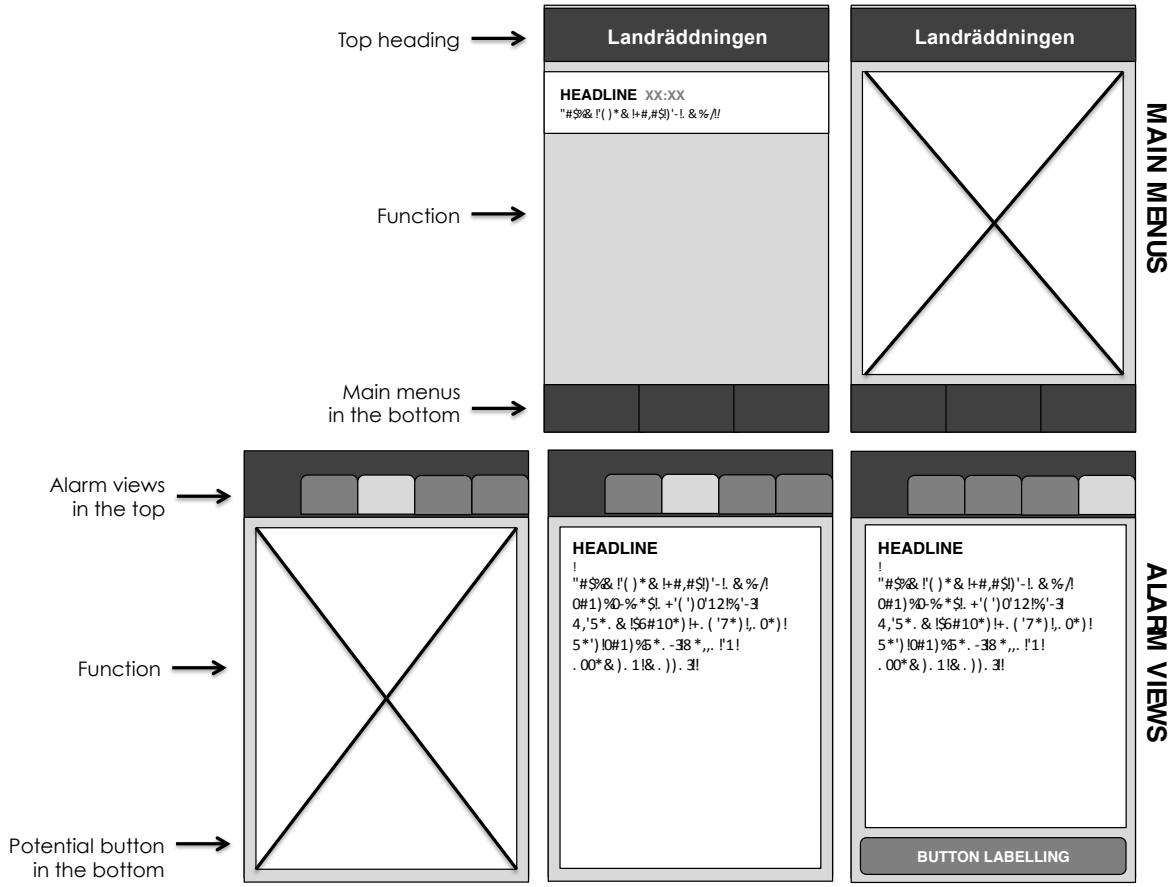


Figure 16. Platform design. The user interface was developed from a platform point of view to make it simple to adapt the user interface and include, or exclude, functions and features.

7.2.3 Initial app

After several iterations was an initial app achieved (see Figure 17, Figure 18). The user interface of the alarm user and the volunteer share similar design in terms of menus and alarm views, overall functions and features but with somewhat varying content. Primarily the information view differs where the volunteer is presented with detailed information on the alarm whereas the alarm user is only given information on current status and the time and location of the alarm.

Figure 17. The alarm user's app. In the top the main menus are shown – the Alarm List, the Alarm Function and Settings, and bellow are the alarm views are displayed – the Information view where the alarm user can see the alarm's status and follow their process in receiving help, the Map where the alarm user can see their own and the volunteers' positions and from this receive feedback on expected arrival, the Telephone List where all volunteers are listed and End Alarm view where the user can inform when they no longer need help.

Figure 18. The volunteer's app. The volunteer shares the same menus, therefore it was decided to not present these once again. In the top it is showed how the requests are listed in the Alarm List. After entering a request and agreeing to assist, the Information view is automatically opened. Bellow the alarm views are presented. After reporting of arrival in the Report function the button will change to enable report of delivery of assistance.

Interaction

To enter the main menus the buttons in the bottom of the display are used. To open an alarm the user clicks on the alarm in the Alarm List, an action that is encouraged by the arrow in the top right corner. Settings are opened and provoked in a similar way. Alarms are activated through a click on the alarm button in the Alarm Function menu.

The alarm views are entered through the alarm tabs in the top of the screen or by "sweeping" the views to the side, similar to how many other applications are operated. When wanted the user can return to the Alarm List through the backwards-pointing arrow in the top left corner.

Functions & features

The application includes different functions. Some of them are (see Appendix X):

- ***Alarm activation***: An alarm is activated through the red button in the Alarm Function menu. This initiates a countdown before the alarm is sent, enabling the alarm user to end accidental alarms. Thereafter the alarm user receives contact with the call centre operator. After the call has ended the alarm user is presented with the first view of the alarm, the Information view.

- ***Feedback on alarm status:*** Feedback on alarm status is presented to the alarm user in the form of a status display that changes according to the process of receiving assistance (that an alarm has been activated, that help is being looked for and that help is coming).

- ***Road Directions***: Through a click on the user icons in the map, road directions to the alarm user can be achieved.

- ***Telephone Call:*** Through the telephone icon in the telephone list, telephone calls can be initiated with the users of the alarm and with other important functions such as the emergency services, Landräddningen's call centre and medical enquiries.

- ***View other users:*** By clicking on the photos of the users in the telephone list, larger images of the users are displayed.

- ***Report function:*** In the report function the alarm user can communicate he or she no longer needs assistance, and the volunteers can inform when they have arrived at the alarm user's location and when have delivered assistance.

7.3 FEEDBACK ON ALARM STATUS

Communicating the process from alarming to receiving help is important to enable the alarm user feeling secure (see 5.4.2). As there are two steps when it can be found that assistance is not available[47] there are three 'statuses' that each alarm will be in: (1) *alarm activated*, (2) *searching for help* and (3) *help is on its way* (see Figure 16). The first occurs when the alarm user has activated an alarm. The second is entered when the operator has forwarded the alarm to volunteer. The alarm will have this status until a volunteer has agreed to assist, hence that help is on its way.

During initial ideation the idea of using a display to inform of alarm status was created. Six ideas were created by the use of common principles to illustrate progress, such as by a growing bar, colouring from red to green and increasing numbers (see Figure 17). These were evaluated with test participants in terms of how simple they are to understand and to perceive during different conditions.

The participants were first presented with the six ideas printed on paper and were asked to identify strengths and weaknesses in terms of how well they communicate status. Then they were presented with the ideas on a telephone screen. To ensure that status is understood during different conditions the ideas were then tested indoors in normal lighting and outdoors in bright sunlight. Tests were also carried out by the participants using normal vision and blurred vision.[48] The tests had seven participants of varying age and visual ability, although only four of these performed the evaluation on visibility. Four were aged 18-30 years old, two 45-60 years old and one was aged 75+. Of the ones that evaluated visibility, three used visual aids when reading. Advantages and drawbacks of the different solutions, faults and potential problems were documented and are presented in this chapter.

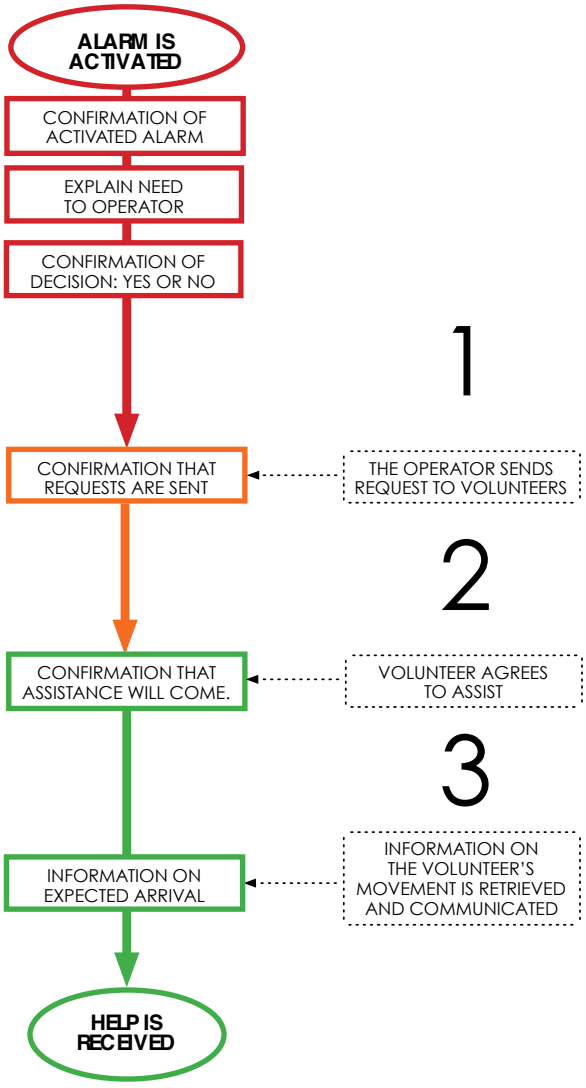


Figure 19. Alarm status. Each alarm will have three statuses: (1) alarm activated, (2) searching for help and (3) help is on its way.

[47] Assistance can be rejected by the operator informing that the alarm does not fit the services Landräddningen has decided to deliver and/or by volunteers not being available.

[48] Normal vision included the participants vision they possessed most often, achieved either through normal vision or visual aids. Blurred vision was attained through removing visual aids and the participants "blurring their vision".

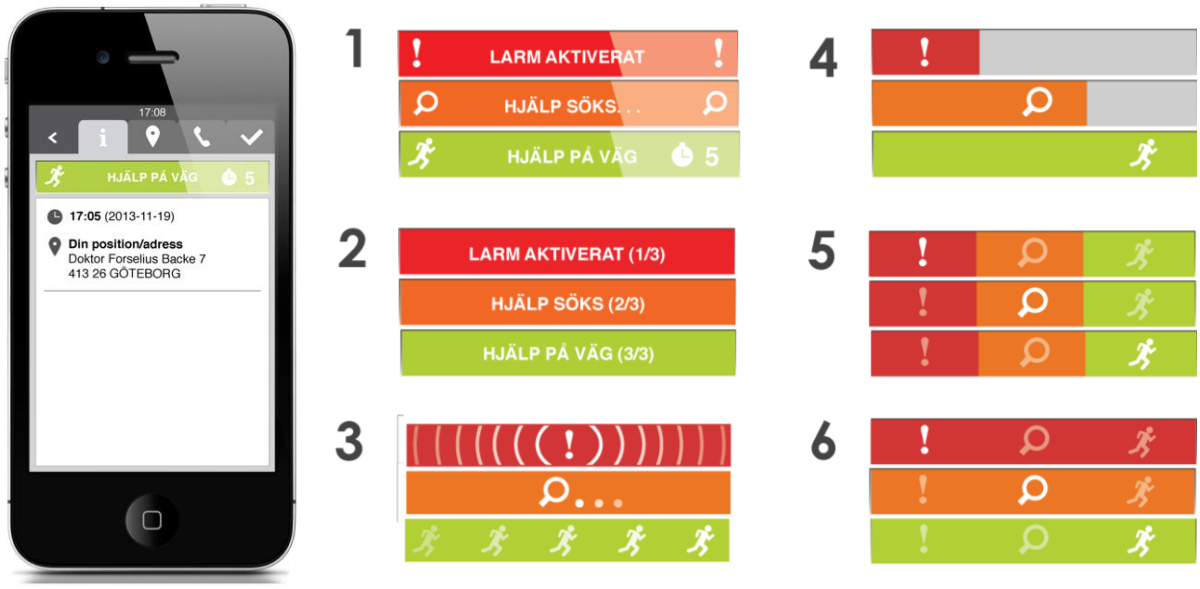


Figure 20. Ideas on alarm status feedback. All of these utilise colour to inform of status, where some also show through icon, text and increasing bar or left-to-right placement. The third idea utilises animation to communicate status.

7.3.1 Ability to communicate status

All participants believed that all suggestions were able to communicate their status, where the colour change from red to green was explained to contribute to the understanding of the process. Most participants found the symbols as simple to understand and connect to different statuses, although all did not directly understand the icon used to illustrate "searching for help" that portrayed a magnifying glass. Though since the icon was accompanied by either colour, text or both the participants had no problem understanding which step that was portrayed.

Some potential usability problems were also identified:

- The gradient used to illustrate the glass display in 1 was mistaken for an increasing bar.
- It was not evident to everyone what the numbers on 2 aimed to communicate.
- Several participants perceived 4 to illustrate continuous increase instead of steps.
- One participant perceived the status bar in 4 as a button that can be pushed to the side. The participant also perceived 5 to have similar type of buttons.
- One participant claimed that the man running in 4 seemed to run *away* from the alarm user instead of *to* the alarm user.
- Three participants commented that it could be confusing to show icons for all steps at the same time as in 6. One participant believed that the icons in combination with the rectangular areas on the status bar in 5 could be mistaken for additional tabs.

During evaluation other comments were also received:

- All participants appreciated being given information on expected time of arrival as in 1.
- One participant favoured 1, 2 and 3 since they "appear more natural than the others".
- Some participants appreciated 2, 5 and 6 because they informed of past, present and future events, which makes it more clear how far the process of receiving help has gone.

- Three participants favoured 6 since it showed progress by continuously moving and that something is happening, which was explained to be reassuring. It was further believed that an animation counteracts that the bar is mistaken for a button, which previously had been identified as a common problem (see 6.3.1). However one participant commented that having something constantly moving could cause worry.

7.3.2 Visibility during different conditions

All participants claimed that they were able to perceive status using normal vision during normal indoor lighting settings for all suggestions. All elements, including colour, icon and text, were possible to the participants to identify during these settings. The only remark was that white text on green background could be difficult to perceive. However the tests using blurred vision and of bright sunlight contributed to new findings.

Visibility with blurred vision

Using blurred vision some participants was still able to perceive the complete status displays. All participants were able to detect which colour that was presented on most ideas and some were also able to perceive the icons clearly. However some difficulties appeared:

- The text on 1 and 2 was difficult to read during blurred vision.
- The gradient on 1 made it difficult to perceive colour. Red and orange appeared apricot and the green became lighter and "almost vanished", according to a participant.
- The icons of the exclamation mark and magnifying glass were easier to detect compared to the running man, which a participant described to "resemble the shape of a star".
- Even though some participants were able to tell which icon that was marked in 5 it was considered difficult and it was preferred that only one colour was used.
- Orange and red merge when vision is blurred and makes the colours difficult to separate, which was especially difficult on 5.
- Even though it was not possible to test the animated status display of 6, the participants believed it would be possible to identify the fixed icons of the exclamation mark and magnifying glass. However the man running was believed to be less easily perceived given that it is constantly moving in combination with the white colour on light green.

Visibility in bright sunlight

The tests in bright sunlight led to identification of other advantages and disadvantages of the different suggestions:

- The bright sunlight causing reflections and making the screen appear darker made it more difficult to separate colours, especially red from orange. The green almost appeared as grey in this setting, which made it difficult to separate from the background. This especially affected 1 and 2 that were covered completely with the colour.
- The difficulty to perceive colour did not affect 4 as greatly as the other suggestions since it was still possible to detect the degree of fullness of the bar.
- It was difficult to read the text since it was regarded to merge with the background. This especially concerned the white text on green background.
- The icons were possible to detect since they appeared as very white to the background.

7.3.3 Implications

Besides that the evaluation pointed to advantages and disadvantages on the different solutions (see Table 5), they also highlighted some common implications:

- During blurred vision it is difficult to perceive text and icons, however the colours are possible to distinguish and the status is still successfully communicated.
- During bright sunlight it is more difficult to separate colours, where the colours instead appear as monochrome blocks. However it was possible to detect the white icon against its background, making it possible to perceive the status during these conditions as well.
- All ideas were understood since they combined multiple methods to convey progress.

From these findings it was acknowledged that it is an advantage to combine various methods to communicate status given that the different elements show varying performance during different conditions. It was concluded that the most suitable idea to move forward with was idea 1 that combined colour, text and icon as well as communicated time of arrival.

Table 5. Summary of evaluations of the ideas.

	IDEA	UNDERSTANDING	VISIBILITY	OTHER COMMENTS
1		+ Very simple to understand since it use both colour, icon and text	+ Possible to perceive due to icon & colour - The gradient makes it more difficult to perceive - Difficult to read during blurred vision - Orange and red look similar in bright sunlight	+ Appears natural + Shows time to help
2		- Not evident to all what the numbers refer to	- Difficult to read during blurred vision - Orange and red look similar in bright sunlight	+ Convey the past, present & future + Appears natural
3		+ Communicates that the process is ongoing + Evokes that the display is perceived as a button	- Difficult to perceive the animation in bright sunlight	+ A favourite to some + Appears natural - Evokes worry?
4		- Mistaken for a button - Mistaken to show continuous progress - The man appear to run away than to the user	+ Visible in bright sunlight	
5		- Confusing to show all steps at the same time? - Appears as "tabs"	- Orange and red merge in bright sunlight	+ Convey the past, present & future
6		- Confusing to show all steps at once?	- Orange and red look similar in bright sunlight + The icons are still	+ Convey the past, present & future

7.4 USABILITY TEST

To identify potential usability problems of the application's overall layout and evaluate if the application is simple to understand and intuitive to operate tests with users were performed. The test constituted of two parts where the participant was first asked to take the role of an alarm user and then as a volunteer that has been assigned to assist. The test included tasks such as to alarm, to find out which volunteers that are on their way to assist and to inform that help has been received respectively to review a request, to call the alarm user and to report that help has been given (see Appendix XI for complete list of tasks). During the tests the participants were asked to comment on their thoughts and method of operation and if needed they were asked additional questions. Clues were given if these were needed to complete the task.

Tests were made with eight participants of varying age and experience of smartphones. This included four participants aged between 18-30 years old, one participant aged between 31-45 years old, two participants aged between 46-60 years old and one aged 75 years old ore more. Among the participants four used iPhones, two used Android smartphones and the remaining two used "old-fashioned" mobile phones of different brands (although the definition of "used" varied between the participants from almost never to every day). The tests were performed on a mock-up application on a smartphone screen except for four tests that were executed on a mock-up on a computer screen (see Figure 18, Figure 19). Throughout the tests notes were taken that primarily focused on highlighting use errors and potential usability problems. The result was analysed by the author grouping similar findings and identifying potential causes to the found usability problems.

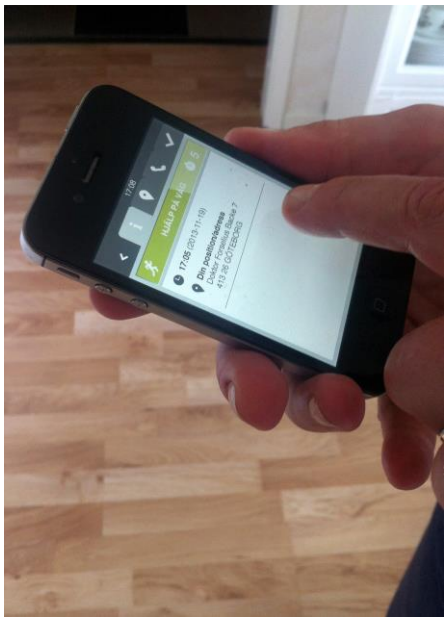


Figure 21. Mock-up on smartphone.

Figure 22. Mock-up on laptop.

Overall the participants had no major difficulties understanding or operating the interface, except for the older participant who was unfamiliar with smartphones, apps and touchscreens. The participants understood how to move in the interface to change between menus, enter alarms and shift between the alarm views. They were also able to complete most tasks without difficulties. This included e.g. to alarm using the alarm button (which they all explained to be very simple and intuitive since the button resembled an alarm button), to view information on the map via the user icons and to initiate phone calls through the telephone icon. Thereafter when testing the interface of the volunteer few faults were performed, significantly fewer than for the previous tests of the alarm user, suggesting that the user interface becomes easier to use after experience has been gained. Some usability problems were however found, which are presented in the following sub-sections.

7.4.1 Listing of volunteers

When asked to identify which volunteers that had been assigned to assist all but one participant incorrectly went to Information instead of the viewing the volunteers in the Telephone List (or in the Map where they also could be seen through a click on their icons). It was commented that they thought that the volunteers would be declared in Information since it seemed as the most suitable of the available tabs. It was explained that the telephone icon that labels the Telephone List was associated to the function of calling, which was not the aim of the specific task. These results suggest that the functions on the tabs do not match with the participants' expectations and that the cues given by the icons are not sufficient to communicate the actual functions.

It was identified that it was not evident that the volunteers listed in the telephone list are the ones that had agreed to assist. Two participants believed that they had to call the volunteers and ask if they were the ones that were going to assist. It was expressed that this confusion may come from the labelling "volunteers" that could refer to any volunteer of Landräddningen or friends of the volunteer that also have registered themselves as volunteers. This problem was also recognised in the volunteer's interface where the volunteers instead were labelled "other volunteers" but may imply similar confusions.

7.4.2 The status display

Aiming to find out which volunteers were on their way to assist, four participants pushed the status bar shown in Information (see Figure 23). It was expressed that the green field labelled with "help on its way" resembled other buttons of the application and made them believe that this also was a button. This indicates incorrect cues and/or absence of correct cues.

From left: Figure 23 The status display was mistaken for a button. Figure 24 Icons in map. Figure 25. Absence of cues to show photos. Figure 26. Conflict between the tab's icon and the "End Alarm" button.

7.4.3 Show photo of user

The majority of the participants intuitively, and correctly, pressed the picture of the volunteers when they were asked to obtain a larger image of them. However two participants hesitated to press the photo since they believed their action instead would initiate a phone call. Another participant incorrectly thought that the photo could be enlarged in similar way as photographs are zoomed. These problems suggest absence of cues to communicate that the picture can be pressed without initiating a phone call (see Figure 25).

It was further commented that the button labelled "OK" that leads the user back to the Telephone List from being shown the volunteer's photo may confuse the user into believing that they have to approve the volunteer (see Figure 27). Moreover all did not understand that the field behind the enlarged photo is inactive.

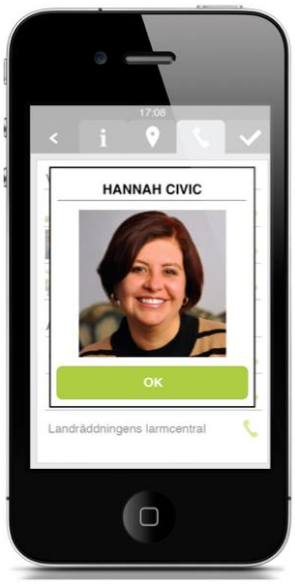


Figure 27. Photo of volunteer.

6.4.4 Conflict in "End Alarm"

Even though the participants had no difficulties disarming their alarm it was commented that they did not connect the function "end alarm" with the tab labelled by the check mark (see Figure 26). It was further commented that there is a conflict between the meanings of the check mark and the red colour of the button given that the check mark is associated to "OK" and "completed" and red to "close" and "incomplete".

7.4.5 Need for increased feedback

Some participants claimed that it was not evident which of the icons of the map that depicted them when they took the role as volunteer (see Figure 24). Although all were able to identify correct icon as it was explained to be more active compared to the similar grey icon (and since participants believed that the volunteer likely would know their current location), feedback similar to how one's current location is communicated in other map applications[49] was desired. It was further claimed that the icon's blue colour in combination with the white human figure resembles a traffic sign. The icon of the alarm user was believed to be made clearer by adding feedback that visually communicates that an alarm is sent from the icon.

It was also found that not all participants immediately understood which menu they were in, which suggests a need for increased feedback on this.

7.4.6 Desired functions & features

The usability test identified desired functions and features of the application:

- A possibility to learn how the service works, which information that can be retrieved and which functions that are available before having to use it on a real alarm.
- A link from the address in Information directly to the map.
- It was suggested that other information than just photo and name could be shown when previewing volunteers, e.g. the position of the user and expected arrival time.
- It was desired that it is possible to call other users directly from their icons in the map. This would make it easier to call the person that is closest to the alarm user, which was found as desired when attempting to get in contact with another volunteer.
- Some participants requested a chat function enabling volunteers to communicate with each other and to communicate with the alarm user.
- Feedback on the other volunteers' activity was requested.
- Additional signs of appreciation were desired, e.g. that the volunteer is given a thank you.
- Possibilities to step backwards and "undo" e.g. confirmation of arrival. Also it was proposed that it is possible to leave alarms in case of sudden inability to complete them.
- A possibility to communicate additional information to Landräddningen was requested since it was clamed that reporting of arrival and delivery may not fit the situation and that the volunteer may e.g. want to give information on the alarm user's condition.

7.4.7 Additional comments

During the test other comments were also achieved:

- Some participants perceived the countdown from activation until the alarm is sent as too long, although others claimed that it is adequate. It was recognised that the time might be perceived as long when help is needed but applicable if the alarm was mistaken.
- One participant commented that he would likely leave the alarm when waiting.

[49] The participants refer to the area circulating the user's icon in maps that often is used to communicate the location accuracy in map applications.

- The text shown on the quit alarm tab was commented as too long and it was believed to be difficult to read during stress.
- One participant expressed an obligation to personally inform the volunteers that they are not needed when disarming the alarm.
- Instead of disarming alarm after having received assistance it was commented that the user instead should confirm that help had been received. That is, instead of selecting "quit alarm" the user would select "Thank you, I have now received help!".
- It was commented that the current layup encourages, or at least not hinders, the volunteer to (incorrectly) confirm that they have completed the alarm instantly after informing of their arrival. The use of pop-ups to avoid this behaviour was not appreciated but regarded as motivated to counteract the fault.
- It was suggested that the tab to quit and report on alarms should be differentiated from the other tabs to avoid that it is used when it should not.
- One participant suggested that the report function could be integrated in Information, thereby decreasing the movements between the tabs.
- The check boxes used to visualise the user account in Settings may lead the user into believing that these could be checked respectively unchecked.
- One participant expressed that the buttons used to accept respectively reject assistance should be placed the other way around since the current placements were believed to promote rejection as the thumb (on a right-handed person) is closer to this alternative.

7.4.8 Implications

The participants showed no major difficulties to understand and operate the application. Given that all participants saw the interface for the first time, the interface could be judged to promote high degree of *guessability*, which was aimed for. Fewer problems were identified for the volunteer's interface that was tested after the alarm user's. Given that they shared similar design this may suggest that the effect of *learnability* had been applied.

The usability problems that occurred primarily originate from incorrect expectations on the available functions and an absence of cues that communicate the correct functions, which primarily relate to the aspects of *compatibility* and *explicitness* but also *visual clarity*. These problems included the status display being perceived as a button (see 7.4.2), the lack of cues on how to initiate calls and view photos (see 7.4.3) and the conflict between icon and function in the Information view and End Alarm view (see 7.4.4).

It was also identified that the application would benefit from providing increased information on e.g. which main menu the user is in, which of the user icons in the map that depicts the different users and the current status of the volunteers (see 7.4.5). This refers the aspect of *feedback*.

Several suggestions of improvements and comments were received during the user tests (see 7.4.6 and 7.4.7). Some of these were decided to incorporate into the final concept (see 7.7).

7.5 MOTIVATING HELP THROUGH THE REQUEST

Promoting that volunteers decide to assist is fundamental in providing the alarm user with assistance. During ideation three ideas to encourage help from theories on helping were created. These included directing the request towards the specific volunteer, presenting the alarm user to the volunteer and making it more difficult to select the button used to reject the request from labelling (see 5.1.4). These three ways to encourage help were evaluated in a survey (see Appendix XII) that had 12 participants. The respondents were shown images of the user interface picturing different aspects and ideas (see Table 6)[50]. Thereafter they were asked to grade on a scale from 1 to 5 the likelihood they decide to assist based on this and to comment on their grading. Mean values were calculated and were illustrated in charts (see Appendix XIII for each participant's results). The findings from the survey are presented in the following subsections.

Table 6. The alternatives on how the initial message is formulated in the push notification and in the alarm list, type of information that is given on the alarm user in the request and labelling of buttons to accept respectively decline the request that were assessed in the survey.

	A. INITIAL MESSAGE SHOWN IN PUSH NOTIFICATION & ALARM LIST	**B. INFO ON ALARM USER** SHOWN IN THE REQUEST	**C. BUTTON LABELLING** SHOWN IN THE REQUEST
1	*Can you help out now?*	No personal information on the alarm user is given.	*Yes, I can help out* *No I can't help out*
2	*A person near you needs help*	Gender, age and a small default image are given.	*Yes, I'm available* *No, I'm not available*
3	*Man (85 years old) needs help!*	Gender, age and a large default image are given.	*Accept request* *Reject request*
4	*Rune needs your help!*	Name and a large default image are given.	*Yes, I can help Rune* *No, I can't help Rune*
5	*Your help is needed now!*	Name, gender and large default image are given	-
6	*Hannah, your help is needed now!*	Name and photo are given.	-
7	-	Name, gender, age and photo are given.	-

[50] These are translations made by the author. In the survey the request all information was stated in Swedish.

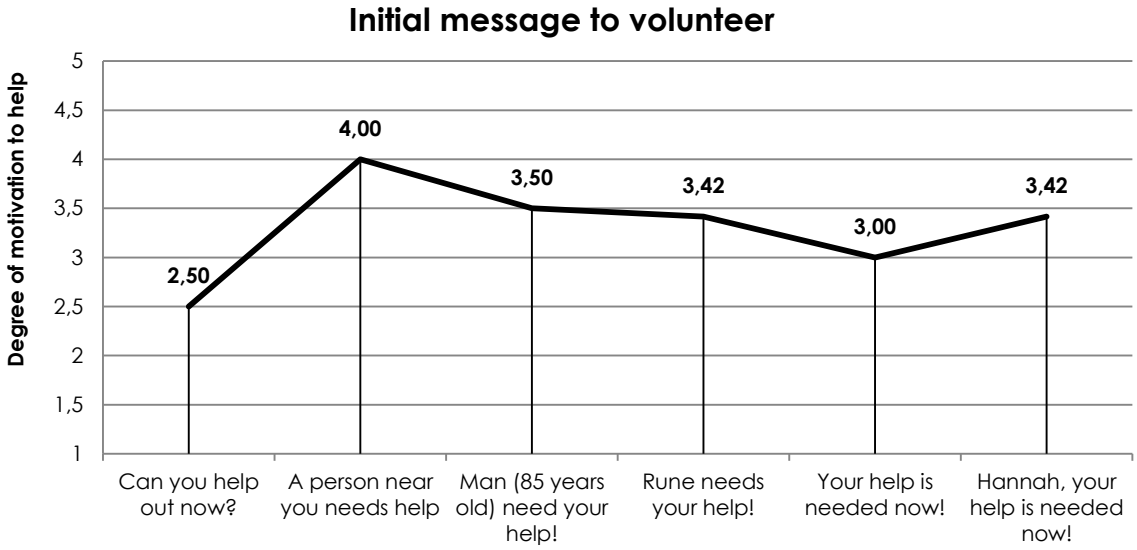


Figure 28. Motivation from message. As seen in the chart, highest degree of motivation was evoked by "A person near you needs help", lowest degree of motivation was elicited by "Can you help out now?"

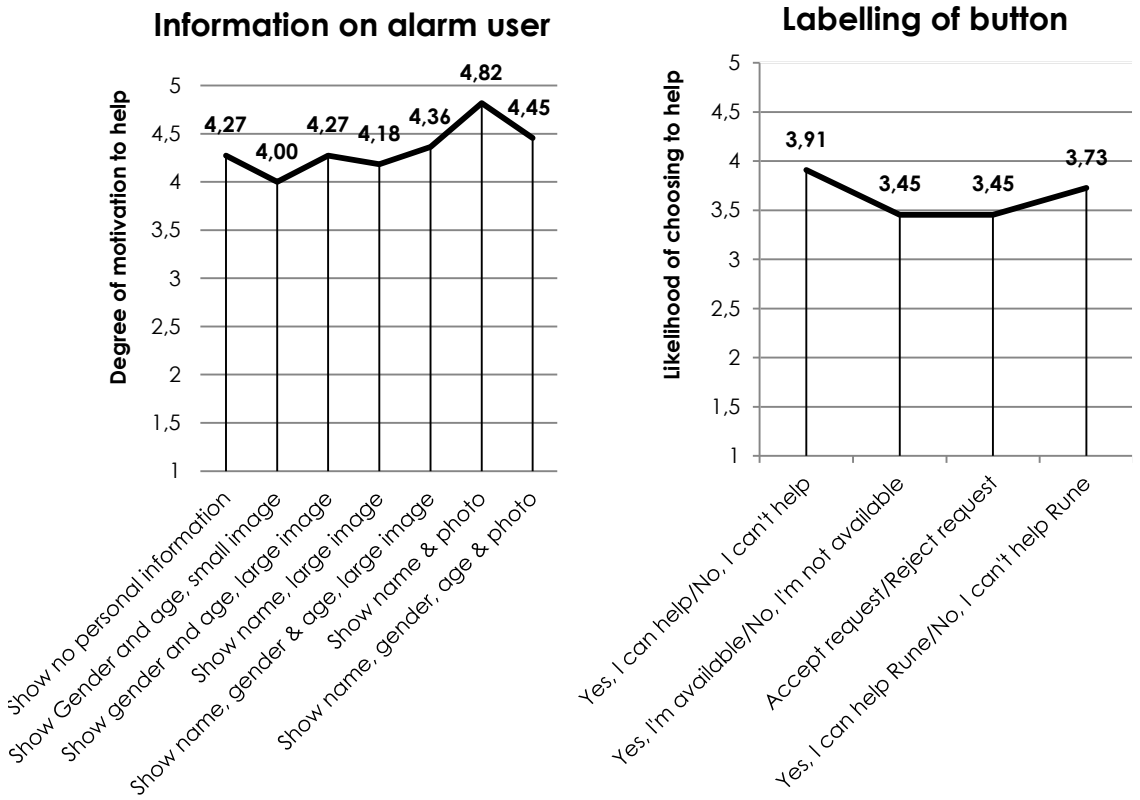


Figure 29. Motivation from information on user. Strongest motivation was achieved by presenting the alarm user with name and photo, whereas lowest was achieved with just giving sex and age.

Figure 30. Motivation from labelling of buttons. The first alternative was found to promote help better than the alternatives.

7.5.1 Motivation from initial message

Even though some respondents expressed that the initial message was not sufficient for them to determine if they are able to assist, thereby suggesting that they did not believe that the initial message had impact, common tendencies could be identified (see Figure 25).

Proximity evokes motivation

Strongest motivation was achieved from the message "A person near you needs help". This received high scores by all respondents. It was explained that motivation increased from knowing that the volunteer had been selected due to their proximity to the alarm user.

It was further commented that "a person near you" could refer both to someone that is geographically close or socially close, which may be confusing.

Moderate motivation from facts on the alarm user

The message "Man (85 years old) needs help!" was judged to evoke second strongest motivation when considering the mean value. However the scores varied between high and low among the respondents. It was commented by some that informing of age and sex creates a relation to the person in need and provides better understanding of the situation they are asked to handle. However it was noted by four respondents that informing of age and sex provides opportunity for the volunteer to reject assistance based on prejudices.

The message "Rune needs your help!" also received varying scores from the respondents. Similar comments as for "Man (85 years old) needs help!" were retrieved, where it was commented that name might not only give clues on gender but also on ethnic origin. This was seen as unsuitable since it provides the opportunity to reject assistance based on prejudices towards specific ethnicities. However informing of name was also believed as more personal and that the respondents claimed to feel obligated to assist since the request declared that specifically *their* help was needed, which may explain some of the higher ratings.

Motivation from addressing the volunteer

The message "Your help is needed now!" received varying scores on motivation, resulting in moderate mean value. Even though some respondents commented that their motivation was increased since the message emphasised that *they* specifically was needed and that their help was needed *now*, it was also commented to be common and impersonal. Similar comments was also received for "Hannah, your help is need now!". Despite the fact that the respondents claimed that they felt very motivated by being addressed with their name, almost on the verge of being forced into helping, moderate ratings were given.

Least motivation was evoked from the message "Can you help out now?", which received low ratings from all respondents. It was commented that the question was common and indifferent, which makes it simple to reject. It was stated that it was too cautious and that it did not contribute to action in similar way as the other alternatives.

7.5.2 Motivation from alarm user information

Compared to the motivation evoked from reading the initial messages, seeing the complete request resulted in higher rankings (see Figure 26). These somewhat higher scores could however be explained by the respondents requiring additional information to determine if they are able to assist, which was commented in the survey (see 6.5.1)

Highest score on motivation was received when presenting the alarm user with name and photo where all but one respondent ranked the highest score. It was expressed by some respondents that they felt more motivated by seeing the person they were asked to help and that they would have difficulties rejecting assistance due to feelings of empathy, sympathy and guilt, which further follows the research of identifiable victims (see 3.1.3). It can be noted that also informing on age and sex received lower scores than only giving name and photo. Furthermore it was commented that showing a photo of the alarm user could also revoke helping due to prejudices that the volunteer may have towards different groups of people.

The other alternatives received varying scores among the respondents, though all resulted on similar mean value. It is therefore difficult to draw further conclusions on these.

7.5.3 Motivation from button labelling

Despite that the decision to help or not help was commented to be made before being presented with the alternatives (it was also claimed that the colours green and red communicated the alternatives well without labelling), some tendencies were found (see Figure 27).

Strongest likelihood of helping was evoked by "Yes, I can help out/No, I can't help out", despite the fact that it was claimed that the phrasings did not affect their decision. It was commented that the phrasing allowed them to make the decision on their own, which was appreciated. However it was commented that the text was too long.

Second strongest likelihood was achieved for "Yes, I can help Rune/No I can't help Rune". Some participants that the labelling would make them feel guilty if they were not able to assist, which forced them to agree. One respondent claimed that this instead had an opposite effect that made her unwilling to help. It was also expressed that the request should not evoke guilt since being volunteer means contributing to a good cause.

"Yes, I'm available/No, I'm not available" and "Accept request/Reject request" received moderate values. The first one was believed to have similar meaning as "Yes, I can help out/No I can't help out" but with a more negative tone to it. It was believed to be more easily rejected, except for one participant that believed "I'm available" evoked reflection and made the volunteer reconsider their response. It was commented that it would be easier to "reject a request" rather than to "neglect help", as two of the other alternatives more clearly communicate. The phrasings were regarded as too formal, impersonal and cold for volunteering.

7.5.4 Implications

The results suggest that help is encouraged if the alarm user is presented to the volunteer, which follows the theory on identifiable victim effect (see 3.1.3). Some respondents were negative to showing a photo of the alarm user since they feared that people could be neglected based on prejudices. However, given that the volunteer will be presented after accepting the initial request the risk that the volunteer decides to leave the alarm based on their prejudices remains. Furthermore it is believed that it is unlikely that these register as volunteers if they have been informed of the preconditions that includes that one is willing to assist all people. It was decided that ***the alarm user should be shown in the request***.

It may further be discussed whether or not the identity of a person should be given in the request since this may violate the alarm user's privacy. This could be avoided by making it possible for the alarm user to decide if they want their photo to not be shown in the request. (Moreover, as the function will depend on the user inserting their picture the user could also choose to not to.) Hence ***displaying the alarm user's photo in the request should be optional.***

As it was concluded that the identity of the alarm user should be given in the request, phrasing the headline message with the alarm user's name is unnecessary. It was found that distance to the alarm user is among the most important factors to enable the volunteer feeling motivated to assist. It was also found that directing the message to the volunteer by their name evoked moderate to strong motivation. For the final concept it was decided to use ***a combination between "Hannah, your help is needed now" with "A person near you needs help".***

It was recognised that labelling makes the volunteer relate to the situation on varying degree. "Yes I can help" better communicates that the volunteer is asked to help compared to "Accept request" and "I'm available", which imply that a request is to be answered respectively that the volunteer is to confirm of their availability. Compared to "Yes, I can help Rune", it also is shorter and does not require synchronisation to user information. For these reasons ***it was decided that "Yes I can help" respectively "No I can't help" should be used***. It was decided that all buttons should share similar, personal character that conveys their meanings.

7.6 GRAPHICAL STYLE & EXPRESSION

Using the graphical profile as inspiration (see 7.1.3) several suggestions for the graphical style of the mobile application were created. The suggestions differed in colouring, form and other detailing such as thickness of lines but they all were coherent with the graphical profile's colour scheme that went in black, white, grey and green. After screening based on how the suggestions were perceived on a mobile screen, strength of coherence to the graphical profile and ability to keep information in focus five suggestions were selected (see Figure 29). These were evaluated in a survey that aimed to identify how well the alternatives communicate desired expression and their coherence to the graphical profile (see Appendix XIV). The survey had 11 respondents, whom were first asked to rate Landräddningen's graphical profile according to ten attributes that was desired for the expression: *security, active life, engagement, significant, informative, functional, reliable, serious, human compassion* and *kindness*. During rating the respondents were presented with images portraying the graphical profile such as logotype and screenshots of the website. The suggestions were then rated according to the ten attributes and on their match to the graphical profile. Mean values were calculated and were illustrated in charts (see Appendix XV for each participant's results). The results are presented in the following subsections.

7.6.1 Expression of graphical profile

The result of the survey pointed to that the graphical profile is perceived as *reliable*, *serious* and *informative* (see Figure 28), which is regarded as desirable for a security service. Landräddningen's core values, *Security*, *Active Life*, *Significant* and *Engagement* all received moderate to low values (except for *Security*), suggesting that the graphical profile do not as successfully communicate these values. The moderate values may also be explained from a difficulty to interpret the attributes visually, which was the case for more than one respondent.

The graphical profile received low values in *Human compassion* and *Friendly*, where it among all respondents that chose to comment on their ranking claimed that it lacked images of people. It was commented that the graphical profile had a cold, tough and dark expression, mainly due to the choice of portraying a dark city alley that was perceived as unsafe. It was claimed that showing people in the photo would not only result in a friendlier, more compassionated and safer expression, but also result in higher levels of engagement.

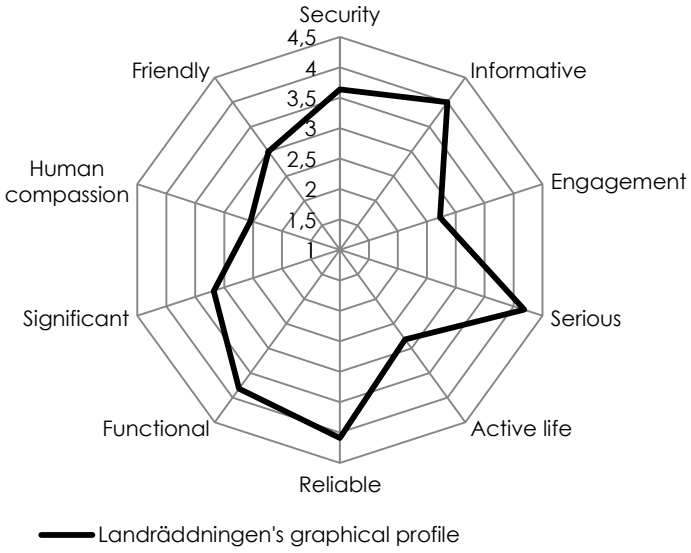


Figure 31. Expression of Landräddningen's graphical profile. As seen in the chart, highest values are received for Informative, Serious and Reliable. Lowest values are received for Human compassion, Active life & Engagement.

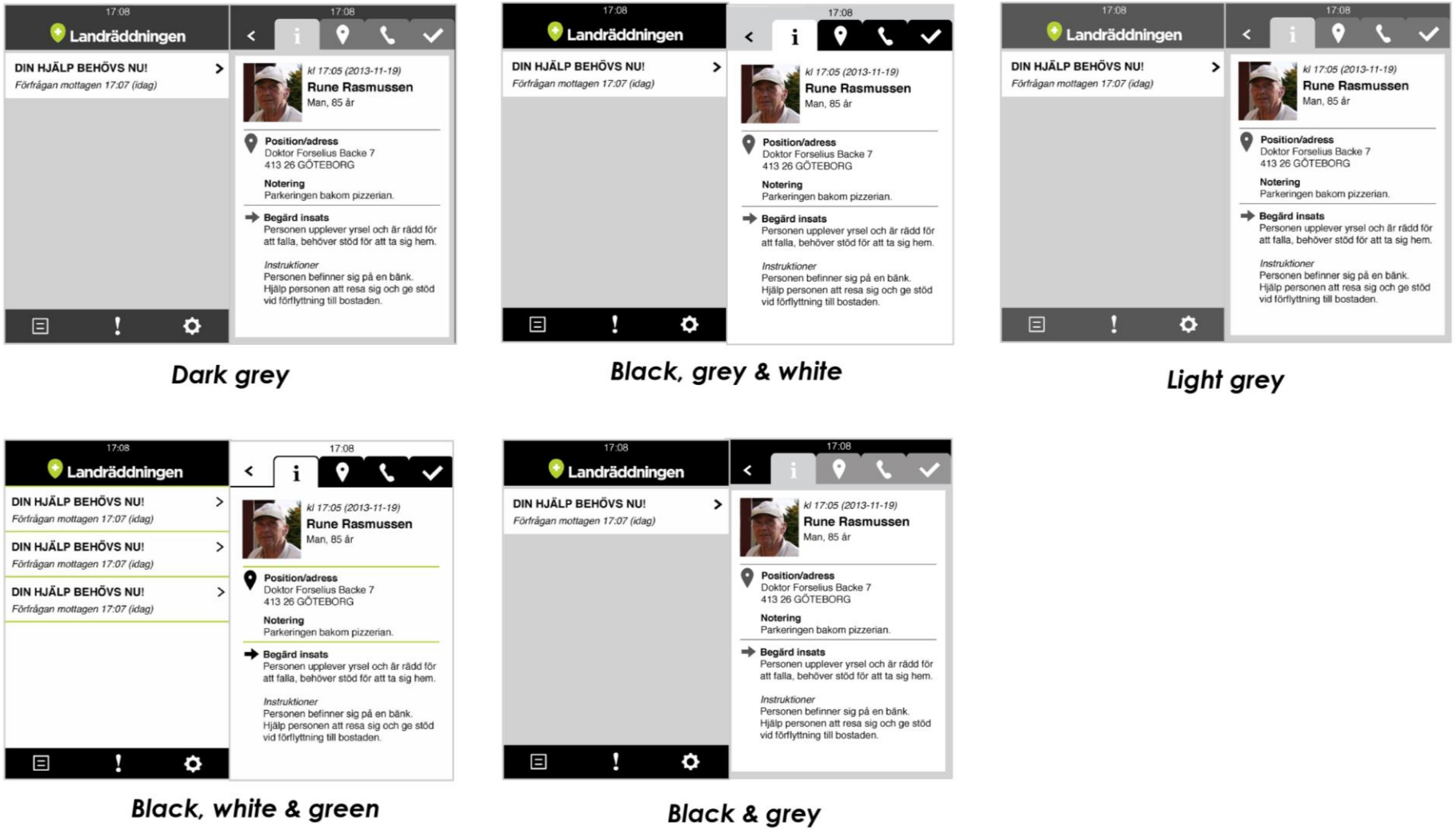


Figure 32. Design suggestions of graphical user interface.

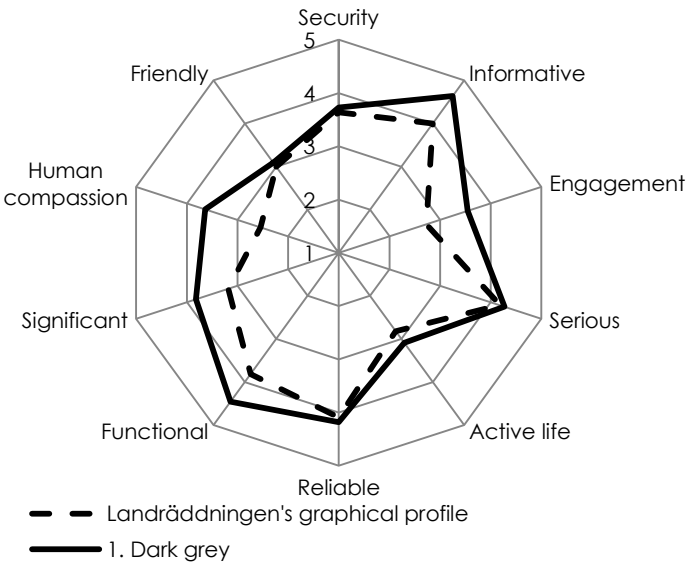
7.6.2 Expression of suggestions

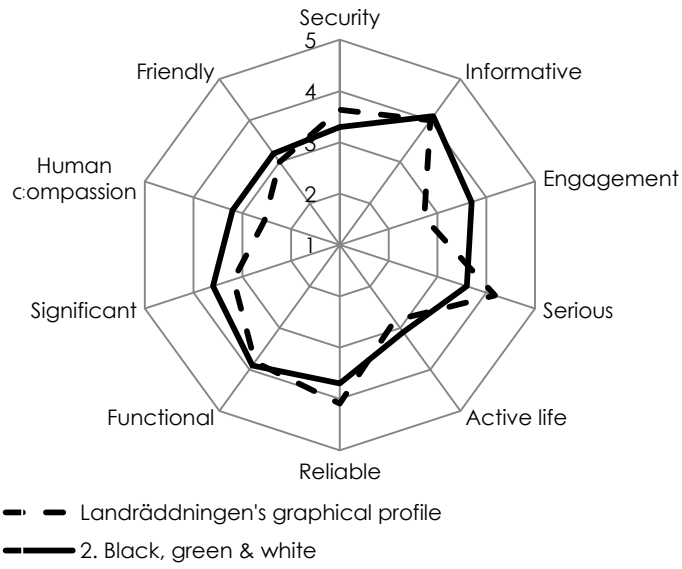
Overall the attributes were ranked higher for the five suggestions compared to the graphical profile (see Figure 30). Primarily the categories *human compassion*, *significance* and *engagement* received higher rankings, where it was explained that the picture of the man in need of help contributed to these ratings. It was commented that the picture made the message of human compassion more apparent and that they felt more engaged by seeing the person in need.

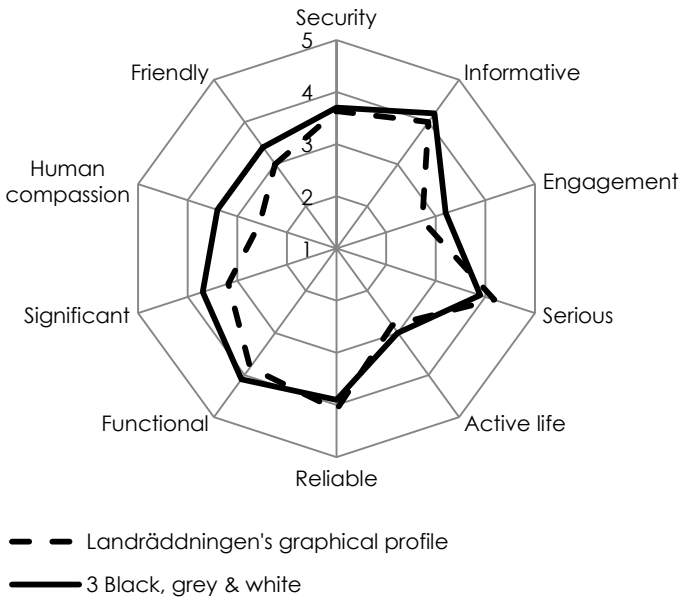
Few comments were announced that specifically concerned the different interface suggestions. It was expressed by several respondents that the suggestions were very similar and that they had difficulties perceiving differences that had impact on their ratings of the attributes. Moreover the rankings varied between the respondents, making it difficult to draw conclusion. Despite this some differences can be seen:

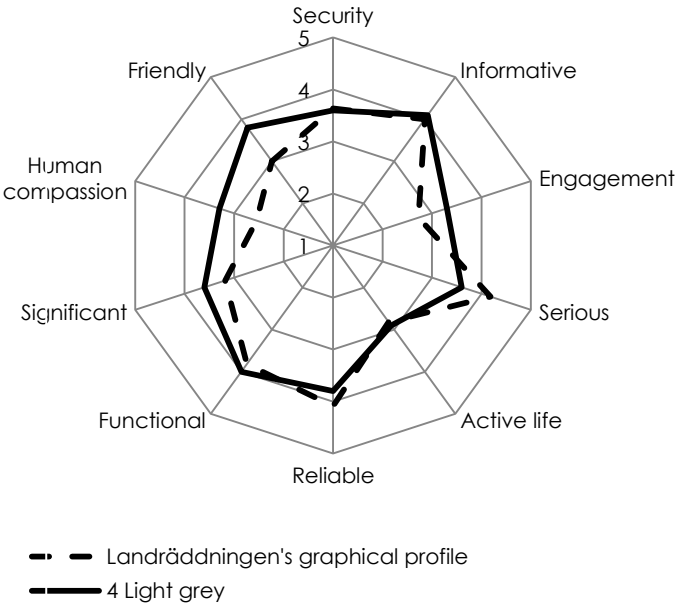
- *Light grey* was ranked highest on *friendly* and it was commented that the light colours and low contrasts contribute to a kinder expression. It further received lower scores in *serious* and *reliab*le. It was explained that higher contrasts promote a professional impression, where light grey tones with little contrast instead promote the opposite.
- *Dark grey* received highest rankings in the attributes *informative, functional, reliable, human compassion* and *significant*. It was commented that the interface was "simple and clean where focus was laid on the information, as it should". Compared to *Light grey* the contrasts were stronger, which promote a more professional expression and higher scores in *serious* and *reliable*.
- It was commented that *Light grey* and *Dark grey* are more harmonic and calmer in their expression compared to the suggestions that use stronger contrast and colours, e.g. *Black, green & white,* that are perceived as more active. This could though not be seen in the charts where *Active life* received similar ratings for all suggestions. However *Light grey* received the highest score on *friendly,* which has similar expression as calm and harmonic.

Furthermore it was explained that the overall interface layout looked well thought-through where suitable functions are available in the tabs and that the information is given attention, which give a reassuring impression. The respondents also appreciated the lines separating the information that made it simpler to take in. However it was highlighted that the lines need to be thin to ensure that information is given attention.









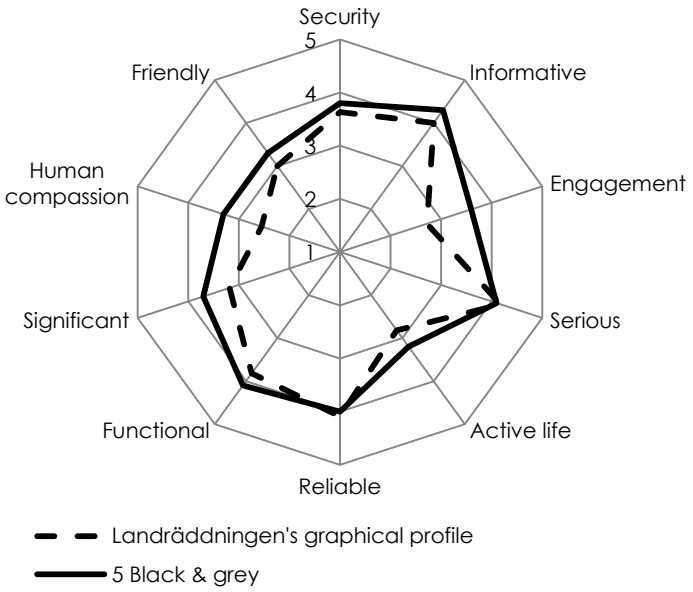


Figure 33. Expression of design suggestions in relation to the graphical profile, which is marked with a dashed line.

7.6.3 Suggestions' match to graphical profile

All five suggestions were ranked 3 or higher (see Figure 31), suggesting that they all are somewhat coherent with the graphical profile communicated through the website. Studying the scoring on the different interface suggestions, the values differed and *Dark grey* was ranked to fit the graphical profile to greatest extent. It was commented that the white areas circulating the information resembled the white areas from the website. However it was also stated by a respondent that the interface lacks the black, white and green colours used in the website, which instead promotes low coherence. Following this contradiction was *Black, green & white,* which shares same colours as the website, rated to least fit the graphical profile. Among the comments it was explained that interface lacks the transparency in the menu bar of the website and that the contrast between black and white was too strong. Similar comments on contrasts were also expressed for *Black, grey & white*. Another note on *Black, grey & white* was that the white area behind the tabs "felt empty". For *Black & grey* it was commented that the contrasts between the grey views and the black background was to strong, whereas *Light grey* was perceived to have too light contrasts.

To achieve coherence with the website it was explained that strong colour contrasts are needed, both in main colours and in accent colours. It was claimed that stronger contrasts contributes to a more professional impression, which is desired for a security service. To avoid that the contrasts are too hard, as they claimed to be for *Black, green & white* and *Black, grey & white*, it was proposed that transparency on the menu bar could be used in a similar way as on the website.

Among the respondents favourites were *Dark grey*, *Black & grey* and a combination between *Black, green & white* and *Black & grey* mentioned. It was claimed that *Dark grey* and *Black & grey* were the most pleasant to look upon, where they were believed to be balanced in their colour setting that promotes high degree of readability. *Black, green & white* was appreciated for its use of similar colouring as the website.

Figure 34. The suggestions match to the graphical profile on a scale from 1-5. The numbers represent mean values.

7.6.4 Implications

The graphical profile is perceived as informative, reliable and serious, which is desired for the service. Though it was found that there may be a need to revise the selection of photos shown on the website as the current photo, which depicts a lonely city street, is perceived as unsafe and to lack the message of human compassion.

Overall the suggestions received higher scores on desired attributes compared to the graphical profile. Though, as for the graphical profile, low values were achieved for *engagement*, *active life* and *human compassion*. These may however be difficult to translate into visual elements that made it more difficult to grade these.

The suggestions of the user interface design were all regarded to fit the graphical profile. Thus all could be selected. For the final design it is believed that a combination between ***Black & grey*** and ***Dark grey*** would result in a design that communicates desired expression and that is coherent with the graphical profile of the website.

7.7 FINAL APP CONCEPT

The usability tests, tests on feedback, survey on how to motivate volunteers in the request and the survey on expression and graphical style lead to the development of the final concept of the smartphone application (see Figure 35, Figure 36 and Appendix XVI). Some of the changes that were made from the previous version (see 7.2.3) are described in the following subsections.

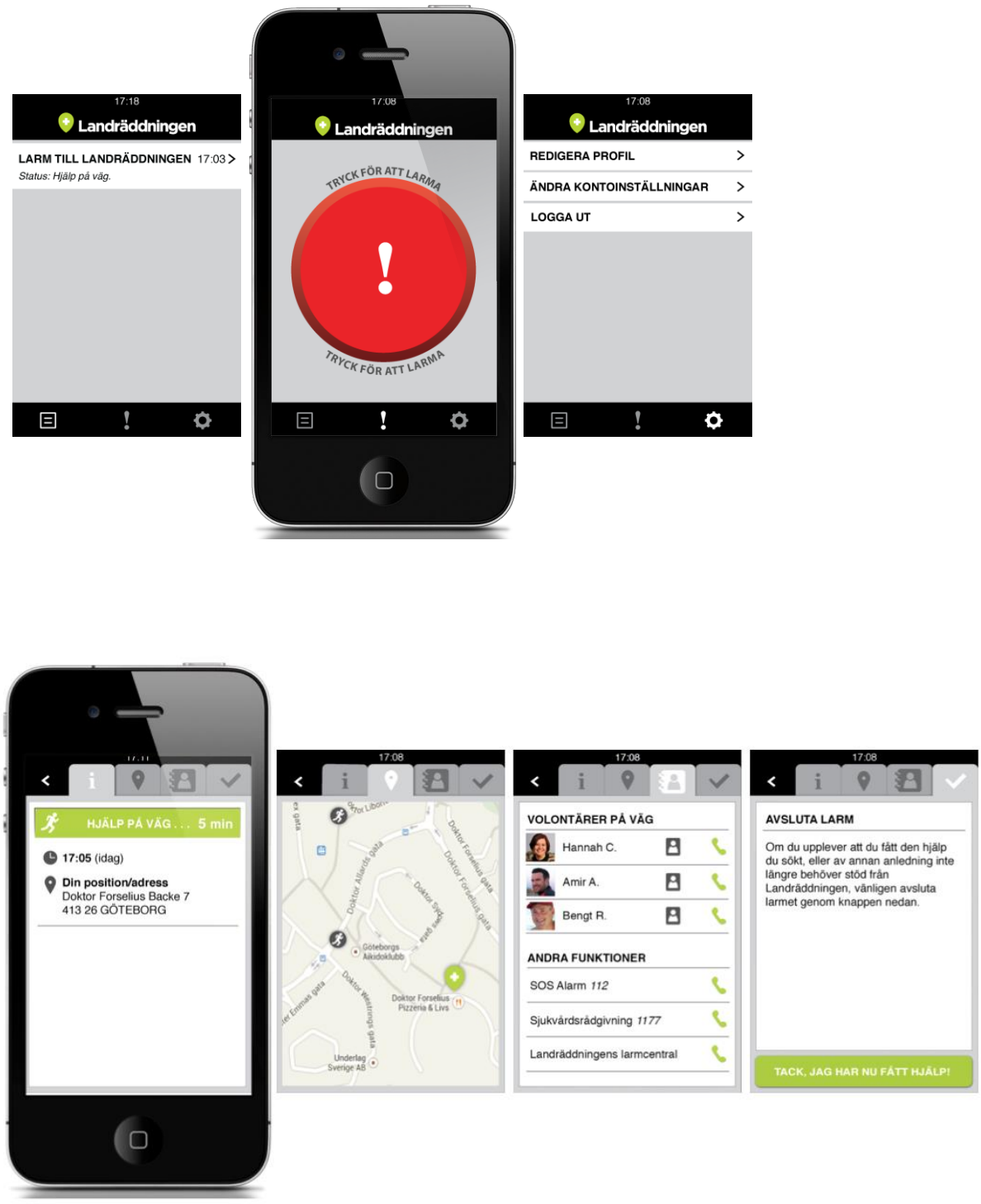


Figure 35. The alarm user's app. There are three main menus: the Alarm List, the Alarm Function and Settings. After an alarm has been activated via the alarm button of the Alarm function, the alarm it is listed in the Alarm List. From here can all alarms be entered, which all include four views: Information, Map, Contacts and End Alarm. In Information the user can view current alarm status and in Map and Contacts the volunteers that are on their way can be seen. In End Alarm the alarm user informs when he or she no longer needs assistance.

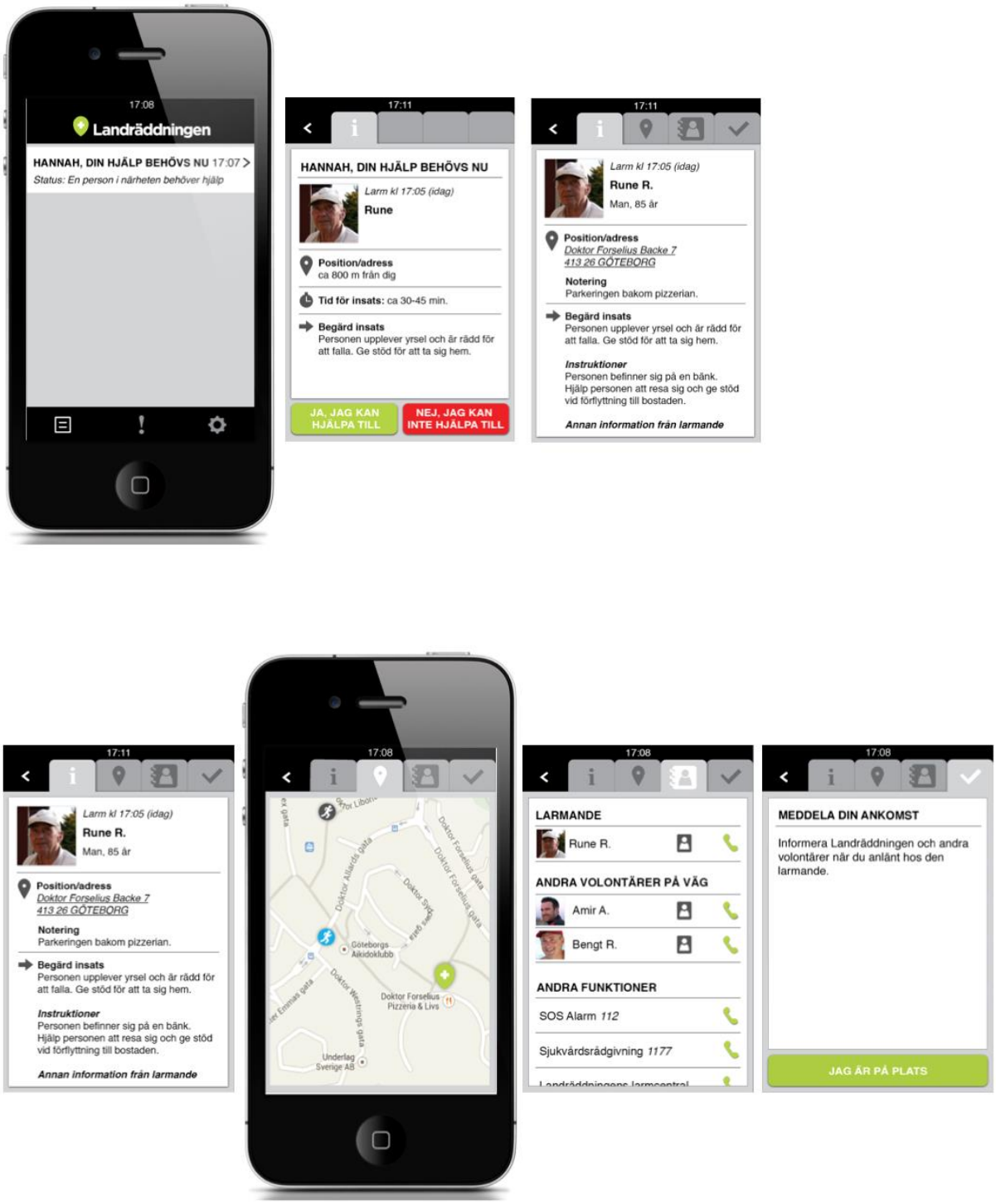


Figure 36. The volunteer's app. The app shares the same main menus as the alarm user. Requests of assistance are listed in the Alarm List. In a request the volunteer is presented with information on the alarm and asked to reply on their possibility to assist. Thereafter more detailed information such as the position of the alarm user can be viewed. The alarm has four views: Information, Map, Contacts and Report. In Report the volunteer informs when they have arrived at the alarm user's and when they have completed their tasks.

7.7.1 Description

Landräddningen's app enables people in need to alarm and to be helped by volunteers that are located close to them. Through activating an alarm, the alarm user gets in contact with a call centre operator whom then, if found suited, sends a request of help to nearby volunteers to enable these to find and help the person in need.

Menus

The application has three main menus. All alarms that the user is connected to are listed in the *Alarm List*. In the list the user can view the status of the alarm and through entering the alarm additional information is presented (see Alarm views). Through the alarm button in the *Alarm Function* alarms can be activated. This will automatically open an alarm that later can be found in the *Alarm List*. Lastly the user can change their account settings etc. in *Settings* (see Figure 35).

Alarm views

Each alarm is represented in four views. In *Information* the user can view details on the alarm. For the alarm user this means the current status of the alarm, e.g. if help as been accepted or not, time of the alarm and their current position. The volunteer on the other hand can view information on the alarm user, the location of the alarm user and what assistance they are asked to provide. In *Map* the position of all users that are involved in the alarm are shown, and from each icon it is possible to view the user, call the user or to retrieve road directions. The alarm user will be able to see the volunteers' movements towards them, which hopefully will make time to help appear to go faster. In *Contacts* all users connected to the alarm are listed, as well as other functions that the user may need to call. In *End* Alarm respectively *Report* the alarm user informs when he or she no longer needs assistance, and the volunteer informs other volunteers that they have arrived at the alarm user's location. Thereafter the volunteer also reports when they have completed their tasks (see Figure 35 and Figure 36).

7.7.2 Functions

The final concept shares similar functions as the previous version. This includes how to activate alarms through the alarm button, initiate calls in the telephone list and inform when assistance is no longer needed respectively inform on arrival and delivery of assistance (see 7.2.3). As a result from the usability tests, new functionalities have been integrated and some have been adapted to promote more intuitive use.

Status display

The status display that communicates current alarm status to the alarm user functions similarly as in the previous version. When an alarm has been activated the status display is red to thereafter turn into orange when the operator has sent the request to volunteer, to finally become green when someone has agreed to assist. Compared to the previous version the status display has been integrated in the white field to counteract that it is misunderstood as a button. The gradient used to illustrate glass was also excluded as it was found that this made the colours more difficult to perceive abnormal vision conditions. Moreover the clock icon was replaced with "min" to stimulate that user understands that the time of arrival refers to minutes (see Figure 38).

Call from the map

A possibility to call another user directly from the map, which would make it easier to call the volunteer that is located closest to the alarm user, was requested during the usability tests and has been included in the final concept. Road directions to the alarm user were also integrated in the concept and can be entered via the icons in the map (see Figure 37).

View users

The possibility to enlarge the other users' photos in the telephone lists was not intuitive in the previous design. To make the task more simple to recognise it was decided to include an icon that leads to the function (see Figure 39). To return from this view the user clicks on the "arrow" in the top left corner, similar to how the user returns to the Alarm List from an alarm.

The request

It is essential that the volunteer decide to assist. To make the volunteer feel needed and motivated the request is labelled "[Volunteer's name], your help is needed now! A person located nearby needs help". In the request information on the alarm is presented, enabling the volunteer to estimate if they are able to assist. This includes information on distance to the alarm user, expected time for assisting and the form of assistance that is asked for. The alarm user is also shown with name and photo, as it was found that these increase the chance of helping (see 7.5).

7.7.3 Details

As a result of the usability tests, smaller changes were made to promote more intuitive use. These include change of icons, colouring and graphical style.

Icons

The final concept shares the same icons as the previous version except for two. During the usability tests it was found that the telephone that labelled the telephone list was not associated to the possibility to view the volunteers of the alarm. Due to this it was decided to instead label the tab with a telephone book, which is believed to better convey that all users connected to the alarm could be found here. Also, the volunteer icon in the map was made more turquoise compared to the previous version to associate better to the icons used in other "map apps".

Active and in-active colours

During the usability tests it was found that not all participants understood which menu they were in. To illustrate which menu the user is in active and inactive colours were used, where the current menu has a white icon and others have grey icons (see Figure 40 and Figure 41).

In the previous version the area behind the photo was not understood as inactive. In order to more successfully communicate that the area is inactive it was instead coloured black, following how inactive areas commonly are illustrated (see Figure 37).

Graphical style

The final concept is a combination of the suggestions *Black & grey* and *Dark grey* that were found to the best suit the graphical profile and desired expression of Landräddningen (see 7.6). The black heading, as in *Black & grey*, is assumed to promote a professional and trustworthy expression, as well as coherence to the graphical style that can be seen in the website. The grey colours used inside the alarm, inspired from *Dark grey*, is sought to contribute to a friendlier and calmer expression that is desired to keep the alarm user, and volunteer, feeling safe. Also they are believed to be more pleasant for the eye to look upon, which in the survey was found as an advantage for the previous grey alternatives.

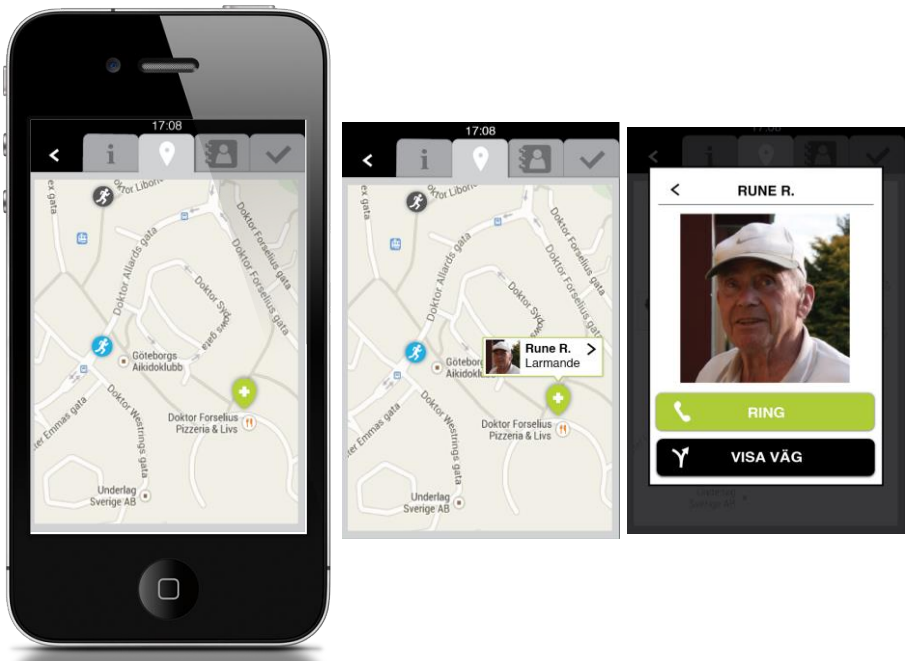


Figure 37. Possibility to call from the map and to view road directions.

Figure 38. Status display ”inside” the white field.

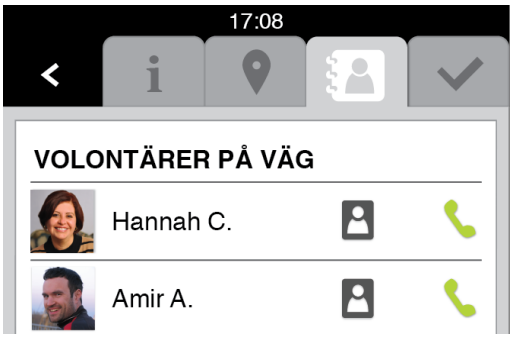


Figure 39. Icons to view enlarged photos.

Figure 40. The current menu is shown with a white icon.

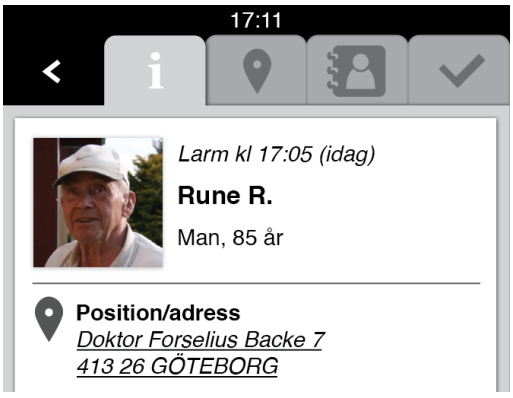


Figure 41. The current alarm menu’s icon is white.

8. THE CALL CENTRE INTERFACE

Concurrently to the development of the smartphone application the call centre interface that was to be used by the operators, called Landcentralen, was addressed. Since the initiators already had come far in the development of the call centre interface it was decided to deliver suggestions of improvements instead of creating a complete new interface. It was decided to only point to overall improvements that could be detected without user tests given that the author only had received entry to view the interface rather than to actually use it. The process was initiated by analyses of the expected user interaction to identify potential usability problems and use errors. This identified some potential problems, from which suggestions of improvements were created. The suspected problems and ideas were then discussed with operators working at the intended call centre. The discussion resulted in discoveries that will aid Landräddningen in the future development of the call centre interface and the service over all.

8.1 REFERENCE INTERFACE

During handling of alarms within Landräddningen the operator will use 'Landcentralen', an online call centre interface that is synchronised with the software used for social personal alarms.

8.1.1 Pages of the interface

The interface primarily consists of two main menus, one called *Alarm List* where all alarms are listed and *User accounts* where the users personal information is stored. From the Alarm List alarms can be handled or viewed. Each alarm consists of four pages: *Information*, *Volunteers*, *Reports* and *Log* (see Appendix XVII).

Information

When initiating the handling of alarms the operator is first presented with the page *Information*. Here the operator documents information during interview with the alarm user, selects measure (i.e. if the alarm should be forwarded or not) and declares the information to the volunteer (i.e. what they are asked to assist with, expected time to assist and instructions that are given after the volunteer has entered the alarm). The operator is also supposed to classify the type of alarm and location of the alarm. Above these fields, information that was given from the alarm user during registration is shown, which include personal information, contact information, preferences on the volunteer[51] and account settings (see Figure 42).

Volunteers

On the second page, *Volunteers,* the operator is presented with a map displaying the alarm user and with the volunteers that are located close to the alarm user. Here is selection of volunteers performed through the operator sorting them based on distance to the alarm user, preferences and desired capabilities (see Figure 43).

[51] As part of registration the alarm user can specify if they have preferences on their helper, such as the gender. The initiators of Landräddningen included this function to attract users from cultures where it is not possible for e.g. a woman to be helped by an unknown man or vice versa. It was also decided to enable the possibility to retrieve information on spoken languages, enabling the possibility to select volunteers that speak the same language.

Reports

After each alarm the alarm user and the volunteer is expected to report on their experience, of which their answers are presented to the operator on the page *Reports*. The idea of the initiators is to retrieve feedback on the service and find opportunities to improvement as well as a way to potentially exclude users that do not are not suited for the type of services that Landräddningen involve.

Log

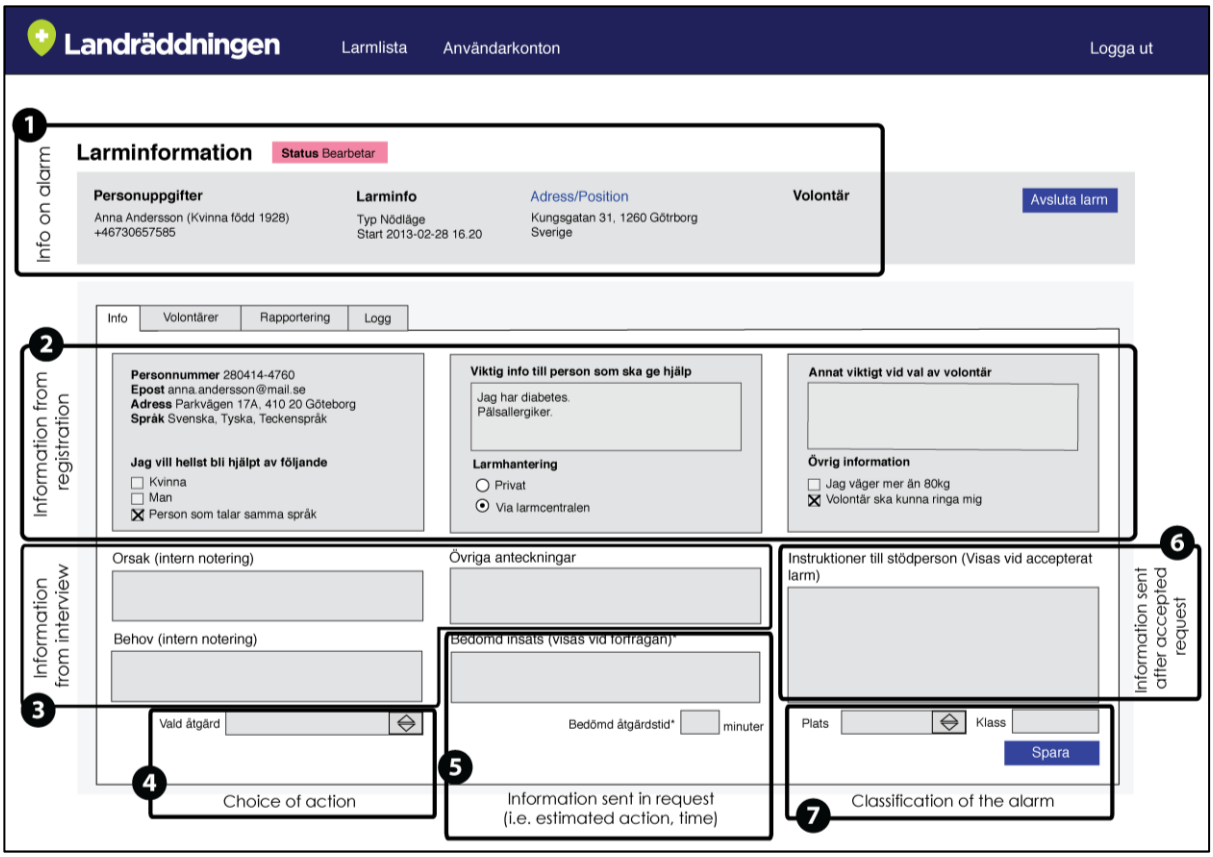
On the fourth page of the alarm, *Log,* all activities that have been performed associated to the alarm are stored. This enables the operator to go back and view the handling of each alarm and become updated on the alarm, for instance to see answered requests.

Alarm list

All alarms are listed on a separate menu. From the list each alarm can be entered, viewed and handled. In the list various information can be seen: the alarm user's name and telephone number, time of the alarm, current status and which operator that has handled the alarm. Each alarm is given an ID and colour coded according to their status. Moreover there is additional information listed that can be retrieved that is associated to another function that have not been addressed in this thesis.

User accounts

In user accounts information about the users are stored. Since this function is not used during handling of alarms it will not be addressed in this project.



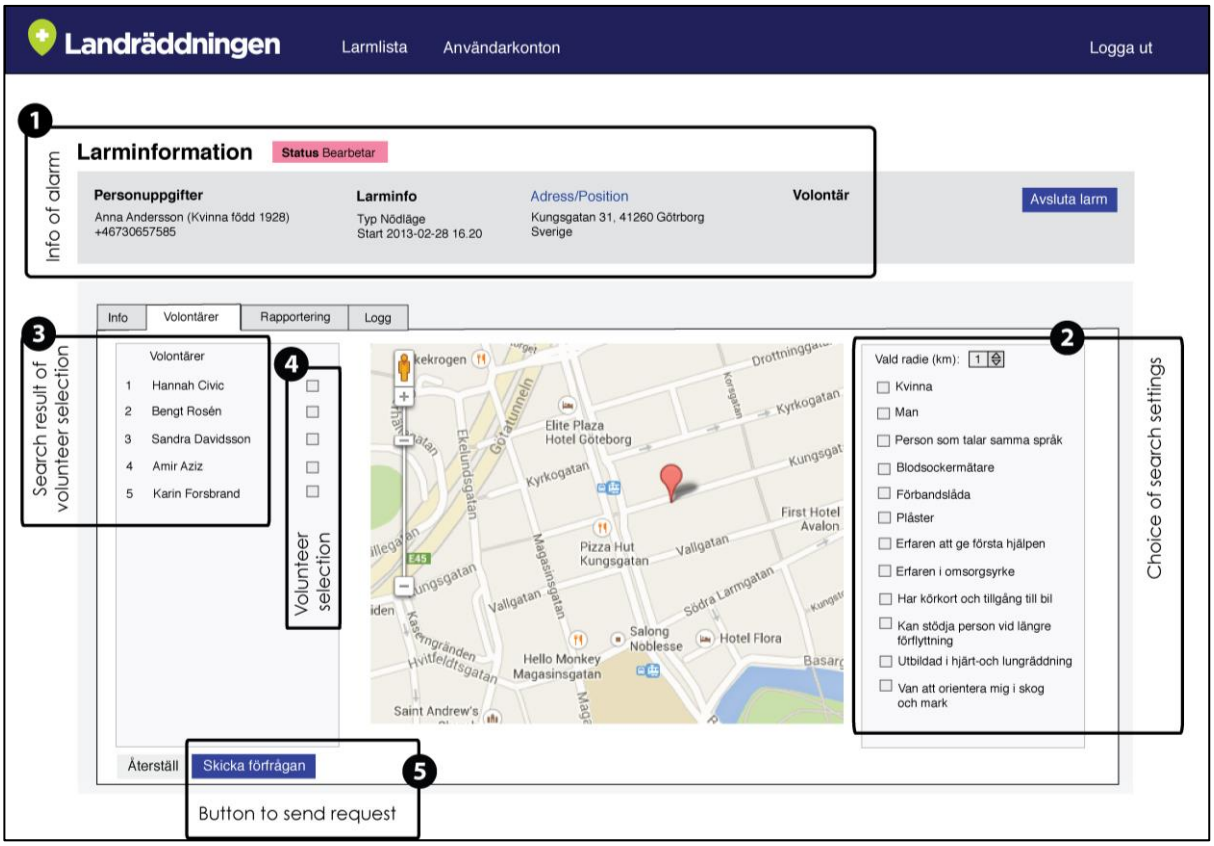


Figure 42 and Figure 43. The two first pages to every alarm: Information and Volunteers. In Information documentation on the alarm is made. In Volunteers, the volunteers are sorted based on various criteria, selected and sent requests of assistance.

8.2 INTERACTION ANALYSIS

To investigate potential usability problems and use errors *Cognitive Walkthrough (CW)*[52] and *Predictive Human Error Analysis (PHEA)*[53] were performed on expected use. The analysis pointed to potential usability problems and use errors that are evoked from the layout, absence of support and feedback. Additional notes on the service in its whole were also collected.

8.2.1 Use from layout

From first impression the layout seems to promote intuitive and systematic use where the operator starts on the interface's left side and ends in the right. However not all elements are placed after sequence of use which causes inefficiency:

- The layout evokes a handling where the operator identifies the need of the situation, selects action and provides rich documentation before actually knowing that there are volunteers located close to the alarm user. To avoid that the alarm user is incorrectly promised help and documentation of "unnecessary" information the operator has to enter the volunteer page and review availability (see Figure 44).
- The interface does not communicate when interaction with the alarm user is supposed to be carried out. This may result in the operator either keeping the alarm user on the phone longer than necessary, thereby increasing the cost of the operator, or that retrieval of this information is forgotten.
- The selection criteria used to sort volunteers are placed on the right side of the page, whereas the search result is presented on the left side of the page, incoherent to the sequence of use (see Figure 45).
- Volunteer preferences are displayed on the first page and not where volunteer selection is carried out (see Figure 44 and Figure 45).
- To enable documentation of additional information than cause and need there is a box labelled "Other notes". This is not placed directly after the two first boxes used during documentation but after selection of action, and may for this reason be mistaken to e.g. serve as information to the volunteer.

[52] *Cognitive Walkthrough (CW)* is a structured and systematic analysis of the tasks that are performed when a user uses a user interface. The method identifies potential usability problems through four questions: (1) Will the user try to achieve correct effect? (2) Will the user detect that correct action is available? (3) Will the user associate correct action with desired goal? (4) If correct action is performed, is feedback on this received? The questions are answered with YES/NO along with a motivation to the response that informs why the user succeeds or fails. Hence the method gives an understanding for where in a sequence of use problems occur and why (Osvalder et al, 2007).

[53] *Predictive Human Error Analysis (PHEA)* identifies potential errors that can be performed when a user interface is used. The method aims to answer the two questions: (1) Which errors may the user perform? (2) What happens if the user makes error? After having identified potential errors that may be performed each is analysed to identify the cause of error, consequence of error, possibility for error detection and possibility for recovery from the error (Ibid).

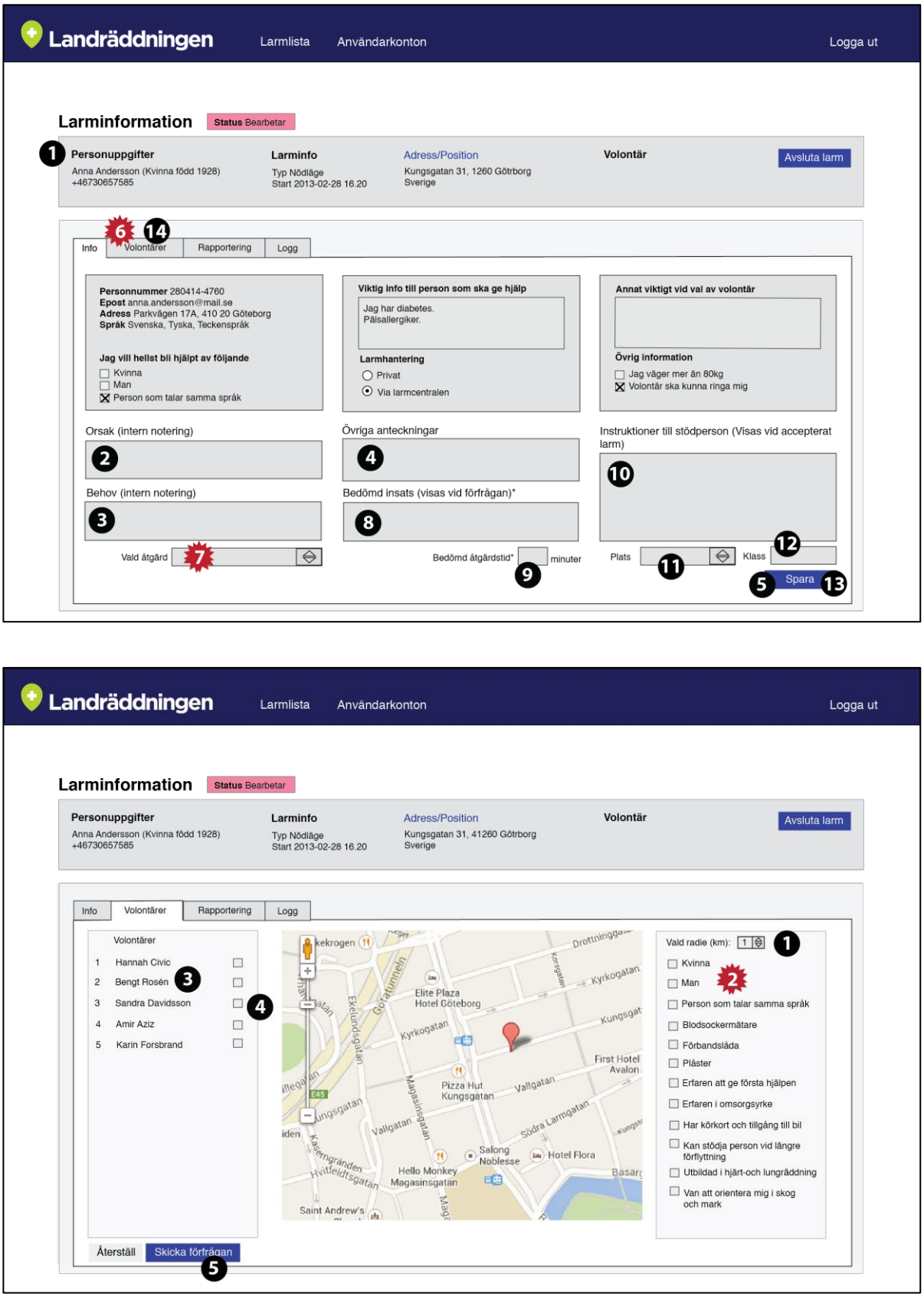


Figure 44 and Figure 45. On the Information page handling is primarily carried out from left to right, but with interruptions availability is reviewed on the Volunteer page (step 6-7). On the Volunteer page the search criteria are marked in the right and the results is viewed in the left. To retrieve the complete preferences the operator has to return to the Information page where they are shown.

8.2.2 Support and feedback

The interface requires skilled operators that know how to identify need, determine measure, estimate time and classify alarms, as well as to how to formulate themselves in a way that enables one to review the alarm afterwards and the volunteer to know how to assist:

- The interface does not tell how to identify the cause or need, merely indicate that this should be documented in the boxes.
- Documentation through writing is limited during handling of social personal alarms, whereas Landräddningen's interface is depended on it. Given that the interface gives no clear indication of the richness of the information that is aimed there is room for providing both insufficient and too extensive information. This either leaves the volunteer with insufficient information or that the operator has used their time unwisely. With free writhing there is also a risk that the quality of the information may vary, which affects how the organisation is perceived by the respondents (e.g. incomplete sentences and misspellings give an unprofessional impression).
- The interface does not indicate which information that is to be sent in the request and which information that should be given after accepted request, nor does the interface tell which information that is given automatically from the system. This provides opportunities for error where the operator may distribute information that should not be forwarded, e.g. personal information on the alarm user, or that the operator spends time retyping information that already has been declared, e.g. "instructions to the volunteer" may involve similar documentation as in "estimated distance".
- The interface does not support the operator in determining which measure to take, i.e. during which situations that the alarm should be distributed to volunteers, forwarded elsewhere (e.g. emergency services) or rejected assistance.
- The interface does not provide support on how to classify the alarms.
- The operator needs to make estimations such as the time needed to provide assistance. Since the interface gives no support in how these are made the operator is depended on past experiences and guesses, opening for the risk that incorrect times are communicated to the volunteers.
- During selection of volunteers no feedback is given that declares on which criteria the volunteer was selected besides that they fit the criteria set. To ease selection of the most suitable volunteers, feedback should be given that displays the criteria they fulfil.

8.2.3 Additional comments

During the analysis some additional comments on the interface can be made regarding the overall interface and the service.

- The interface favours documentation before quickly distributing assistance. During less severe situations this may not be regarded as a major problem, but during situations where assistance is needed quickly the necessity to document before distributing assistance is unfavourable. This issue was discussed with the initiators who acknowledged the problem but expressed that it also is important that each alarm is well documented to supply results to the research study that also had been initiated.
- Given that the alarms of Landräddningen occur outdoors compared to personal social alarms that occur in a fixed position of the user's home it is especially important to confirm that the location of the alarm user is correctly calculated. That this should be confirmed is not implied by the interface than that the location should be documented as part of the classification.
- By supplying a possibility for the alarm user to declare their preferences on which they want to be helped by it will likely be assumed that the wishes are possible to satisfy. However given that there may be difficult to ensure that there are volunteers available, these expectations would unlikely be fulfilled. The need for a possibility to specify the volunteer can further be questioned. No such tendencies were recognised during the user studies performed in this project. Furthermore the function to sort volunteers based on equipment they claim to have access to, such as a car, bandages or a first aid kit, is unreliable given that the volunteers may not have these with them during a specific alarm. To avoid these problems it may instead be suggested that distance is the only criteria upon which volunteers are selected.

8.2.4 Implications

The analyses pointed to potential usability problems and use errors of the interface. This resulted in requirements on the call centre interface. It may be noted that some of these also were found during the interviews with operators (see 4.3).

The call centre interface should:

- ***promote that assistance is distributed quickly.***
- ***communicate availability of volunteers directly.***
- ***follow sequence of use.***
- ***promote that the location of the alarm user is assessed.***
- ***encourage documentation.***
- ***support during documentation.***
- ***support the decision on which measure to take, how to estimate time of assistance and how to classify alarms.***

8.3 LAYOUT ANALYSIS

The interaction analysis identified that potential usability problems derives from the layout of the interface. To explore how the layout should be set up to promote efficient use a layout analysis was performed according to the method of Stanton et al (2013). The analyses involved four steps: to sort the interface components into functional groups and than to place these according to importance of use, sequence of use and frequency of use (see Figure 46 and Figure 47).

8.3.1 Functional groups

The different elements of the interface were sorted into functional groups, which showed that similar components were not displayed adjacent to each other. These e.g. include user information, account settings and volunteer preferences that were placed on more than one location on the Information page.

8.3.2 Importance of use

The groups were ranked after their importance of use and thereafter ordered accordingly, where the most important elements were placed on a diagonal from the top left corner to the bottom right corner. The analysis recognised that several components might not be of any importance during handling of alarms and potentially could be discarded. These include contact information and account settings that provide no value to the operator during interview with the alarm user and classification of alarm is not important to ensure that help is distributed quickly. It is further uncertain whether or not the alarm user would want to declare specific volunteer preferences given that the user studies identified no tendencies of this sort. Also the information that is declared by the alarm user during registration and is to be forwarded to the volunteer might not be of interest to the operator and could potentially be excluded.

8.3.3 Sequence of use

The groups were ordered after their expected sequence of use. It was recognised that there are elements that unlikely would be used during the handling of an alarm. These include those that were found as less important, i.e. contact information, account information and volunteer preferences/volunteer selection based on specific criteria. It was recognised that some elements could be handled after having forwarded the alarm to the volunteer. These include documentation of cause, need and other notes as well as classification of alarm.

8.3.4 Frequency of use

The components were ordered to their expected frequency of use. It is believed that the operator most frequently will use the elements associated to the interview, the tabs used to switch pages and the selection of action.

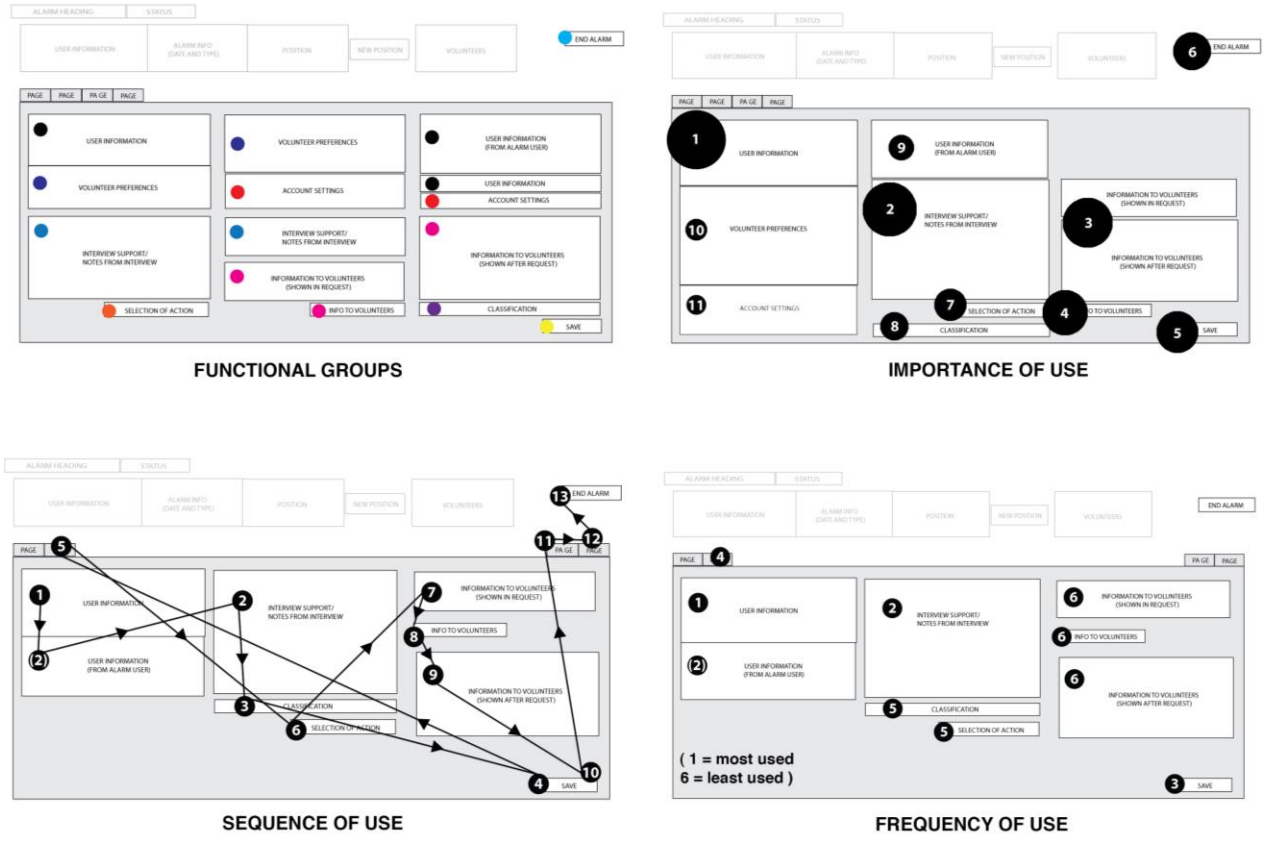


Figure 46. Layout analysis. The Information page.

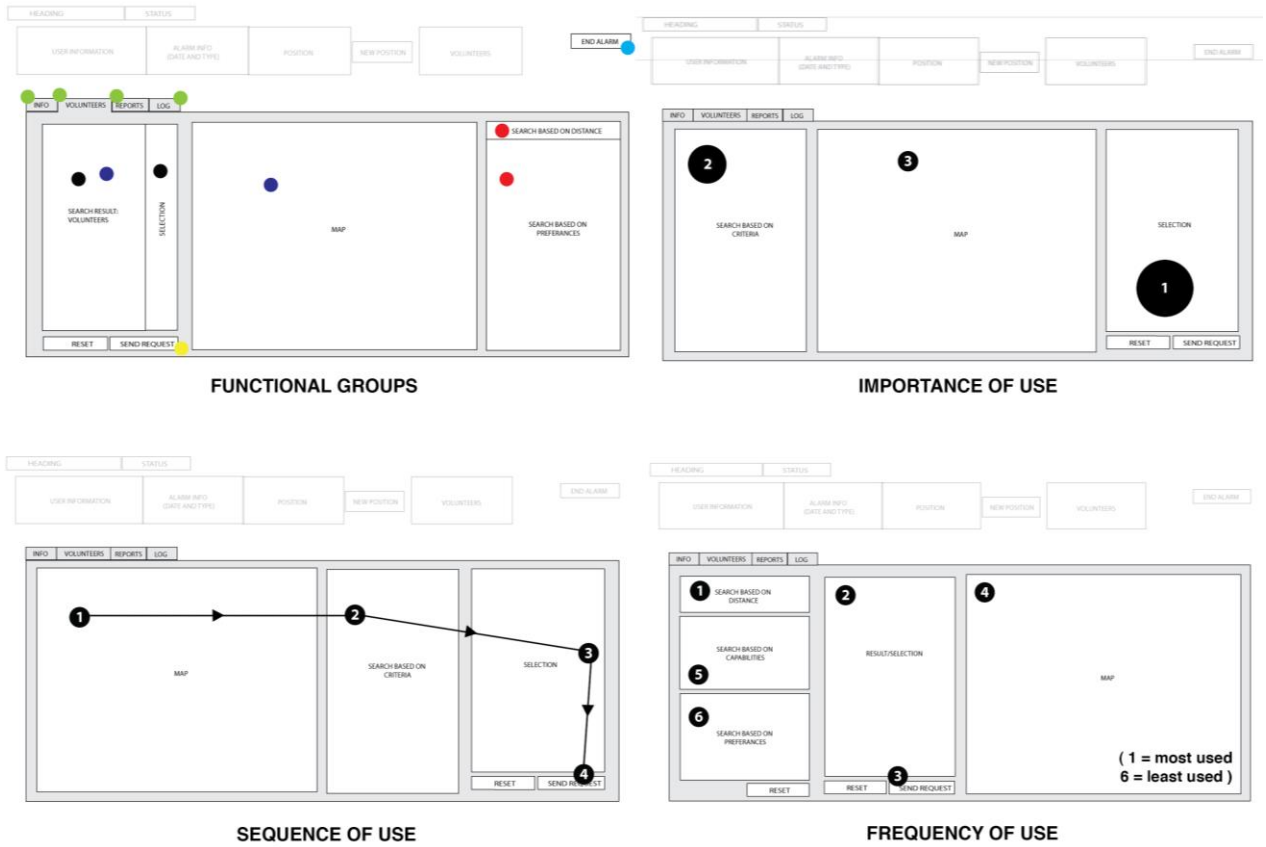


Figure 47. Layout analysis. The Volunteer page.

8.3.5 Implications

The layout analysis pointed to that there are elements of the interface that unlikely is meaningful to the operator during handling of an alarm and that these unlikely will be used. These elements include certain user information, account settings, preferences on volunteer, volunteer selection and classification of alarms. This suggests a layout where these either are given a less prominent placement, or that they are excluded.

After having rearranged the elements of the interface according to importance of use, sequence of use and frequency of use, ideas for the call centre interface were achieved. These ideas formed the foundation of the interface concepts that were developed (see 8.4).

8.4 CALL CENTRE INTERFACE CONCEPTS

The interaction analysis and layout analysis formed the basis for three interface concepts: *Rearranged*, *Reduced* and *Integrated*.

8.4.1 Concept 1: Rearranged

Rearranged includes most elements from the reference but has been rearranged to follow expected sequence of use (see Figure 48 and Figure 49). New elements has also been integrated such as a map in the Information page, a text box for details on the alarm user's location and a short cut to routines.

Overall design

The overall layout follows sequence of use where cause and need initially is retrieved and decision upon action thereafter is made, where a shortcut to routines is available. Thereafter information to the volunteer is declared, which include the initial information sent in the request as well as detailed instructions and location information. Classification of alarm is placed bellow the text box for additional notes, and can initially be skipped and declared later on in the process. The layout of the second page also follows sequence of use were selection criteria is made in the left and volunteer results are shown to the right. Specific criteria may however be skipped and the operator can directly enter selection based on distance.

Map

To enable the operator to directly view availability of volunteers, the position of the alarm user and surrounding volunteers are shown in a map on the first page.

Routines

To make it easier for the operator to determine on decision of action the pre-determined routines is available through a short cut placed to the right of where the decision is made.

Location information

A text box has been added where the operator can document location information to enable the volunteer to more easily find the alarm user. This information will be forwarded to the volunteer when he or she has accepted the alarm.

Volunteer selection

To select volunteers the operator primarily will use the two top functions that sorts the volunteers based on distance. Besides the possibility to search for volunteers within a pre-determined distance as in the reference interface it can also be chosen to only show the nearest volunteers. Volunteer selection can also be made based on desired skills, equipment and preferences of the alarm user. To avoid that the operator has to return to the previous page to view preferences, these are instead shown here.

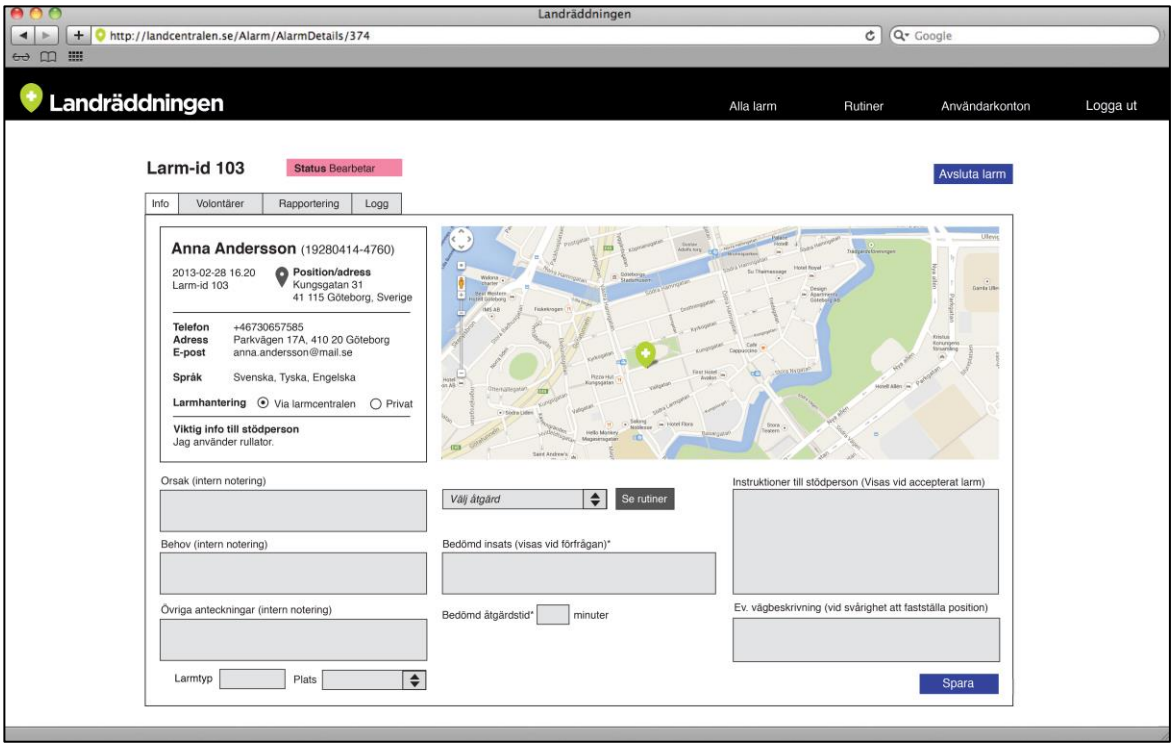


Figure 48 The first page of Rearranged. A map is shown to communicate availability of volunteers directly. Classifications of alarm have been placed bellow the text box aimed for other notes, and can be documented later in the process.

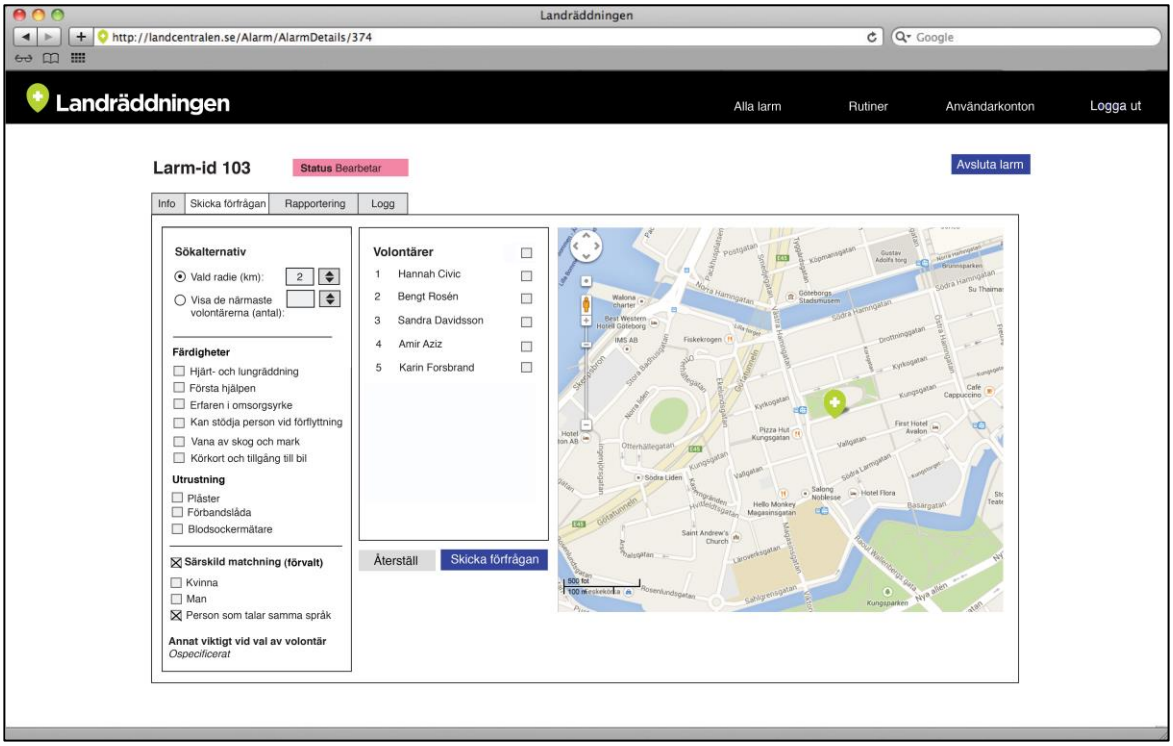


Figure 49. The second page of Rearranged. Preferences on the volunteer are only shown on the second page. The most important criteria has been placed in the top and the least important in the bottom. These less important criteria can also be skipped.

8.4.2 Concept 2: Reduced

Elements that had been identified as superfluous were discarded or moved to another page, leaving a interface that requires less documentation and contributes to more quickly distributed assistance (see Figure 50 and Figure 51). As for the first concept a map is included on the first page to communicate availability of volunteers directly and a shortcut to routines was integrated.

Single field to the volunteer

It had been identified that the operator likely would declare similar information to the volunteer in the request and in the details that are received after the request has been accepted. To avoid that the operator repeats information, and to promote that assistance is distributed more quickly, it was decided that the complete task description is forwarded directly in the request.

Support

Supporting questions were added above the text fields to make it more intuitive for the operator to identify the cause and need of the situation. To ease the declaration of information to the volunteer a sentence has been started where the operator then can continue the sentence.

Send request

To promote that it is understood that request are sent on the second page, the page was renamed from "Volunteers" to "Send request". The possibility to sort volunteers based on other criteria than distance was also discarded.

Classification on separate page

The classification of the alarm has been moved to a separate page. This promotes that help is distributed quicker while enabling retrieval of additional information on the alarm.

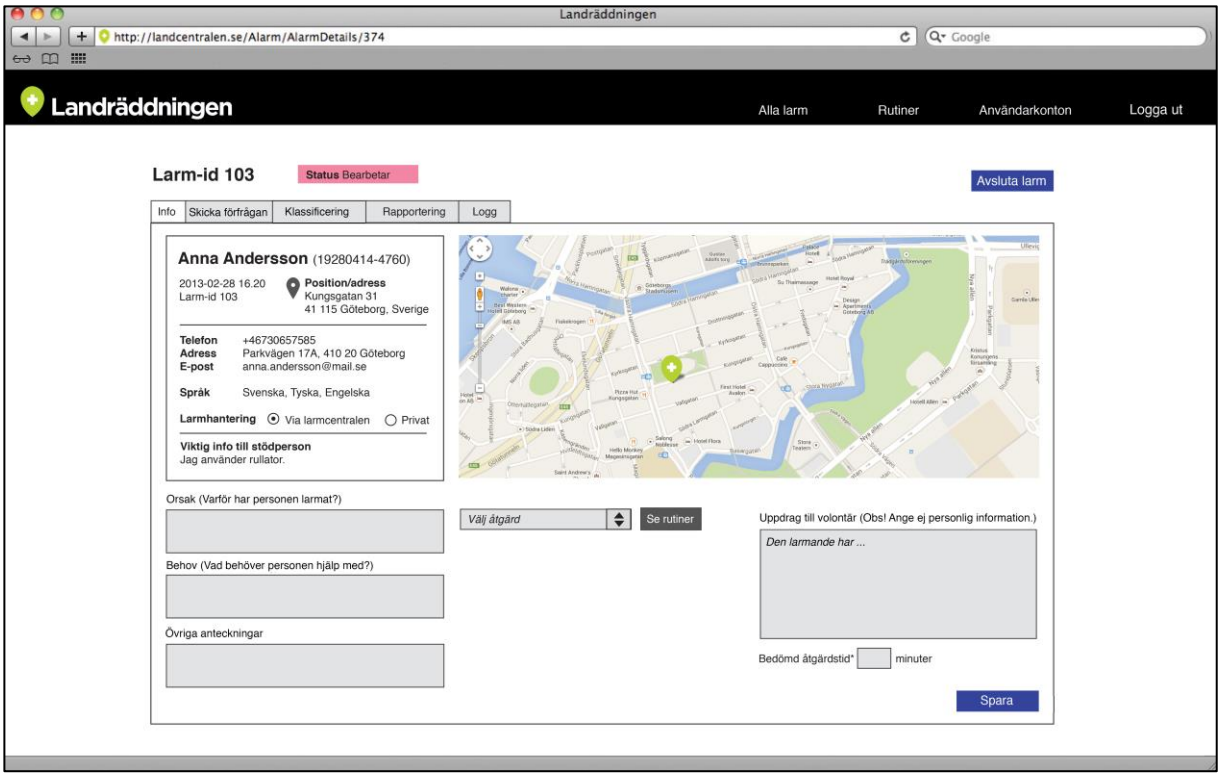


Figure 50. The first page of Reduced. The number of text boxes has been decreased. The information to the volunteer has been initiated to make it easier for the operator to formulate the text. Classification of alarm is carried out after help has been distributed.

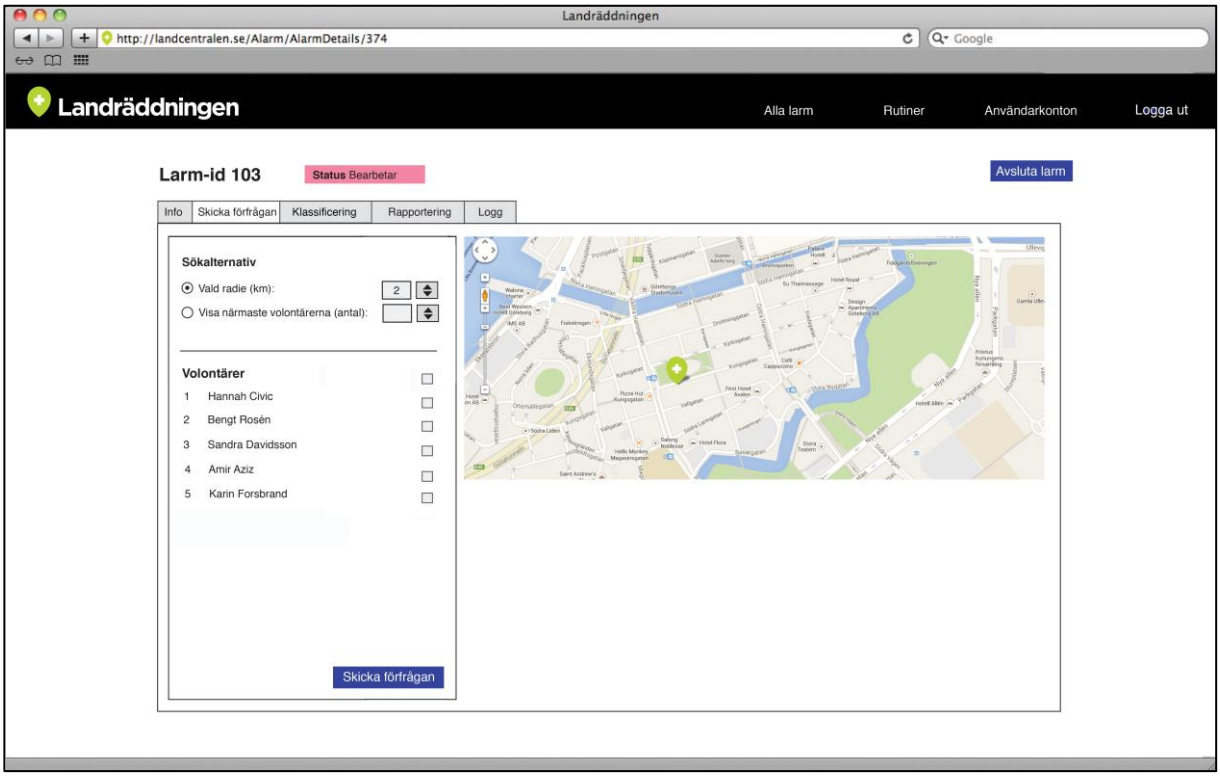


Figure 51. The second page of Reduced. Volunteer selection is made only based on distance.

8.4.3 Concept 3: Integrated

In *Integrated* the two first pages of the reference were integrated in an effort to avoid that the operator has to change between pages before the request has been sent to volunteers (see Figure 52). To fit the important elements in one page some elements had to be excluded, such as text box aimed for additional notes and classification of alarms.

Changed text boxes

Besides decreased amount of text boxes, the type of text box was changed for the information aimed to be forwarded in the request. Instead of the operator declaring estimated assistance through writing, the operator selects between different pre-determined types of situation in a scroll menu, e.g. "Support to get home". The concept assumes that such a short message in combination with estimated time of helping is sufficient to make it possible for the volunteer to determine if they are able to assist.

Reduced selection of volunteers

As it is assumed that specific criteria is not needed, volunteer selection has been reduced to only enable selection based on distance to the alarm user. By default the system will automatically list the five volunteers that are the closest to the alarm user, promoting that the request is sent more quickly and help arrives sooner to the alarm user.

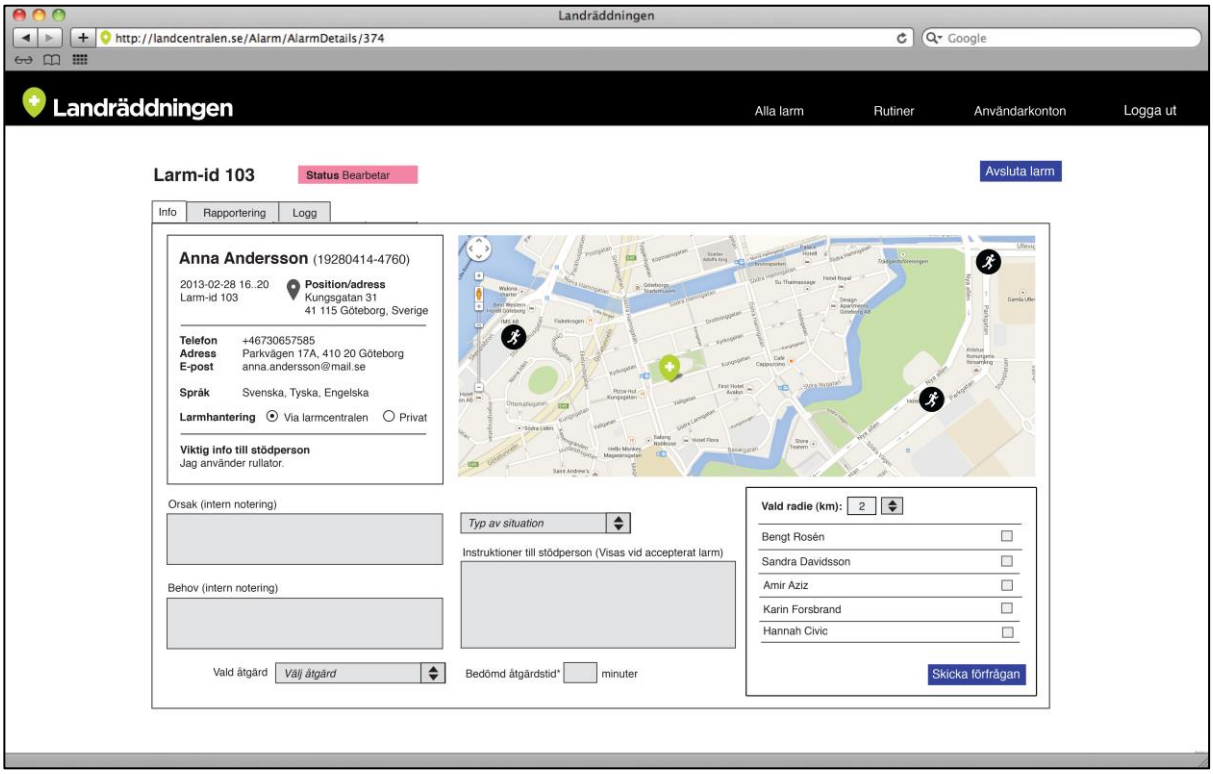


Figure 52. Integrated. The Information page and the Volunteer page are integrated. The number of text boxes that require free writing has been decreased. Volunteer selection has been reduced to only enable selection based on distance. Classification is excluded completely.

8.5 EVALUATION WITH OPERATORS

To investigate how users perceive the ideas they were evaluated with operators from the call centre. Besides aiming to receive feedback on the ideas the evaluation also intended to validate the problems that had been found during previous analyses. The evaluation took place at the call centre as a discussion where three operators and two other employees participated. They were initially asked to explain their own views of the reference interface and then to comment on the problems that had been identified during analysis (see 8.2 and 8.3). Following this they were asked to comment on the ideas (see 8.4), where the participants first were presented with the ideas one by one and thereafter shown together to more clearly point to their differences. However during the meeting it became known to the author that the operators lack experience of using the reference interface and hence would have difficulties to point to problems and to comment on the ideas. The intention of the evaluation then changed to instead focus on identifying problems of the reference interface and concepts, and to point to possible improvements that Landräddningen could take forward on their own. During the meeting notes were used for documentation. The results are presented in the following sections.

8.5.1 A lean interface is wanted

During analysis it had been recognised that the interface primarily appeared to favour documentation before quickly distributing of assistance. The operators also received similar impression and it was expressed that to firstly document cause and need, then to state estimated assistance followed by instructions, seemed excessive.

It was believed that a more slimmed interface where superfluous information, e.g. account settings, and questionable functions, e.g. volunteer selection based on preferences, are discarded was a suitable way to proceed with the development of the interface.

8.5.2 Support to retrieve important information

It was identified that the operators desired support to secure that important information was retrieved. This includes confirming that the person asking for assistance is the person that has registered to the account, and that the person is located at the position calculated by the system. It was suggested that these either could be integrated in the interface as control questions or be given in a manual that supports during interview.

To support the overall handling it was also proposed that the interface automatically change according to the different situations. For instance if it is selected "forward to ambulance", the interface should automatically say "call 112".

8.5.3 Support to make estimations and decisions

Among the initial comments on the reference interface it was asked how the operator is to estimate how long time different situations will take. This suggests that the operators require support on how to make these estimations.

It was also questioned how long time the operator should wait until it can be determined that help cannot be given as well as how many times they should send requests or how far away from the alarm user they should search on. It became apparent that the operator feels responsible to ensure that the alarm user is given assistance, or at least quickly informed when assistance is not available, and that the operator wants feedback to keep them up-to-date. It was seen valuable to be able to view the time when the alarm most previously was handled and what activity that was carried out from the alarm list, which enables the operator to directly see when the requests were sent instead of having to enter the alarm and view the *Log*. It was also desired that the operator is reminded to review the request after a specified period of time had gone. Furthermore it was found that the colours used in the reference interface to convey status of the alarm were difficult to understand and that these may need to be revised. It was also found that the operators were confused by the fact that all alarms are shown in the list, even those that are not handled by the operator such as those that have been cancelled, completed or are handled privately[54].

8.5.4 Information that could be excluded

It was confirmed that various user information and account information is irrelevant to the operator during the handling of alarms and that this information could be excluded. It was believed that the only necessary information is name, telephone number, address and spoken languages, and that the personal identity number potentially could be useful if the alarm is forwarded to emergency services – otherwise it served no point. It was believed since the information from the alarm user to the volunteer is forwarded through the system, this information does not need to be considered by the operator and could also be excluded.

8.5.5 Functions that could be excluded

It was found that the classification primarily intends to supply documentation for the research study, where the operator is to declare the location of the alarm (e.g. city, woods or countryside) and the type of alarm (e.g. medical assistance, service assistance or social contact). It was questioned amongst if the location could not be calculated by the system itself since it already calculates the position of the alarm user.

The use of search criteria was questioned among the operators. It was doubted if it truly was desired among the users to be able to specify their volunteer, and it was further acknowledged that users with such requirements unlikely would register to a service that could not ensure that such wishes are fulfilled. The operators instead identified that the most important criteria to select volunteers upon is location, although it was recognised that it is not only distance to the alarm user that is important but also how simple it is for the volunteer to transport to the alarm user.

8.5.6 Comments on the ideas

It was difficult for the operators to point to advantages or disadvantages of the suggestions compared to the reference interface, as well as the suggestions relative to each other. Overall the

[54] The system can also be used privately where the alarm user has listed friends, family or other contacts to respond to their alarms. Landräddningen does not handle these but they still appear in the alarm list.

interface concepts were claimed to appear as "simpler and more functional" compared to the reference, which somewhat promotes that they are seen as improvement. To some extent were also comments on the different suggestions achieved.

Benefits with directly showing location

Even though it was expressed that it was simple to shift between pages to e.g. review availability of volunteers, other benefits of directly showing the position of the alarm user (and volunteers) was achieved. It was claimed that directly being presented with the alarm user's position on a map gave a clearer and deeper comprehension than from just being informed of their address as in the reference interface. This was further believed to more naturally evoke questions to verify if the location is correct during the interview.

Appreciated "search for nearest volunteers"-function

The possibility to directly search for the volunteers closest to the alarm user than to search for volunteers in different distances from the alarm users was appreciated. It was expressed that the function makes it possible to view the volunteers in just one search than having to perform several searches, on different distances, until a volunteer is found.

Integration of volunteer selection into the first page

The idea to integrate volunteer selection into the first page was appreciated, though possibly due to undesired reasons. It was expressed that "the more information on less space, the better" and that they are "experts on searching for relevant information", which conflict with the usability principle *Prioritisation of functionality and information* (see 7.1.3).

8.5.7 Implications

The evaluation with operators pointed to that there were elements that potentially could be excluded from the interface. This includes information that is not meaningful to the operator during handling of alarm, volunteer selection based on preferences, skills and/or equipment, and classification of alarms. Additional requirements on the call centre interface were also found:

- ***The call centre interface should support that important information is retrieved.*** This includes confirmation of identity and location of the alarm user.

- ***The call centre interface should support following of routines.***

- ***The call centre interface should give feedback on current status in the alarm list.*** This includes informing of current alarm status and the last activity that was handled by the operator.

- ***The call centre interface should only display the alarms that are supposed to be handled by the operator.***

- ***The call centre interface should enable search for the closest volunteers.***

8.6 CONCLUSION

Analyses on the reference interface identified that few cues are available to support the operator in identifying important information during interview, evaluating which action should be taken and declaring information to potential helpers. The reference interface is thereby depended on experienced operators to ensure that each alarm is handled appropriately.

The reference interface is believed to favour documentation before quickly distributing help. To promote that help reaches the alarm user sooner there are elements of the interface that could be rearranged or excluded.

The interface concepts and ideas that were presented point to some potential changes. These could be seen as inspiration during future development of the call centre interface.

PART **03**:
DISCUSSION
AND **CONCLUSION**

9. DISCUSSION

In this chapter the project is discussed. This includes the result of the project, the process and the methods that were used and recommendations for future work.

9.1 RESULTS

The goals of this project (see 1.2.2) were met through the development of concepts of the user interface (see chapter 6-8). The questions that were formulated in the beginning of the project were addressed, and are further discussed in the following sections. This includes discussion on the users of the service, the situations that the service will need to handle, the results of the user study and the final result.

9.1.1 Users of the service

In the project it was aimed at identifying the expected users of the service. Even though everyone would benefit from being able to receive help outdoors, it was concluded that people with increased risk of being presented with situations that requires assistance could be seen as expected users. It was believed that younger, healthier and more active persons would not need to be helped as frequently and the situations when they do need assistance likely requires help from medical personnel. This conclusion is however also dependent on the current set-up that requires the alarm user to be charged for their alarms. If the function is free of charge there is a possibility that also other users would see benefit in registering as alarm users.

This project identified two groups of users, users that can understand when they need assistance and users that do not understand when they do due to cognitive disability. This identified that these groups require two different types of alarm system, one that is activated by the user respectively one that the system activates. For this project it was decided to continue with the first alternative. However there is reason to believe that there may be many users that would benefit from a system that automatically recognises dangers, activates alarms and informs respondents that help may be needed. This does not however naturally implicate that volunteers of Landräddningen should handle these situations. It was acknowledged by the experts that these situations might require specific knowledge, while it of course is beneficial that many people help to locate a missing person. The situations in which help should be distributed within Landräddningen was concluded that the initiators should decide upon. If it is wanted that Landräddningen also handle these users such functions need to be incorporated.

9.1.2 Situations of Landräddningen

There are several situations of varying degree of severity when help may be needed. However these situations does not implicate the situations where help should be given from volunteers of Landräddningen. It was acknowledged that the situations where help is needed might not reflect the situations when the volunteer is willing to assist. It was found that volunteers are neither willing to assist in situations that are unharmful to the alarm user's well-being nor during

situations that are too dangerous (the end points of this span are though difficult to define given that the willingness to assist also depends on the current activity of the volunteer). However, given that situations that require medical care should be performed by trained personnel there is a risk that the situations where the volunteer could be asked to assist in does not fit the situations that volunteers are willing to assist in. It was though concluded that the situations in which help should be given to the alarm user need to be decided upon by the initiators of Landräddningen.

There is a difference in the situations help may be needed and the situations when help will be asked for. Reluctance to seek assistance from unknown people may hinder the willingness to alarm and have the effect that assistance is only sought during critical situations, which may require assistance from emergency services instead of from volunteers of Landräddningen.

9.1.3 Results from user studies

The results of the user studies primarily pointed to generic requirements that may be set on an organisation that provides personal assistance through volunteering. This is likely an effect of that the author was not permitted to inform of Landräddningen due to confidentiality reasons. There is thereby a possibility that other results could have been retrieved if it had been possible to inform of the complete idea of Landräddningen.

The user studies revealed that there are worries to use the service. This include worry of not being given assistance due to insecure availability of volunteers and undefined situations when help can be received, worry of being given incorrect assistance due to untrained volunteers and fear of being assaulted by unfriendly persons. To attract users to Landräddningen these worries need to be counteracted, which paradoxically requires that users already use the service and that their alarms have been handled with success. Some aspects could be addressed before this. This include informing of which situations help can be received and ensuring that the volunteers possess required knowledge and that they are fit to provide assistance. To ensure that help is available is however more difficult. (Especially this concerns areas of few people, such as the countryside. Paradoxically it is in these areas where help most likely would be needed from Landräddningen as the probability of being noticed and helped by someone passing by, not volunteer, is higher in areas where there are more people circulating.) The likelihood that the volunteers decide to assist will however be increased if they have been informed of the situations they may be asked to assist in and have agreed to these pre-conditions.

It was further acknowledged that there is a difference to feel trust towards an organisation and their representatives compared towards a private person. This has impact on the need for presenting the volunteer to the alarm user. If the volunteer is seen as a representative of a well-reputed organisation, the importance to communicate exactly whom is coming becomes less important as the volunteer feeds on the reputation of the organisation. Potentially there is not even a need to communicate the name of the volunteer and that it is sufficient to convey that a "land rescuer" comes to assistance. However, if the organisation instead is seen to distribute private persons, presentation of the specific person becomes more important to promote that that the alarm user feels safe.

9.1.4 The 'app'

The final concept of the smartphone application is thought to include the most important functions, which are to alarm in need of assistance and to view information on each alarm. It is believed that the possibility to view current alarm status, to view the other users of the alarm and to communicate with these contributes to that both the alarm user and the volunteer feel safer. During the usability tests it was identified that it also was simple to use.

The application needs to be combined with another solution to ensure that alarms can be activated during stressed situations. During ideation some ideas were generated that has potential in fulfilling these goals. Though it was for this project decided to not further elaborate on this due to the limited time that was available.

The alarm user's possibility to use the various functions of the smartphone application may be limited during alarms. This e.g. includes the function to call another user from the map or to view users from the telephone list. It could be suggested that these functions are made more accessible through for instance additional pages. Since it was judged that that this information might not even be critical to the alarm user during these situations and the current integration seemed most convenient it was decided to not elaborate on this. Similarly it may be suspected that the alarm user might fail to report when they have received assistance and no longer need assistance, respectively when the volunteer has arrived at the location of the alarm user and when he or she has finished helping the alarm user. To avoid this it was investigated if the report function could be integrated in the other three tabs, which would result in that the function always is available to the user. It was also evaluated if the volunteer should have the possibility to finish alarms directly, without the alarm user. However the three-page idea was rejected since it was assessed to conflict with the main function of the page and to contribute to a cluttered design, which is undesired for a user interface that has to communicate information clearly. The idea of the volunteer ending alarms directly was also excluded since it was concluded that the volunteer should not be able to end another user's alarm. Hence, the problem of users failing to report is left for future work.

The service may contribute to false security if it is believed that one cannot be harmed when using the system. It should be noted that the system does ensure that a person is not injured but it increases the possibility that help can be received if such a situation occur.

There is a risk that volunteers may feel less motivated if they know that there are other volunteers who have agreed to help (which will be the effect of presenting these in the application). It was however decided that the possibility to communicate with other volunteers is more important than risk of decreased motivation. Moreover there is a risk that the volunteer feels lured if they from the request receive the impression that specifically *their* assistance is needed and they later found that other volunteers also have been addressed. These are issues that the organisation may need to attend to.

9.1.5 The call centre interface

The aim of the development of the call centre interface changed during the project. Initially it was intended at delivering an interface that is intuitive, promotes that help is distributed quickly and that the respondent, the volunteer, easily understands the information that is communicated through the interface. However, since it late in the project was recognised that there were many uncertainties related to the call centre interface (e.g. the situations where help will be given, the need of various functions and that the operators had no experience of the reference interface) it was decided to instead point to overall opportunities for improvement.

9.2 PROCESS & METHODS

The process of the project and methods used are discussed here.

9.2.1 Process

Overall the project has followed a typical design process where a problem first is investigated followed by a development phase were solutions are generated and then evaluated. However several activities were carried out parallel and several iterations have been necessary to come to the conclusions that have been made in this project. For instance, the second part of the user studies chapter was performed parallel to the ideation phase and initial development of the app. This was an effect of that it was not until the ideation that the spectrum of the service was addressed that contributed to the understanding of the service and identified which problems that should be attended to within the project. It was also not until development of the user interfaces that it became known which implications that the requirements have on the use, which initiated further analysis. The development of the smartphone application and the call centre interface have also had to be performed concurrently since they affect each other, for instance through that the information retrieved by the operator will appear on the volunteer's screen. To have to regard how an idea of an interface affects another interface has to some extent been experienced as limiting. Possibly the end result would have landed in another design if these had not affected each other.

9.2.2 Analyses during the project

Since the idea of Landräddningen was new to the author and it was found that a study on user needs yet had not been performed, it was believed that a thorough analysis was necessary before the concept development could begin. For this reason the project was initiated by an analysis phase that involved several steps. This included analysis on the background problem, which e.g. involved identifying what type of assistances that can be received from social services, what type of assistance that can be received outdoors and why mobile safety alarms are not more common. Thereafter the overall requirements on the service as well as to who the potential user may be were investigated through e.g. interviews with experts. The roles of the alarm user, the call centre operator and volunteer was then addressed through interviews with potential users to identify their requirements on the service and the user interfaces. After that additional analysis was carried out aiming to identify requirements that are set on the system and the user interfaces

during alarms. Also the ideation phase developed into an additional phase of analysis that identified which problems that should be attended to within the project.

In relation to the extensive analysis that had been carried out it may be noted that relatively little time has been spent on concept development. To be able to develop user interfaces that are intuitive, efficient and pleasant to use, which was aimed for, more time should preferably have been spent on development.

9.2.3 User interfaces to an undefined service

It was initially determined that the project should develop the user interfaces to the service and not attempt to develop the organisation or the service. However to develop user interfaces to a service that is yet not defined has been challenging. The fact that the initiators of the organisation had not specified the situations in which help should be received affects the service and the user interfaces on several aspects. This includes the fear of not being helped, which increase the need for being informed of alarm status from the user interface. This also affects the amount of information that could be presented to the alarm user, and likely also the amount of information that is wanted from the alarm user. The likelihood that the volunteer decides to assist will also be increased if they have been informed of the situations they may be asked to assist in before registering. The situations further affect the skills that the volunteer need to possess. (Regarding this issue there further is a conflict in wanting high competences and at the same time ensuring availability of volunteers.) Also the possibility to design the call centre interface according to routines is affected by the situations where help is given as well as to how other situations should be handled.

If it had been defined which situations help is distributed it would have been possible to develop the user interfaces according to these. Since this was not the case, and it was believed that these situations should be decided by the organisation, it was decided to develop the user interfaces independent to the situations the service will handle.

9.2.4 Involvement of participants in the project

Throughout the projects it has been seen necessary to involve external resources to retrieve information during interviews, tests and evaluations. This has involved many interviews, of which not all are presented in this report but has contributed to the overall result. In total have about 60 persons participated in the project, of which some have been asked to partake multiple times. The selection of participants likely had impacts on the result, which is discussed here.

Pre study

Experts were interviewed to identify overall requirements on Landräddningen, potential alarm users and situations where these may need assistance. The experts named users that fit their field of knowledge, such as seniors that see value in being able to alarm for assistance during unexpected situations and persons with disabilities. It may be suspected that other groups would have been identified if their expertise encompassed other subjects. However it is believed that the identified groups likely are the groups that would benefit the most from Landräddningen.

User study

The pensioners that participated in the focus groups knew each other and the interviewer, which may have affected the result both positively and negatively. The fact that the participants were well acquainted may have produced a climate where all participants feel comfortable to declare their thoughts. Though it could also be the case that it is more difficult to speak their mind in fear of being perceived in a certain way. It may also have been the case that the participants tried to deliver the result they thought the author wanted instead of true opinions. Despite these possible effects it is believed that the focus groups revealed findings that can be trusted.

The parents that participated in interviews were found through personal contacts and online forums for parents of children with cognitive disabilities. Among the participants that were found through online forums there is reason to believe that these represent extremes, which make them more interested in contributing to solutions that could help them. Hence the stories told might not reflect the average families where there is a child with cognitive disabilities.

The participants that were interviewed as potential volunteers constituted of friends and family of the author. This may have affected the participants' abilities to speak their mind in fear of being perceived as uncompassionate by the author or by fellow participants, although the author tried to create a climate that encouraged different thoughts. Furthermore as it initially was seen that no specific requirement was needed to take the role as volunteer, no specific selection was made on participants. Afterwards, when it has been acknowledged that the volunteer likely need to be someone that can sacrifice private activities to help the person in need, it may be the case that the participants of the study do not reflect the typical volunteer of Landräddningen. The findings of the interviews instead point to barriers that may make it difficult to recruit volunteers from the general population, which however also are important to regard.

Usability tests

Since it was difficult to find participants that fit the expected alarm user category, i.e. seniors that want the possibility to receive assistance during unexpected situations through a smartphone application, most usability tests were performed with younger participants. This most likely affected the outcome of the tests that primarily found smaller problems related to intuitiveness. For this reason it would have been valuable if it had been possible perform tests with more participants that represent the expected alarm user, which would likely have identified other difficulties such as manoeuvring and readability.

The test participants constituted of persons that knew the author, which may have impacted the result. They may have been more positive towards the application that was shown to them, or the opposite – that they were more incline to point to difficulties with the agenda to help the author to find opportunities for improvements.

Surveys

To investigate how the request should be formulated and designed to promote that the volunteer decides to assist as well as to evaluate how to design the application to ensure coherence to the graphical profile, surveys were sent to private contacts of the author. In total were twelve responses received, which is too few to be able to come to conclusions even though some

common tendencies could be recognised. To increase reliability it would have beneficial if more answers had been retrieved. Initially it was attempted to achieve this via an online survey. However since it was difficult to include desired questions it was instead decided to send the surveys as documents via e-mail. The validity of the test results should also be taken with consideration given that they constituted of self-estimations. Besides that the respondent may have difficulties to response truthfully in fear of being perceived in a certain way, it may also be difficult to tell exactly how one would act in reality. Furthermore it was commented that the different alternatives on e.g. graphical style were very similar. This made it difficult for the respondent to assess the alternatives separately and it may be believed that the respondents selected their answers based on their previous answers.

9.3 FUTURE WORK

Recommendations for Landräddningen, the smartphone application and the call centre interface are declared in this section.

9.3.1 Landräddningen

The initiators of Landräddningen need to define what type of assistances they aim to deliver and to communicate these situations to potential alarm users and volunteers. This enables the alarm user to evaluate if they can receive assistance during the situations they wish to and the volunteer to determine if they are willing to assist during the pre-determined situations, which promotes that they decide to assist when requests are received.

The initiators need to formulate routines on how different alarms should be handled to promote that the alarm user is given suitable assistance. This includes the handling of what is expected as more common alarms, such as fall accidents, dizziness and fatigue, but also the handling of emergencies, silent alarms and social alarms. This likely requires collaboration with functions such as the emergency services, the home care services and other non-profit organisations.

Depending on the services Landräddningen decides to deliver there may be a need for ensuring that the volunteers possess required knowledge to assist in these situations and that they have the right mindset for providing personal assistance. To secure that the volunteers acquire these qualifications the organisation may need to provide possibilities for the volunteers to become confident in their role and perform activities that certifies their knowledge. However, whether or not the volunteers will require specific knowledge and how these should be secured remains to the organisation to determine. Potentially it may be suggested all situations that require specific skills should be forwarded to social functions and that the volunteer should only be asked to assist to their capacity.

It is important that the organisation recruits many volunteers and that these are distributed over the country to promote that help always is available anywhere. A problem related to this may further be that the need of help will likely be higher in areas where there are few people, thus few volunteers, circulating. In the beginning it may be difficult to ensure help and that there may be a need for providing assistance through other ways. Also it is suggested that the organisation starts

in a smaller scale within a limited geographical field to thereafter start similar start-ups on other locations, which finally would lead to that Landräddningen will be accessible to all Swedes. Through their pilot study that currently is being performed in Västerås, Landräddningen has already started a strategy in line with these thoughts.

A person should not need to have separate alarm systems to be able to alarm for assistance inside the home respectively outdoors. This will also require Landräddningen to cooperate with the home care services that handles personal social alarms and with the emergency services. These functions could possibly have a common solution that can be used to alarm during various situations when help is needed, where the call centre operator then forwards the alarm to suitable function.

9.3.2 The app

To assess if the final smartphone application is considered as more intuitive compared to the version that was evaluated through usability tests new tests should be made.

It is believed that alarm activation through an alarm button inside the application is not sufficient to secure that alarms can be activated during different types of situations. Alternative ways of activating alarms should preferably be further looked into. It is believed that some ideas that was identified in this project has potential. Since restrictions within operative systems change over time it should also be looked into if it will be possible to use existing features of the smartphone to activate alarms. In the near future it may be possible to use physical buttons as alarm buttons or to place an alarm button in the control panel, which would make the function more accessible.

It was decided to not further investigate how the notification should be designed to promote that the volunteer quickly understands that their help is needed. That the volunteer quickly grasps that their help is wanted is though important and should preferably be further looked into during future work.

The smartphone application communicates current alarm status through visual feedback. This may though be difficult to perceive during stressed situations when the vision is unclear. To promote that current status is understood also during these situations haptic and auditory feedback could be investigated.

To promote that the volunteer decides to assist was to some extent addressed in this project. Through a survey with 12 respondents it was investigated how motivation could be achieved through the design of the request. Though, to be able to determine details of the request more participants are needed. Other ideas of recruiting volunteers and creating motivation to assist were also identified, although not all of these were taken further in this project. Potentially could the ideas of creating a social forum associated to Landräddningen be something to further look into. For instance could assistances be shared to other volunteers through a "news feed" and through synchronisation with other social media there is a possibility to could encourage new volunteers.

Additional functions could possibly also be included in the application, e.g. a message function that enables volunteers and alarm users to communicate via chat.

9.3.3 The call centre interface

Before initiating further development of the call centre interface the initiators should preferably evaluate if there are elements of the reference interface that could be excluded. In this project it was recognised that the possibility to sort volunteers based on preferences, capabilities and equipment might not be needed and that classification of alarms potentially could be automatically handled by the system or at least carried out after help has been forwarded. It was also identified that there is information presented that is not used by the operator, such as account information and contact information. If it is found that these elements could be eliminated there is a possibility to design the call centre interface to promote that assistance is distributed more quickly.

After determining which functions the interface needs to have and redesigning the interface to only include these functions it will then be possible to evaluate ease of use and to point to opportunities for improvement. Tests should be made with operators early in the process and consulted with throughout the development.

Possibly it could be investigated if a more interactive interface could be achieved, which automatically adapts to the specific alarm.

Related to the development of routines it should also be assessed how much time the operator should wait before it can be concluded that help is unavailable. It should also be determined how far away from the alarm user that help can be searched for. These should then be integrated in the interface as reminders and recommendations or constraints.

The alarm list should preferably be revised to promote that current status of the alarm is understood more easily. For instance columns could be rearranged, names of columns could be changed and additional columns could be included, for instance one that informs of the last activity that had was performed and the time of this activity. Also the colouring that conveys alarm status should be revised as it was found that these were difficult to comprehend. Moreover the alarms that are not handled by the call centre should preferably be hidden to the operator.

10. CONCLUSION

The project identified requirements that are a set on a service that provides assistance to people in need through volunteering. This include requirements on ensuring that help is available, that the volunteers are suitable to give help and that routines have been established to ensure that that correct assistance is forwarded. Most important to the alarm user is that they can easily alarm and to be given assistance when such a situation occurs. Since help from volunteers cannot be guaranteed the alarm user needs continuous information on their alarm. The volunteer wants to assist during situations when *their* help is needed and needs to be given information on the assistances they are asked to provide, to whom and where. The call centre operator demands an interface that stimulates that necessary information is retrieved during interview with the alarm user, promotes that help is distributed quickly to the alarm user and that enables direct evaluation of current alarm status.

A concept of the user interface to a smartphone application that is to be used by the alarm user and the volunteer was developed. In the application the alarm user can alarm for assistance and view information on their alarm. This e.g. includes the status of their alarm, enabling the alarm user to understand where in the process of receiving help he or she is. The volunteer can see incoming requests of assistance and view the alarms they have agreed to assist in, where the volunteer can assess what assistance they are asked to provide, to whom and where. Through usability tests it was identified that the concept is intuitive to use. Concepts to the call centre user interface were also developed. These can be seen as inspiration for the future development of the call centre interface.

To conclude, the smartphone application concept provides an opportunity for everyone to take part in the society while feeling safe, confident and in control.

REFERENCES

1177 Vårdguiden (2012a). [Online] Available at <http://www.vardguiden.se/Sjukdomar-och-rad/Omraden/Sjukdomar-och-besvar/Fallskador-hos-aldre/> [Accessed: 2013-02-02]

1177 Vårdguiden (2012b). [Online] Available at <http://www.1177.se/Fakta-och-rad/Behandlingar/Hjart-lungraddning-HLR/> [Accessed: 2013-03-15]

Adlin, T. and Pruitt, J. (2010). *The Essential Persona Lifecycle – Your Guide to Building and Using Personas*. Burlington: Elsevier Inc.

Afolabi, O. A. (2013). Roles of Personality Types, Emotional Intelligence and Gender Differences on Prosocial Behaviour. *Psychological Thought*, Vol 6, No 1, pp124-139.

Arthur, C (2011). iPhone keeps record of everywhere you go. *The Guardian*. [Online]. Available at <http://www.theguardian.com/technology/2011/apr/20/iphone-tracking-prompts-privacy-fears> [Accessed: 2013-06-03]

Bénabou, R. and Tirole, J. (2013). Incentives and Prosocial Behaviour. *The American Economy Review*. Vol 96, No 5, pp 1652-1678.

Böhme, R. and Köpsell, S. (2010). Trained to accept? A field experiment on consent dialogs. In: *CHI 2010: 1001 Users*. Atlanta, USA, 10-15 April 2010.

Clarke, R. (2001). Person location and person tracking – Technologies, risks and policy implications. *Information Technology & People*, Vol. 14 No 2, pp.206-231.

The Data Inspection Board (2013). [Online] Available at <http://www.datainspektionen.se/lagar-och-regler/personuppgiftslagen/> [Accessed: 2013-06-02]

Demenscentrum (2013). [Online] Available at <http://www.demenscentrum.se/Fakta-om-demens/Vad-ar-demens/> [Accessed: 2013-02-02]

Falzone, A. (2013). Regulation and Technology. *Harvard Journal of Law & Public Policy*, Vol. 36, No 1, pp 105-107.

Federal Aviation Administration (2012). [Online] Available at <http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/gps/> [Accessed: 2013-06-03]

Fischer, P. et al (2006). The unresponsive bystander: Are bystanders more responsive in dangerous emergencies? *European Journal of Social Psychology*. Vol 35, pp 267-278

Harding, T. (2012). *Framtidens Civilsamhälle. Underlagsrapport 3 till Framtidskommisionen*. Stockholm: Elanders Sverige AB.

Jordan, P (1998). *An Introduction to Usability*. London/Bristol. Solna: Prevent.

Karlsson, M. (2007). Lyssna till kundens röst. *MMT015 Produktutveckling: behov och krav*, Intititute of Product and Production Development, Division Design and Human Factors, Chalmers University of Technology [unpublished].

Lindahl, L (2013). *Om Görbra – Utvärdering av ett försöktsprojekt inom ramen för Göteborgs Stads strategi för äldres boende.* Göteborg: FoU i Väst/GR

Melander-Wikman, A., Fältholm, Y. and Gard, G. (2008). Safety vs. privacy: elderly persons' experiences of a mobile safety alarm. *Health and Social Care in the Community*. Vol 16, No 4, pp. 337-346.

Melander-Wikman, A & Gard, G (2006). Mobilt larm och rörelsefrihet – Upplevelser av ett mobilt trygghetslarm. [Research Report]. Luleå University of Technology

Missing People Sweden (2013). [Online] Available at <http://missingpeople.se/> [Accessed: 2013-03-13]

Mossler, K. and Höjgård, U. (2001). Avgifter och minskade serviceinsatser: Tillgodoses äldres behov? *Välfärdsbulletinen.* No 2, pp. 10-11.

The Mountain Safety Council of Sweden (2013). [Online] Available at <http://www.fjallsakerhetsradet.se/Fjallomradet/fjallraddning/> [Accessed: 2013-04-18]

Natt och Dag, N (2010). 5 tekniker som bestämmer din position. *PC för alla.* [Online] Available at <http://www.idg.se/2.1085/1.296404/5-tekniker-som-bestammer-din-position> [Accessed: 2013-06-03]

The National Board of Health and Welfare (2007). [Online] Available at <http://www.socialstyrelsen.se/etikisocialtjansten/arpromenaderanhorigasellerhemt> [Accessed: 2013-05-29]

Natur och Kultur (2013). *Natur och Kulturs Psykologilexikon.* [Online]. Available at <http://www.psykologiguiden.se/www/pages/?ID=234&Psykologilexikon> [Accessed: 2013-06-28].

Osvalder, A. and Ulfvengren, P. (2008). Människa-tekniksystem. In: Bohgard, M et al. (2008). *Arbete och teknik på människans villkor.* Stockholm: Prevent, pp.339-422.

Osvalder, A., Rose, L. and Karlsson, S. (2008). Metoder. In: Bohgard, M et al. (2008). *Arbete och teknik på människans villkor.* Stockholm: Prevent, pp.463-566.

Our Mobile Planet (2014). [Online]. Available at <http://think.withgoogle.com/mobileplanet/sv/> [Accessed: 2014-06-25]

Penner et al (2005). Prosocial Behaviour: Multilevel Perspectives. *Annual Review of Psychology.* Vol 56, pp 365-392.

Personal Data Act (1998:204) [Online]. Available at <http://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Personuppgiftslag-1998204_sfs-1998-204/?bet=1998:204> [Accessed: 2013-06-07]

Plaza, I et al. (2011). Mobile applications in an aging society: Status and trends. *The Journal of Systems and Software*, 84 (2011), pp 1977-1988.

Sager, T (2008). Freedom as mobility: implications of the distinction between actual and potential traveling. In Bergmann, S et al (2008). *Spaces of Mobility. Essays on the planning, ethics, engineering and religion of human motion.* King's Lynn: Biddles Ltd. Chapter 10.

Sauro, J (2011). Do Users Read Licence Agreements? *MeasuringUsability.com* [blog] Available at <http://www.measuringusability.com/blog/eula.php> [Accessed 2013-05-29]

Small, D. et al (2007). Sympathy and callousness: The impact of deliberative thought on donations to identifiable and statistical victims. *Organisational Behaviour and Human Processes,* Vol 102, pp 143-153.

Small, D.A. and Loewenstein, G. (2003). Helping a Victim or Helping the Victim: Altruism and Identifiability. *The Journal of Risk and Uncertainty.* Vol 26, No 1, pp 5-16.

SMS-livräddare (2013). [Online] Available at <http://www.smslivraddare.se/> [Accessed: 2013-04-20]

Stanton, N.A. et al. (2013). *Human factor methods: a practical guide for engineering.* 2nd edition. TK International Ltd: Padstow, Cornwall.

Statistics Sweden (2013). The Future Population of Sweden 2013-2060. [Pdf] Available at <http://www.scb.se/Statistik/BE/BE0401/2013I60/BE0401_2013I60_SM_BE18SM1301.pdf > [Accessed: 2013-06-03]

Stickdorn, M. & Schneider, J. (2012). *This Is Service Design Thinking.* New Jersey: John Wiley Sons

Stürmer, S. and Snyder, M. (2010). Helping "Us" versus "Them": Towards a Group-Level Theory of Helping and Altruism Within and Across Group Boundaries. *In The Psychology of Prosocial Behaviour,* pp 33-58. Blackwell Publishing Ltd

The Swedish Institute of Assistive Technology (2013). *Digitala trygghetslarm – ny teknik i nya infrastrukturer.* [pdf] Available at: <http://www.hi.se/en/Activities/Projects-Current-and-Ended-projects/Ended-projects/Digitala-trygghetslarm1/About-the-program/> [Accessed: 2013-06-02]

The Swedish Police (2012). [Online] Available at <http://www.polisen.se/Norrbotten/Om-polisen/Sa-arbetarPolisen/Specialkompetenser/Fjallraddarna/>[Accessed: 2013-04-18]

The Swedish Sea Rescue Society (2013). [Online] Available at <http://www.sjoraddning.se/> [Accessed: 2013-03-13]

Telenor Sverige AB (2013). [Online] Available at <http://www.telenor.se/privat/kundservice/tjanster-och-tillagg/sakerhetstjanster.html> [Accessed 2013-06-03]

Tidwell, M (2005). A Social Identity Model of Prosocial Behaviors Within Nonprofit Organizations. *Nonprofit Management & Leadership,* Vol 15, No 4, pp: 449-467

Ulrich K.T. & Eppinger, S.D. (2003). *Product Design and Development*. Third Edition. Singapore: McGraw-Hill/Irwin.

Volontärbyrån (2012). *Volontärbarometern.* [pdf] Available at http://www.volontarbyran.org/wp-content/uploads/2013/07/Volontarbarometern-2012.pdf [Accessed: 2013-06-02]

Volontärbyrån (2013). [Online]. Available at <http://www.volontarbyran.org/> [Accessed: 2013-06-02]

Zarsky, T.Z. (2004). Desperately Seeking Solutions: Using Implementation-based Solution for the Troubles of Information Privacy in the Age of Data Mining and the Internet Society. *Maine Law Review,* Vol. 56, No 1, pp 14-59.

Images

da Silva Parreira, A. (2009). *Woman smiling at camera*. [image online]. Available at: <http://www.freeimages.com/photo/1170492> [Accessed: 2014-10-30]

Geloo (2009). *Beautiful girl.* [image online]. Available at: <http://www.freeimages.com/photo/1164854 > [Accessed: 2014-10-30]

Horton, N. (2007). *Man smiling in the summer sun.* [image online]. Available at: <http://www.freeimages.com/photo/850658> [Accessed: 2014-11-10]

Landräddningen (2013). [screenshot from website]. Available at: <http://www.landraddningen.se> [Accessed: 2013-10-02]

Landräddningen (2014). [screenshot from website]. Available at: <http://www.landraddningen.nu/aktuellt/nyheter/> [Accessed: 2014-02-13]

Yasnogorodskaya, N. (2007). *Smile.* [image online]. Available at: <http://www.freeimages.com/photo/764343> [Accessed: 2014-11-10]

APPENDIX

APPENDIX I. EXAMPLE OF INTERVIEW GUIDE WITH EXPERTS

Summary of questions:

Q1	Background information on interviewee
Q2-10	View on Landräddningen
Q11-15	Mobile safety alarms
Q16-17	Ethics of positioning
Q18-21	Situations

1. *Vad är din titel och roll?*
2. *Vad tycker du om helhetsidén kring Landräddningen, med att bygga upp en ideell organisation där vanliga människor hjälper andra människor?.*
3. *Vad ser du som de största fördelarna med detta?*
4. *Ser du några risker?*
5. *Ser du en risk med att personer utan medicinsk utbildning bistår med hjälp?*
6. *Ser du risker med säkerheten för den som behöver hjälp eller för den volontär som är tänkt bidra med hjälp?*
7. *Vad tror du om acceptansen för att motta hjälp från någon okänd? Vill man ens söka hjälp från någon man inte vet vem det är?*
8. *Hur tror du anhöriga ser på att en volontär hjälper exempelvis ditt barn eller din pappa?*
9. *Finns det situationer då det är olämpligt att en volontär används? Vilka?*
10. *Finns det situationer då endast anhöriga bör användas? Vilka?*
11. *För att larma är ju tanken att man ska antingen kunna använda sig av vanliga mobila trygghetslarm med GPS eller med en app i sin smartphone. Vilka fördelar respektive nackdelar ser du med de olika alternativen?*
12. *Vet du hur vanligt smartphones är bland äldre? (Vart kan jag ta reda på det?)*
13. *Vet du någon statistik på hur vanligt det är med mobila trygghetslarm idag? (Vart kan jag ta reda på det?)*
14. *Tror du att det finns ett stort behov för att kunna larma utanför hemmet?*
15. *Vad tror du är anledningarna till att inte är vanligare än vad det är?*
16. *Det pågår en debatt kring om GPS-spårning är etiskt riktigt eller inte. Hur ser du på detta?*
17. *Vet du hur äldre ser på att bli spårade?*
18. *Det finns en mängd olika situationer då man kan tänka sig att ett larm skickas, vilka tror du är de vanligaste?*
19. *Vad ser du som problematiskt med dessa situationer?*
20. *Vilka grupper tror du skulle ha nytta av en sådan tjänst?*
21. *Jag har utformat några stycken användningssituationer som jag tänker mig kan uppstå och skulle gärna få dina kommentarer kring dessa.*
    a. *Äldre man med demens som har gått vilse på sin promenad.*
        - *Vad är viktigt att tänka på för att mannen ska kunna larma?*
        - *Är det på något sätt olämpligt att en volontär hjälper personen?*
        - *Hur bör man som person tänka när man ska hjälpa en person med demens?*
        - *Finns det några sätt som kan göra upplevelsen mindre obehaglig?*
        - *Vad bör man som volontär veta för att kunna hjälpa personen?*

b. *Äldre kvinna som välter omkull med sin rullator och behöver hjälp upp och stöttning hem.*
   - *Är detta en situation som bör hanteras av denna tjänst?*
   - *Är det på något sätt olämpligt att en volontär hjälper personen? (Ambulans?)*
   - *Vad är viktigt att tänka på för att kvinnan ska kunna larma?*
   - *Vad bör man som volontär veta för att kunna hjälpa personen?*
   - *Finns det några sätt som kan göra upplevelsen mindre obehaglig?*

c. *Pojke med Downs syndrom har försvunnit.*
   - *Är detta en situation som bör hanteras av denna tjänst?*
   - *Är det på något sätt olämpligt att en volontär hjälper personen? (Anhörig?)*
   - *Om en volontär används, vad är viktigt att veta för att volontären ska kunna hjälpa pojken?*
   - *Vad är viktigt att tänka på för att pojken ska kunna larma? Eller tror du mer på att man som anhörig ska kunna spåra?*
   - *Generellt kring hantering av personer med kognitiv funktionsnedsättning, är detta något som bör hanteras av denna tjänst?*

d. *Ung kvinna på väg hem på kvällen och känner sig otrygg.*
   - *Är detta en situation som bör hanteras av denna tjänst?*
   - *Är det på något sätt olämpligt att en volontär möter upp och följer kvinnan till sitt hem?*
   - *Om det skulle hända något, bör larmet gå till SOS Alarm bara eller kan det tänkas att en volontär kan användas också?*

e. *Medelålders man löptränar i skogen och trillar omkull och skadar foten.*
   - *Är detta en situation som bör hanteras av denna tjänst?*
   - *Tror du att mannen i denna situation vill vända sig till en sådan här organisation?*

f. *Flicka på väg hem efter träningen, oroliga föräldrar*
   - *Är detta en situation som bör hanteras av denna tjänst?*

APPENDIX II. FOCUS GROUP GUIDE

Summary of questions:

Q1-8	Situations when help may be needed
Q9-11	Current systems
Q12-15	Ethics of positioning
Q16-22	Situations of Landräddningen

INLEDANDE FRÅGOR

1. I vilka situationer känner ni till där man använder man teknik för att skapa trygghet?

2. I vilka vardagssituationer tänker ni att man kan känna sig otrygg?

3. I vilka vardagssituationer tror ni det finns ett behov att komma i kontakt med hjälp? (Både allvarliga och mindre allvarliga situationer.)

4. Om vi inriktar oss mot situationer som kan uppstå utanför hemmet, när kan det då finnas behov att få hjälp? (Exempelvis när det hänt en olycka, om man blivit överfallen eller om man har svårt att hitta hem.)

5. Finns det speciella platser eller tider på dygnet som är mer otrygga än andra?

(Exempelvis mörka parker, vägar där det kör mycket bilar, kvällar)

6. Finns det speciella aktiviteter som är mer otrygga än andra? (Exempelvis att promenera, springa, rida, klippa gräset.)

7. Om det skulle hända något, hur kan man få hjälp? (Ex. ambulans, anhörig, hemtjänst, förbipasserande?)

8. Hur skulle ni gå till väga ifall ni exempelvis halkade omkull på er promenad och har svårt att resa er?

9. Vilka produkter och tjänster känner ni till som man skulle kunna använda för att meddela någon om att man behöver hjälp?

10. Hur vanligt tror ni det är att man oroar sig, jämfört med att det faktiskt händer något?

11. Finns det grupper som oroar sig mer än andra, antingen för sin egen trygghet eller för någon annans? (Exempelvis anhöriga, föräldrar)

INTEGRITET

Idag finns det en mängd olika tjänster som används för att skapa trygghet och ge möjlighet att larma. Förutom larm som används inom äldreomsorgen finns det även personlarm som används av ensamarbetare, det finns överfallsalarm som kan meddela närstående om att något hänt, det finns GPS-västar som används för att förhindra att dagisbarn försvinner och det finns mobila trygghetslarm som används för att kunna hitta personer som har svårt att orientera sig.

12. Vad är er inställning till dessa olika larm?

13. Är det okej att man ska kunna spåra andra människor? I vilka situationer är det okej och inte okej?

14. Skulle ni tycka att det vore okej att era anhöriga kan se vart ni är, för att minska deras oro?

15. Tror ni att det kan finnas ett verkligt behov av att kunna se vart sina anhöriga är, eller är det ett behov som uppkommit på grund av att tekniken idag möjliggör detta?

TJÄNSTEN

16. Om vi tänker på situationer utanför hemmet där man kan behöva hjälp men som inte är så pass allvarliga att det klassas som en nödsituation. Hur hade ni då sökt hjälp?

17. Säg att situationen är som sådan att det inte finns någon anhörig tillgänglig, hur hade ni då gjort?

18. Det finns en idé om att dessa situationer skulle kunna hanteras av vanliga människor som för tidpunkten befinner sig i närheten till där hjälpen behövs. Vad är spontana reaktioner till detta?

19. Idag finns exempelvis Sjöräddningen, där privatpersoner frivilligt väljer att ställa upp vid situationer där andra personer kan behöva hjälp. Om det fanns en liknande funktion som i hanterade de situationer vi pratat om, hade ni kunnat tänka er att vända er till en sådan funktion? Varför/varför inte?

20. I vilka situationer tror ni att man skulle dra sig från att söka hjälp från en sådan här organisation?

21. För att personen som hjälper er ska kunna ge er bästa hjälp, hur skulle ni känna inför att dela med er av information så som exempelvis att ni har diabetes eller balanssvårigheter?

22. Vilken information tror ni är relevant att dela med sig av från både den som behöver och ger hjälp, så att önskad hjälp förmedlas på bästa möjliga sätt?

APPENDIX III. GUIDE TO INTERVIEWS WITH PARENTS

Summary of questions:

Q1-5	Background information
Q6-12	Runaways
Q13-17	Use of positioning devices
Q18-22	Need of Landräddningen
Q23-24	Closing questions

1. Hur ser er familjesituation ut, vilka ingår i er familj? Hur gamla är ni?

2. Hur ser en vanlig dag ut i er familj? På vilket sätt skiljer sig det från hur andra familjer lever?

3. Hur ser en dag ut för ert barn? Skola, dagis? Kompisar? Hemma med mamma eller pappa?

4. När upptäckte ni att ert barn inte betedde sig som andra barn? När fick ni reda på att ert barn har Autism?

5. Hur yttrar sig ert barns Autism? På vilket sätt påverkar det ert barns sätt att interagera med andra människor, kommunicera?

6. Vilka problem har ni stött på med anledning av detta? Har det någon gång hänt något allvarligt, eller nära inpå?

7. Har det någon gång uppstått situationer när ert barn försvunnit iväg? När har detta hänt? Varför har barnet försvunnit iväg?

8. Hur har era tankar gått då, vad har ni oroat er för?

9. Hur gick ni tillväga för att hitta ert barn då?

10. Är ni oroliga för att det ska hända fler gånger?

11. Hur gör ni för att undvika detta? Beter ni er på ett särskilt sätt för att få extra koll?

12. Har det uppstått andra situationer som kan vara farliga för ert barn eller ge er oro?

13. Har ni någon gång använt GPS eller liknande för att kunna hitta ert barn när det är försvunnet? Exempelvis via en app?

14. Känner du till andra föräldrar som använder GPS för detta?

15. Vad är din inställning till sådana tjänster? Är det okej att man kan spåra sina barn?

16. Skulle du kunna tänka dig att använda GPS för att kunna veta vart ditt barn är? Varför/varför inte?

17. I vilka situationer tror du att du känner ett behov för detta, när vill du ha extra koll?

18. Tror du att du hade känt ett behov av en sådan tjänst även om ditt barn inte hade haft autism? Känner du ett liknande behov för dina andra barn?

19. Hur ser du på att ta hjälp från andra om ditt barn är försvunnet? Exempelvis, om en person i närheten av ditt barn kan hjälpa ditt barn hem eller finnas där tills ni kommer?

20. Finns det situationer där du tänker att det olämpligt att okända personer hjälper till respektive helt okej?

21. Om en situation uppstår där ni behöver hjälp för att hitta ert barn, vad tänker du är viktigt att man ska veta för att kunna hjälpa?

22. Vad är okej att andra vet om ditt barn?

23. Hur ser ni på framtiden och att barnet blir äldre? Vad förväntar ni er av tonåren och barnets vuxna liv? Tror du att det finnas ett behov i framtiden för en sådan tjänst?

24. Finns det något annat som du tycker är viktigt men som inte kommit upp?

APPENDIX IV. GUIDE TO INTERVIEWS WITH CALL CENTRE OPERATORS

Summary of questions:

BAKGRUND

1. *Hur länge har ni jobbat här?*
2. *Vad har ni för utbildning?*
3. *Vad är er roll här? Vad ingår i er arbetsbeskrivning?*
4. *Hur ser en arbetsdag ut för er?*
5. *Hur tycker du det att jobba på en larmcentral? (Stressig, lugnt, hög ljudvolym?)*
6. *Är det svårt? Var det svårt i början? Vad var det som var svårt då?*

INTRO

7. *Vilka sorters larm hanterar ni?*
8. *Hur ser fördelningen ut mellan sorters larm? Mestadels trygghetslarm i hemmet och få mobila larm..?*
9. *Hur många larm hanterar ni varje dag? Fördelat per operatör?*
10. *Hanterar ni larm för olika kommuner? Påverkar detta på något sätt hur ni hanterar ett larm? (Exempelvis vem som ska utföra åtgärden, vilka åtgärder man utför?)*
11. *Vad larmar man oftast om via sitt trygghetslarm i hemmet? Vilka åtgärder kräver detta? (insats från hemtjänst, ambulans?)*
12. *Till vem dirigerar ni vidare åtgärden?*
13. *Hur ofta krävs det att vårdpersonal rycker ut? Hur ofta behövs det inte?*
14. *Finns det situationer där man lika gärna skulle kunna skicka en person som inte jobbar i vården, exempelvis en anhörig granne eller liknande? (Tänker till exempel åtgärder som inte kräver medicinsk utbildning)*
15. *På vilket sätt hanterar ni mobila trygghetslarm?*
16. *Vad larmar man oftast om via sitt mobila trygghetslarm? Vilka åtgärder kräver detta? (insats från hemtjänst, ambulans, anhöriga?)*

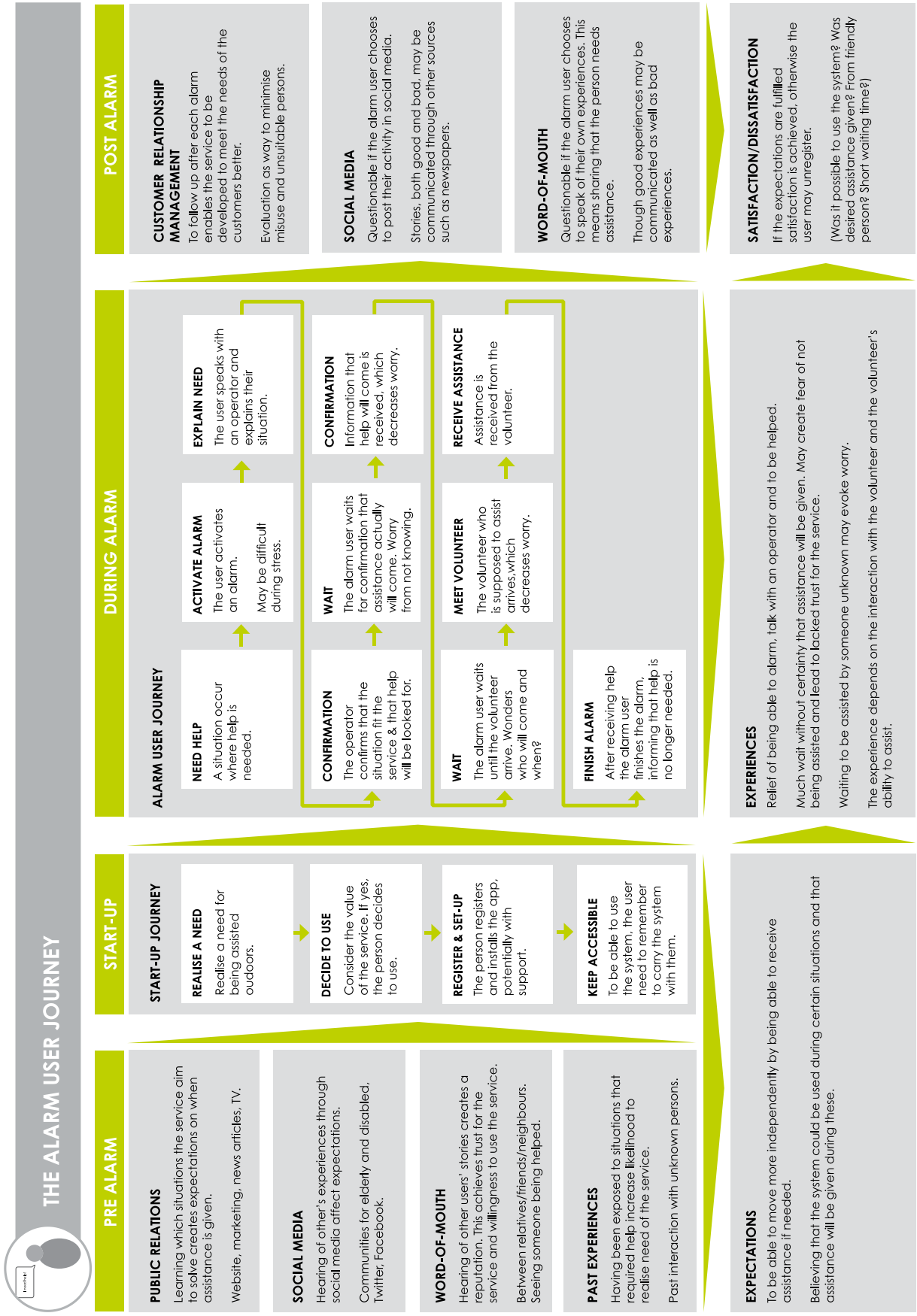
HANTERA LARM

17. *Hur lång tid tar ett ärende?*
18. *Vad ingår i ett ärende?*
19. *Av detta, hur mycket tid läggs på samtalet med brukaren? Hur mycket tid har ni på er, finns det någon gräns?*
20. *Vad ingår mer i ett ärende, förutom att prata med brukaren?*
21. *På vilket sätt skiljer sig det ni gör beroende på vilket sorts larmärende ni får?*
22. *Hur ser en typisk larmsekvens ut, från det att någon larmar med sitt trygghetslarm till att personen har fått hjälp? (BE VISA)*
23. *Hanteras flera larmärenden parallellt av samma operatör?*
24. *Hanteras ett larmärende av samma operatör från att det startas till avslutas?*

25. *Hur tycker du det är att jobba i detta system? (Krångligt, enkelt, tidsödande, onödigt?)*
26. *Vilka problem har ni stött på? Vad kan vara svårt?*
27. *Vad hade du velat ändra?*
28. *Vad för sorts stöd/verktyg använder ni under hanterandet av ett larm? (Frågestöd, beslutsstöd, regler?)*
29. *På vilket sätt skiljer sig er uppgift vid hanterandet av ett trygghetslarm i hemmet och ett mobilt?*
30. *Hur hanterar ni mobila trygghetslarm idag? Hur ser en sådan larmsekvens ut?*
31. *Hur hanterar ni att en dam larmar och berättar att hon har trillat utomhus? Vilka uppgifter ingår?*
32. *Hur hanterar ni i fall en äldre man med demens larmar och berättar att han inte hittar hem? Vilka uppgifter ingår då?*
33. *Hur hanterar ni ifall mannen är försvunnen enligt anhörig eller vårdpersonal? Vilka uppgifter ingår då?*
34. *Hur avgör ni vilken åtgärd som ska göras? Finns det regler eller annat stöd till detta? Skiljer sig detta beroende på vem som är kund? Vilka är reglerna?*
35. *Vad behöver ni veta för att kunna bedöma vilken åtgärd som krävs? Hur tar ni reda på detta? Vad kan vara problematiskt med detta?*
36. *Vad kan ni veta om brukaren sedan tidigare?*
37. *Hur dirigerar ni ärendet vidare till den som ska utföra åtgärden? Vilka problem kan uppstå kring detta?*
38. *Följer ni upp efter utförd åtgärd? Hur då?*
39. *När avslutas ett ärende från er sida?*
40. *Hur gör ni för att jobba effektivt? (Kortkommandon, ”tabba”?)*

ÖVRIGT

41. *Finns det något annat som ni tycker är viktigt men som inte kommit upp?*


THE ALARM USER JOURNEY
PRE ALARM
START-UP
DURING ALARM
POST ALARM
PUBLIC RELATIONS
Learning which situations the service aim to solve creates expectations on when assistance is given.
Website, marketing, news articles, TV.
SOCIAL MEDIA
Hearing of other's experiences through social media affect expectations.
Communities for elderly and disabled, Twitter, Facebook.
WORD-OF-MOUTH
Hearing of other users' stories creates a reputation. This achieves trust for the service and willingness to use the service.
Between relatives/friends/neighbours.
Seeing someone being helped.
PAST EXPERIENCES
Having been exposed to situations that required help increase likelihood to realise need of the service.
Past interaction with unknown persons.
START-UP JOURNEY
REALISE A NEED
Realise a need for being assisted oudoors.
DECIDE TO USE
Consider the value of the service. If yes, the person decides to use.
REGISTER & SET-UP
The person registers and installs the app, potentially with support.
KEEP ACCESSIBLE
To be able to use the system, the user need to remember to carry the system with them.
ALARM USER JOURNEY
NEED HELP
A situation occur where help is needed.
ACTIVATE ALARM
The user activates an alarm.
May be difficult during stress.
EXPLAIN NEED
The user speaks with an operator and explains their situation.
CONFIRMATION
The operator confirms that the situation fit the service & that help will be looked for.
WAIT
The alarm user waits for confirmation that assistance actually will come. Worry from not knowing.
CONFIRMATION
Information that help will come is received, which decreases worry.
WAIT
The alarm user waits until the volunteer arrive. Wonders who will come and when?
MEET VOLUNTEER
The volunteer who is supposed to assist arrives,which decreases worry.
RECEIVE ASSISTANCE
Assistance is received from the volunteer.
FINISH ALARM
After receiving help the alarm user finishes the alarm, informing that help is no longer needed.
CUSTOMER RELATIONSHIP MANAGEMENT
To follow up after each alarm enables the service to be developed to meet the needs of the customers better.
Evaluation as way to minimise misuse and unsuitable persons.
SOCIAL MEDIA
Questionable if the alarm user chooses to post their activity in social media.
Stories, both good and bad, may be communicated through other sources such as newspapers.
WORD-OF-MOUTH
Questionable if the alarm user chooses to speak of their own experiences. This means sharing that the person needs assistance.
Though good experiences may be communicated as well as bad experiences.
EXPECTATIONS
To be able to move more independently by being able to receive assistance if needed.
Believing that the system could be used during certain situations and that assistance will be given during these.
EXPERIENCES
Relief of being able to alarm, talk with an operator and to be helped.
Much wait without certainty that assistance will be given. May create fear of not being assisted and lead to lacked trust for the service.
Waiting to be assisted by someone unknown may evoke worry.
The experience depends on the interaction with the volunteer and the volunteer's ability to assist.
SATISFACTION/DISSATISFACTION
If the expectations are fulfilled satisfaction is achieved, otherwise the user may unregister.
(Was it possible to use the system? Was desired assistance given? From friendly person? Short waiting time?)

THE VOLUNTEER JOURNEY

PRE VOLUNTEERING

PUBLIC RELATIONS

Learning which situations the service aim to solve creates expectations on when volunteers will assist. The brand identify may evoke people to volunteer.

Website, marketing, news articles, TV.

SOCIAL MEDIA

Hearing of other's experiences affect expectations of when the volunteer is to assist. Displaying the service in social media creates reputation.

Twitter, Facebook, LinkedIn.

WORD-OF-MOUTH

Hearing stories increase understanding for the service. Creating reputation evokes volunteering.

Between relatives/friends, seing a volunteer helping, wearing a badge.

PAST EXPERIENCES

Previous expericens within volunteering, social work and care work affect willingness to join Landräddningen.

START-UP

START-UP JOURNEY

DECIDE TO VOLUNTEER

Review possibility to volunteer and then decides to join.

REGISTER & SET-UP

The volunteer registers and installs the app.

(CERTIFY)

The volunteer may need to become certified before assisting.

REMAIN ACTIVE

To receive requests the volunteer needs be 'on call'.

DURING VOLUNTEERING

VOLUNTEERING JOURNEY

REQUEST RECEIVED

A request to assist is in Landräddningen is received.

NOTICE REQUEST

The volunteer is occupied, needs to be notified that their assistance is needed.

READ REQUEST

The information in the request is read.

DECIDE TO ACCEPT

Reviews required effort in relation to the ability to assist.

Decides to accept.

REVIEW NEW INFO

Info of the alarm user, location and instructions is reviewed.

PREPARE

The volunteer prepares. Tries to remember how to act during this type of situation?

RELOCATE

The volunteer relocates through suitable method of transportation.

SEARCH

Arriving at claimed position, the volunteer searches for the alarm user.

FIND & MEET

The volunteer finds the alarm user and can see who the person is.

EVALUATE SITUATION

The situation is evaluated. Are they able to assist? Need to forward alarm to other function?

ASSIST

The volunteer assists to their capacity. Potential need for consulting with suitable personell.

CONFIRM DELIVERY

After having helped the person, the volunteer reports their contribution.

POST VOLUNTEERING

VOLUNTEER RELATIONSHIP MANAGEMENT

To follow up after each alarm enables the service to meet the needs of the customers better.

Evaluations to minimise misuse.

The volunteer may encounter difficult situations and may need to discuss this.

SOCIAL MEDIA

If the experience is good, the volunteer likely would be open to communicate this in social media. This may evoke other to help, as well as keep the volunteer motivated.

WORD-OF-MOUTH

The volunteer tells other friends of their experiences.

By providing assistance others see that help is given. Seeing persons labelled as volunteers of Landräddningen, e.g. through a badge, may evoke more people to volunteer.

EXPECTATIONS

The volunteer hopes to be able to help persons in need and to be able to do good deeds. From this they expect to feel good about themselves, potentially also desrire to be perceived as good to others.

The volunteer receives an idea of during which situations they will be asked to assist.

EXPERIENCES

Positive feelings from being able to help someone. Receive gratitude.

Difficult to reject a request knowing that there is someone in need.

Stress from not finding that the person on claimed position.

Difficult to distinguish critical situations from less critical and to know how to act. Severe situations may be unpleasant. Especially if they are asked to assist on their own.

SATISFACTION/DISSATISFACTION

If the situation is coherent with what they initially perceived satisfaction is achieved.

Satisfaction from the act of helping.

Depends on the nature of the alarm and the outcome.

APPENDIX VI. IDEAS

	1. IN WHICH WAYS CAN ALARMS BE ACTIVATED?	2. IN WHICH WAYS CAN THE NEED BE IDENTIFIED?	3. IN WHICH WAYS CAN ONE BE NOTIFIED THAT THEIR ASSISTANCE IS NEEDED?	4. IN WHICH WAYS CAN ONE BE MOTIVATED TO ASSIST?	5. IN WHICH WAYS CAN THE ALARM RECEIVER BE SUPPORTED TO FIND?	6. IN WHICH WAYS CAN THE ALARM RECEIVER BE SUPPORTED TO ASSIST?
A	TOUCH BUTTON INSIDE APPLICATION	INTERVIEW ORALLY BY THE OPERATOR ASKING QUESTIONS	THROUGH WARNING: PUSH NOTIFICATION WITH LOUD NOISE, VIBRATION AND IRRITATING BLINKING	COUNTERACT BYSTANDER EFFECT THROUGH DIRECTING TO THE VOLUNTEER	MAP AND DIRECTIONS TO THE ALARM USER	PREPARE THROUGH EDUCATION BEFORE BEING ASKED TO ASSIST
B	ADDITIONAL BUTTON ON SCREEN	CHAT INTERVIEW IF THE ALARM USER IS UNABLE TO SPEAK	DEACTIVATION REQ. THE VOLUNTEER HAS TO DEACTIVATE TO SILENT THE ALARM	THROUGH PHRASING: GIVE GUILT, SCARE, FORCE, APPEAL TO THE GOOD SIDE OF PEOPLE	SUGGESTIONS FOR TRAVEL WITH PUBLIC TRANSPORTATION	FIRST AID INSTRUCTIONS IN APPLICATION
C	PULL CORD FROM SOCKET	MULTIPLE CHOICE: THE ALARM USER DIRECTLY CHOOSES AMBULANCE, POLICE, VOLUNTEER ETC.	MULTIPLE CHANNELS SYNCHRONISE WITH CAR'S HUD, E-MAIL, POP-UP IN CALENDAR.	INTEGRATE WITH SOCIAL MEDIA, HAVE FACEBOOK, LINKEDIN, TWITTER AND INSTAGRAM FEED ON WEBSITE? SHOW THEIR CONTRIBUTION BY #landraddningen	GET PHOTO OR VIDEO THE ALARM USER'S LOCATION	SPECIFIC INSTRUCTIONS FOR THE CASE
D	MOBILE PHONE CASING WITH BUTTON (BLUETOOTH)	INTERVIEW THROUGH INTERACTIVE MULTIPLE CHOICE E.G. THROUGH YES/NO SERVICE TYPE: ambulance BODY PART: head ACHE: 5	HEARING SOMEONE SHOUT FOR HELP	EARN POINTS & EVOLVE INTO SUPER HERO	POSSIBILITY TO HEAR THE ALARM USER'S DEVICE (OR TO TRIGGER GUIDING SOUND)	ACCESS TO 112, 1177, CALL CENTRE
E	USE PHYSICAL BUTTON ON THE PHONE, E.G. HOME BUTTON	VIDEO CHAT THE OPERATOR CAN SEE THE USER AND DETERMINE NEED	HEARING YOUR NAME BEING CALLED	COMPETE AGAINST OTHERS "RACE TO HELP"	POSSIBILITY TO CALL THE ALARM USER, WHOM CAN DIRECT	POSSIBILITY TO FIND CLOSEST HEART STARTER, EMERGENCY, PHARMACIST ETC.

F	SEPARATE BUTTON (BLUETOOTH), THAT IS ATTACHED TO THE WRIST, JACKET ETC.	THE OPERATOR CAN ACTIVATE CAMERA TO SEE	VIBRATING WATCH TO INDICATE THAT ASSISTANCE IS NEEDED	FOLLOW CLUES – THE MORE PEOPLE YOU HELP THE CLOSER TO SOLVE THE MYSTERY	HEAT GOGGLES FUNCTION	FIRST AID QUIZ. COMPETE AGAINST OTHER VOLUNTEERS. FURTHER DEVELOP YOUR "HERO" SKILLS.
G	SQUEEZABLE PHONE CASING– JUST SQUEEZE TO ACTIVATE		SPECIFIC LANDRÄDDNINGEN SIGNAL	FOR EACH ALARM YOU EARN A COFFEE	RECEIVING DIRECTIONS IN THE APP	SEND "WEEKLY FACTS ALONG WITH UPDATES OF NUMBER OF TIMES HELP HAS BEEN GIVEN.
H	COOL, "SMART", WRIST WATCH WITH INTEGRATED BUTTON		STANDARD NOTIFICATION	BY SEEING THE PERSON IN NEED AND FEELING RESPONSIBLE FOR THE PERSON	CALLING FOR THE PERSON'S NAME	WEB-LECTURES
I	DEAD MAN'S GRIP ALARM FUNCTION IN APPLICATION			"ROSE OF THE WEEK" EVERY ALARM USER HAS THE OPPORTUNITY TO SEND A ROSE AFTERWARDS. THE VOLUNTEER CAN COLLECT AND DISPLAY TO OTHERS	CALLING THE PERSON	HAVE "HOW TO IDENTIFY CRITICAL CONDITIONS" CHECK LIST
J	VOICE CONTROL: CALL "I NEED HELP!"			GIVE EXCUSES TO BE GIVEN TO CO-WORKERS	COMMUNICATE DIRECTLY WITH THE OTHER PERSON'S PHONE, MAKE THEM WANT TO FIND EACH OTHER LIKE MAGNETS	
K	TIMER – IF NOT DEACTIVATED WITHIN SPECIFIC TIME ⇗ ALARM			E.G. PAY YOUR GRANDMA'S FEE BY GIVING ASSISTANCE FOR FREE.	ACTIVATE THEIR CAMERA	
L	AUTOMATIC DETECTION (FALL, HEART ATTACK)			FOR EVERY TIME YOU HELP YOU RECEIVE AN ALARM FOR FREE	VIDEO CALL	
M	DEAD MAN'S GRIP ON WALKING STICK/WALKER			FREE COFFEE OR OTHER DISCOUNTS FROM PERSONNEL THAT HAVE ARE "LANDRÄDDNINGEN CERTIFIED"		

APPENDIX VII. SELECTION OF IDEAS ON ALARM FUNCTION

CRITERIA	PRIORITY	*REFERENCE: BUTTON INSIDE APP*	**BUTTON ON THE PHONE**	**NOTIFI-CATION BAR**	VOICE CONTROL	DEAD MAN'S GRIP	**SEPARATE BUTTON**	**PHONE CASING**	**PULL CORD**	TIMER	AUTO DETECTION
NO PRE-ACTIVATION Need to pre-activate or not	2	0	**0**	**0**	0	-	**0**	**0**	**-**	-	-
FEW STEPS Number of actions required	2	0	**+**	**+**	+	+	**+**	**+**	**+**	+	+
LOW EFFORT Simplicity of execution	2	0	**+**	**+**	0	+	**+**	**+**	**+**	+	+
USER IN CONTROL User vs. system activated	3	0	**0**	**0**	0	0	**0**	**0**	**+**	-	-
COMPATIBILITY Fit different phones	1	0	**-**	**-**	0	0	**0**	**-**	**0**	0	0
TECHNICAL FEASIBILITY Feasibility of function	2	0	**0**	**0**	-	0	**0**	**0**	**0**	0	-
TOTAL		0	**1**	**1**	0	**1**	**2**	**1**	**2**	0	-1
TOTAL WEIGHED		0	**3**	**3**	0	2	**4**	**3**	**5**	-1	-3

FAILURE MODE EFFECT ANALYSIS (FMEA)

FAILURE	EFFECT	CAUSE	DETECTION	OCC	SEV	DET	RPN	COMMENT
INABILITY TO ACTIVATE ALARM The alarm user is unable to trigger an alarm.	The alarm user is unable to communicate that help is needed. Depending on the situation the severity of the fault can be very high.	The alarm activation is difficult to recognise and/or execute. The difficulty is higher during more severe and stressed situations.	The situations when the user is unable to activate alarm is likely severe, and during these situations the user will most likely also have difficulties detecting if they succeeded to activate.	2	9	7	**126**	To solve the situation of alarm activation is most critical, even though it may occur rarely.
FAILURE TO IDENTIFY NEED DUE TO INABILITY TO SPEAK The alarm user is unable to verbalise their need due to the nature of the situation.	The alarm user is unable to explain what type of assistance that is needed. This means that the operator cannot identify the need.	Due to the nature of situation the alarm user cannot or do not want to verbalise their need.	The operator understands that she cannot detect need. Though detection does not solve the problem!	2	7	1	14	To solve how to identify need during silent alarms is difficult to achieve. The suggestions to allow alternatives ways of identifying need violates integrity, requires data to successfully be transitioned, or may be even more difficult to achieve for the user. The ideas are thereby not suitable. The need to develop such ideas also depends on the routines, where it can be chosen to always forward emergency services or volunteer, or to always treat silent alarms as mistakes.
UNNOTICED REQUEST The volunteer does not notice their request when it arrives.	The volunteer is not informed that assistance is needed immediately, which may result in the alarm user not being assisted in time.	The notification does not catch attention. The volunteer is not close to their phone. The volunteer is occupied and ignores	Unlikely that all volunteers fails to notice the request. The operator can notice that the requests might not be noticed from	5	6	2	**60**	It is important to ensure that the request is seen quickly. Though, the need depend on the situation where more critical situations require immediate recognition. The

		to review the request.	seeing that they have not been answered. Though this may take 5-10 minutes or so...					likelihood that the volunteer is sent to critical situations is uncertain, but believed as low.
REJECTED REQUEST When reviewing the request the volunteer is not motivated to assist, hence rejects.	The alarm user is not given assistance.	The volunteer is unable to assist at the specific time, or does not wish to assist with the required assistances. The request does not motivate assistance, does not make the volunteer feel obligated to assist.	The operator can notice that the request is not answered and review the need for resend request to other volunteers or to solve the situation in another way. However a question remains, how much time should the volunteer have to answer?	4	7	4	**112**	It is important that the volunteers accepts to assist. Though, as likely only persons who want to assist signs up, further motivation should not be needed.
INACCURATE POSITION The positioning accuracy is low and the position that is communicated to the volunteer is incorrect	The volunteer may have difficulties finding the alarm user, which affects the probability of assistance being delivered. Depending on the situation, the effect is more severe. E.g. if the alarm user is unable to speak the effect is very severe.	Poor positioning accuracy. The operator has not asked of the alarm user's location during interview and communicated this to the volunteer.	The volunteer will detect that the position is incorrect when arriving and not finding the alarm user. This can be detected by the operator attempting to identify if the position is correct.	2	6	3	36	The problem of inaccurate positioning is mainly occurring during situations where the alarm user may be unable to speak. Thus, this problem has similar origin as the second problem.
INABILITY TO ASSIST The volunteer judges that she is unable to assist.	The volunteer does not help the alarm user, who forwards the alarm to other function.	The volunteer has been asked to assist during unsuited situations. Untrained volunteers.	Detected when the volunteer arrives and recognises the situation.	5	3	7	**105**	Being unable to assist mainly origins from the volunteer being sent to unsuitable situations and from being untrained. To determine situations and to certify volunteers remain to the organisation to solve.

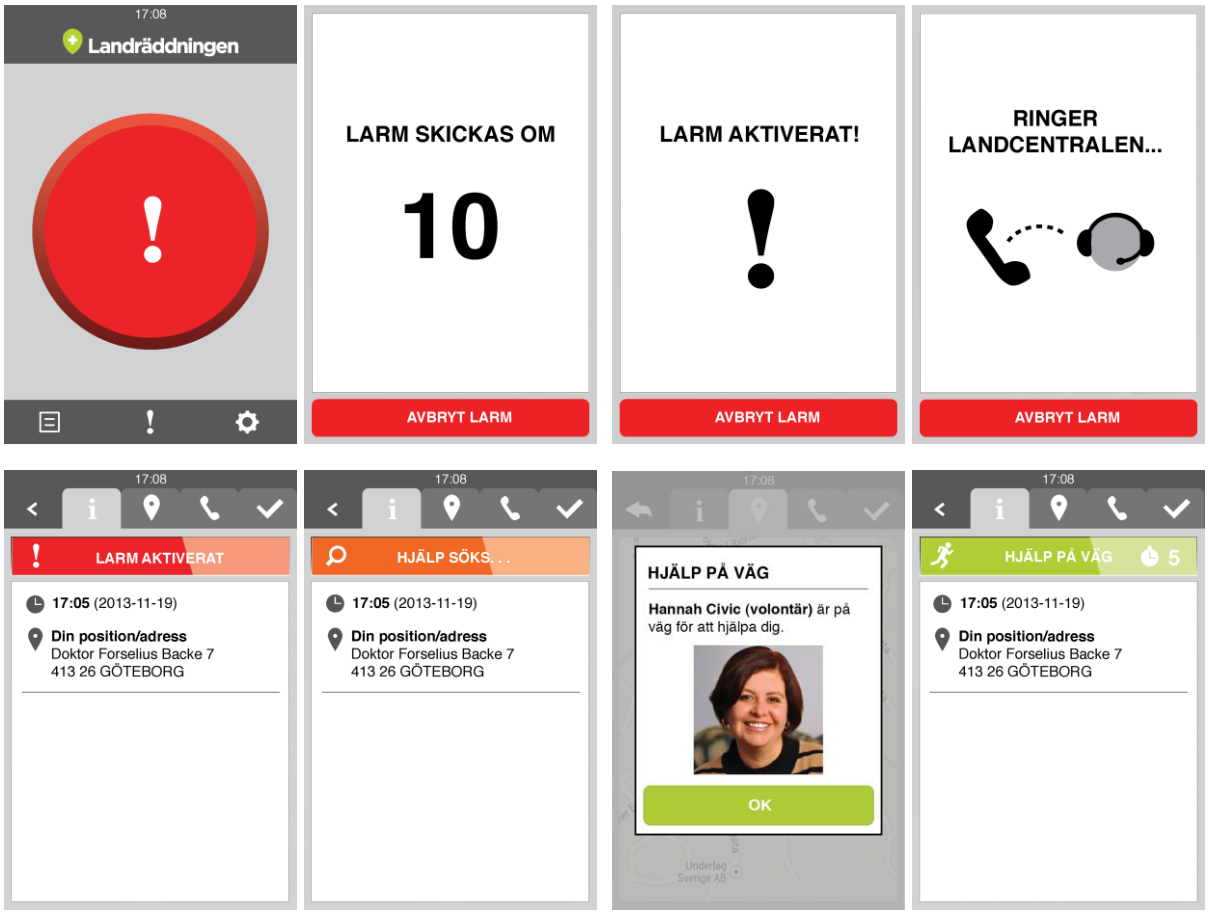
APPENDIX IX. EVALUATION OF ALARM FUNCTION

CRITERIA	PRIO	*REFERENCE: BUTTON INSIDE APP*	HOME BUTTON	NOTIFI-CATION BAR	**BLUETOOTH BUTTON**	**PHONE CASE**	**PULL CORD**
NO PRE-ACTIVATION Need to pre-activate or not	2	*0*	0	0	**0**	**0**	**?**
FEW STEPS Number of actions required	3	*0*	+	+	**+**	**+**	**+**
LOW EFFORT Simplicity of execution	2	*0*	+	0	**+**	**+**	**+**
VISION REQUIRED Require focused vision	2	*0*	+	0	**+**	**+**	**+**
HARDWARE COMPATIBILITY Fit different phones	1	*0*	-	0	**0**	**-**	**0**
SOFTWARE COMPATIBILITY Fit different systems	1	*0*	-	-	**0**	**0**	**0**
TOTAL		*0*	1	0	**3**	**2**	**3**
TOTAL WEIGHED		*0*	4	2	**7**	**6**	**7**

CRITERIA	PRIO	***REFERENCE: PULL CORD***	HOME BUTTON	NOTIFI-CATION BAR	**BLUETOOTH BUTTON**	**PHONE CASE**	BUTTON INSIDE APP
NO PRE-ACTIVATION Need to pre-activate or not	2	***0***	0	0	**0**	**0**	0
FEW STEPS Number of actions required	3	***0***	0	-	**0**	**0**	-
LOW EFFORT Simplicity of execution	2	***0***	0	-	**0**	**0**	-
VISION REQUIRED Require focused vision	2	***0***	0	-	**0**	**0**	-
HARDWARE COMPATIBILITY Fit different phones	1	***0***	-	0	**0**	**-**	0
SOFTWARE COMPATIBILITY Fit different systems	1	***0***	-	-	**0**	**0**	0
TOTAL		***0***	-2	-4	**0**	**-1**	-3
TOTAL WEIGHED		***0***	-2	-8	**0**	**-1**	-7

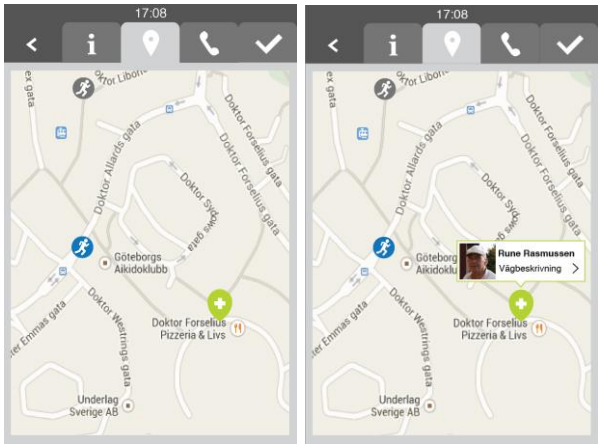
APPENDIX X. APP FUNCTIONS

The Alarm Function



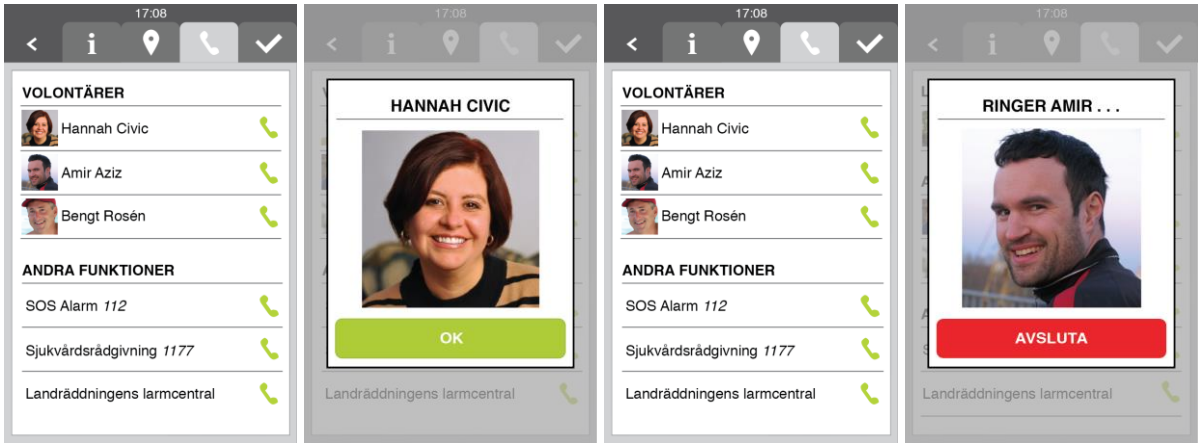
Road directions

Click on icon to show road directions.

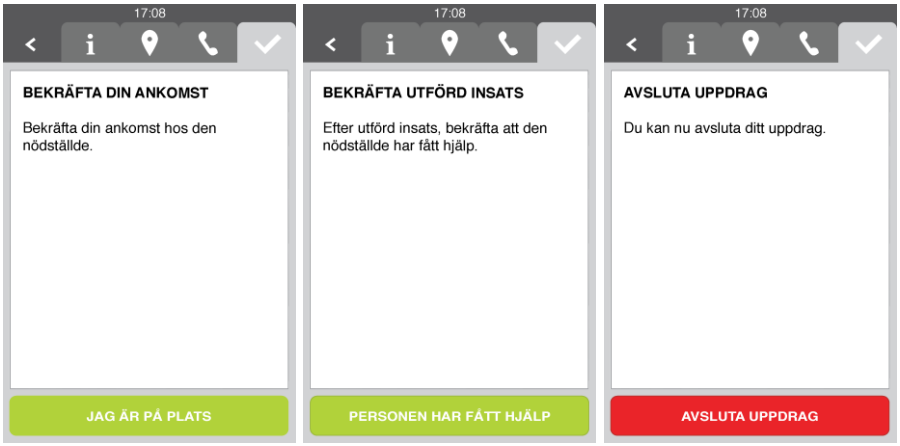


View photo and initiate phone call

Click on photo to show larger photo. Click on row/telephone icon to initiate phone call.



End Alarm / Report function



APPENDIX XI. USABILITY TEST

Summary:

Q1-4	Personal information on the interviewee
Q4-6	Experience of smartphones
A-T1	Activate alarm
A-T2	Find out who your helpers are
A-T3	View photo
A-T4	Find out when help will come
A-T5	Quit alarm
V-T1	Enter request and decide to assist
V-T2	View information on alarm
V-T3	Contact another volunteer
V-T4	Call the alarm user
V-T5	Inform of your arrival
V-T6	Contact support
V-T7	End the alarm

1. Inom vilken ålderskategori tillhör du?

>18 år 18-30 år 31-45 år 46-60 år 61-75 år <75 år

2. Kön

Kvinna Man Definierar mig varken som kvinna eller man

3. Vilken är din högsta genomförda utbildning?

Grundskola, folkskola, realskola eller liknande

Gymnasieutbildning

Universitets- eller högskoleutbildning kortare än 3 år

Universitets- eller högskoleutbildning 3 år eller längre

4. Vilken är din huvudsakliga sysselsättning?

Arbetar som anställd Studerande Egen företagare

Pensionär Långtidssjukskriven Tjänstledig eller föräldraledig

Arbetssökande Hemarbetande (sköter hushållet)

Annat:

5. Vilken typ av mobiltelefon använder du?

Smartphone med Android iPhone

Smartphone med Windows Annat

6. Hur skulle du bedöma din vana av att använda pekskärmar såsom de som ofta används för smarta telefoner och surfplattor?

Använder varje dag Använt några gånger Aldrig använt Vet ej

LARMAPPEN

1. En situation uppstår där du behöver hjälp från en annan person och bestämmer dig för att larma Landräddningen. Gå in i appen och larma efter hjälp

2. Du har larmat och fått prata med en larmoperatör som berättar att hon har skickat vidare larmet till ett antal volontärer i närheten. Några volontärer har svarat ja. Ta reda på vilka de är.

3. Du tycker att bilderna på volontärerna är små och du kan därför inte se hur de ser ut. Detta gör dig orolig, du hade gärna tydligare kunnat se vilka personerna är. Det finns en möjlighet till att förstora fotona, hur då?

4. Du väntar på att få hjälp och undrar när hjälpen förväntas komma. Ta reda på detta.

5. Under tiden du väntar på att få hjälp från Landräddningen upptäcker en förbipasserande dig. Den förbipasserande erbjuder sig att hjälpa till och du tackar ja. Du kommer dock på att du borde meddela att du längre inte behöver hjälp, hur gör du detta?

VOLONTÄRAPPEN

1. Du har fått ett meddelande från Landräddningen att din hjälp behövs. Läs igenom informationen och ta reda på vilken hjälp som behövs. Eftersom du uppskattar att du har möjlighet att hjälpa till väljer du att tacka ja på larmet. Gör detta.

2. Ta reda på ytterligare information om vem den larmande är och vart personen befinner sig. Vem är det som behöver hjälp, vilken hjälp behövs och hur tar du dig dit?

3. Du har tidigare inte blivit ombedd att hjälpa till inom Landräddningen och känner dig osäker. Försök komma i kontakt med någon annan volontär.

4. På din väg mot den larmande känner du dig lite osäker för om du skulle hitta den larmande. Du bestämmer dig för att ringa upp den larmande för att kolla av vart personen befinner sig.

5. Du har nu anlänt hos den nödställde. Meddela detta till systemet.

6. Du är osäker på hur du bäst ska hjälpa den nödställde och känner att du skulle behöva stöd i detta. Du bestämmer dig för att kontakta 1177. Gör detta.

7. Efter instruktioner från operatören på 1177 så har du hjälpt Rune att ta sig hem. Meddela att du fullföljt uppdraget och avsluta ditt larm.

APPENDIX XII. SURVEY ON THE REQUEST

Summary:

Q1-4	Personal information on the interviewee
Q4-6	Experience of volunteering
S1-6	Motivation from initial message
S7-13	Motivation from information on alarm user
S14-17	Motivation from labelling of button
S18	Views
S19	Additional comments

1. Inom vilken ålderskategori tillhör du?

>18 år 18-30 år 31-45 år 46-60 år 61-75 år <75 år

2. Kön

Kvinna Man Definierar mig varken som kvinna eller man

3. Vilken är din högsta genomförda utbildning?

Grundskola, folkskola, realskola eller liknande

Gymnasieutbildning

Universitets- eller högskoleutbildning kortare än 3 år

Universitets- eller högskoleutbildning 3 år eller längre

4. Vilken är din huvudsakliga sysselsättning?

Arbetar som anställd Studerande Egen företagare

Pensionär Långtidssjukskriven Tjänstledig eller föräldraledig

Arbetssökande Hemarbetande (sköter hushållet)

Annat:

5. Jag har tidigare engagerat mig ideellt

Ja Nej Vet ej

6. Om du svarade ja på föregående fråga, inom vilket område?

Den tjänst som Landräddningen ska förmedla bygger på att de personer som anslutit sig som volontärer kommer att få ett meddelande via en mobilapplikation när deras hjälp behövs. Detta meddelande, som kallas Förfrågan, skall volontärerna sedan svara på med ett ja eller nej beroende på om de hjälper till eller inte.

På följande sidor kommer du ställas inför olika alternativ kring hur denna Förfrågan kan se ut. Tänk på att svara instinktivt och fundera inte över ifall ditt svar är rätt eller fel. I vissa fall kan det upplevas svårt att gradera, försök ändå. Markera ditt svar genom att exempelvis fet text, överstrykningspenna eller annan valfri funktion.

1. a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

2. a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

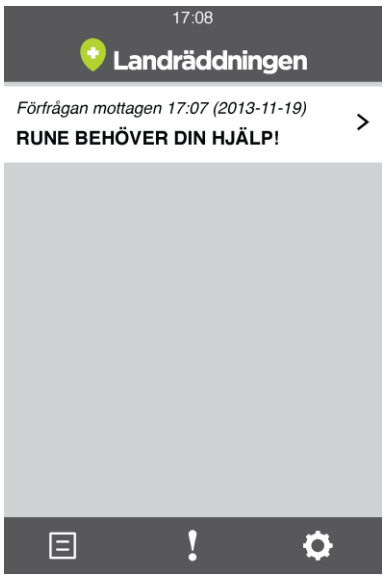
3. a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

4.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

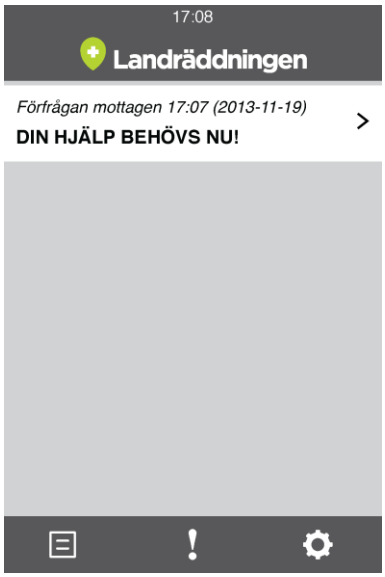


Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

5.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

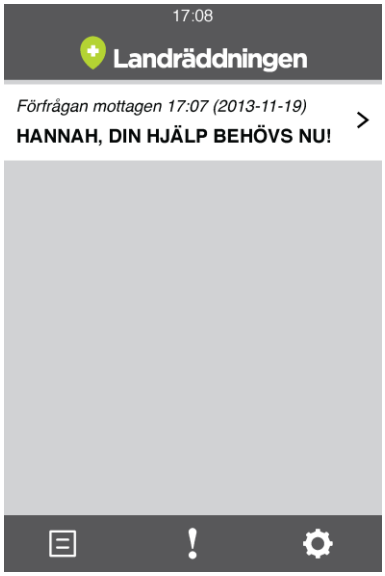


Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

6.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande (Obs! Byt Hannah mot ditt namn):

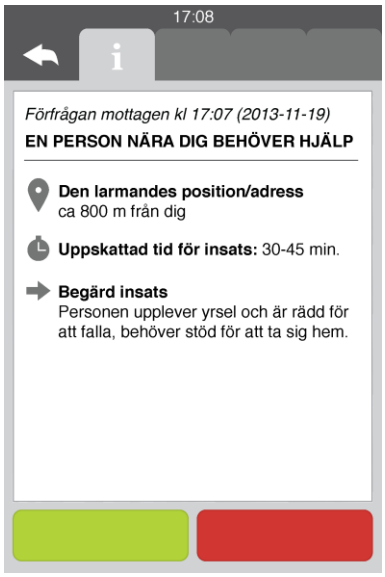


Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

7. a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:



Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

8.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

9.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

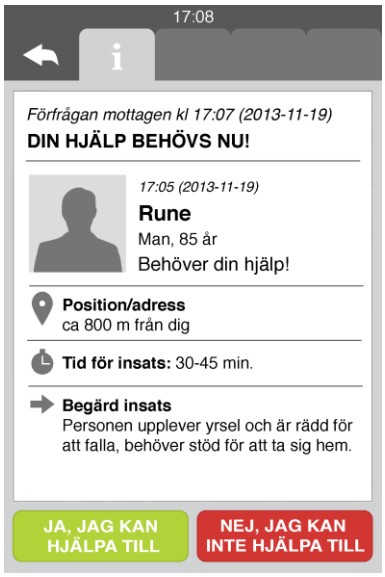
10.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

11.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:



Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

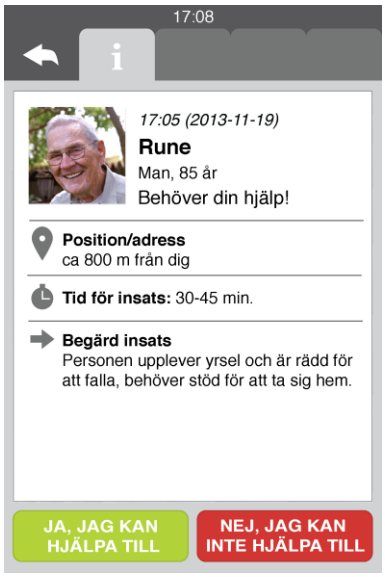
12.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

13.a) Du är ansluten som volontär för att hjälpa inom Landräddningen. I vilken utsträckning känner du dig motiverad att hjälpa till då du får följande meddelande:

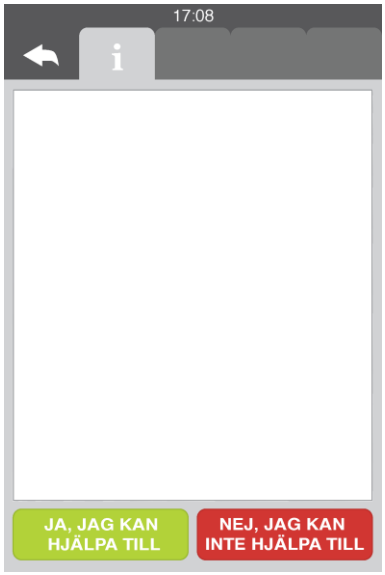


Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

1 2 3 4 5

b) Kommentarer

14. För att svara på den förfrågan om hjälpinsats som du mottagit skall du använda dig av de två knapparna som syns längst ner i bilden.



a) Vad är sannolikheten för att du väljer att hjälpa till när du måste välja mellan alternativen som syns i bilden:

Gradera mellan 1 till 5, där 1 motsvarar mycket liten sannolikhet och 5 mycket stor sannolikhet.

1 2 3 4 5

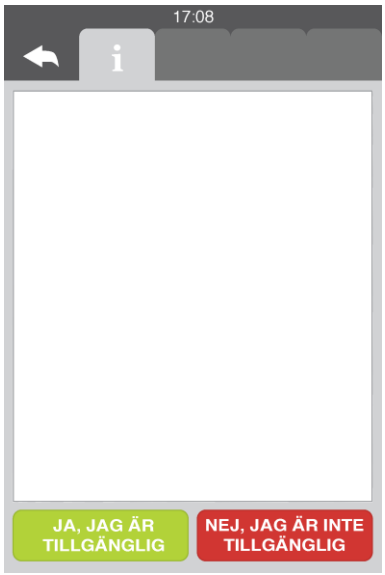
b) I vilken utsträckning känner du dig påverkat till att hjälpa till alternativt inte hjälpa till med anledning av hur alternativen benämnts?

Gradera mellan 1 till 5, där 1 motsvarar inte alls påverkad och 5 mycket påverkad.

1 2 3 4 5

c) Kommentarer

15. För att svara på den förfrågan om hjälpinsats som du mottagit skall du använda dig av de två knapparna som syns längst ner i bilden.



a) Vad är sannolikheten för att du väljer att hjälpa till när du måste välja mellan alternativen som syns i bilden:

Gradera mellan 1 till 5, där 1 motsvarar mycket liten sannolikhet och 5 mycket stor sannolikhet.

1 2 3 4 5

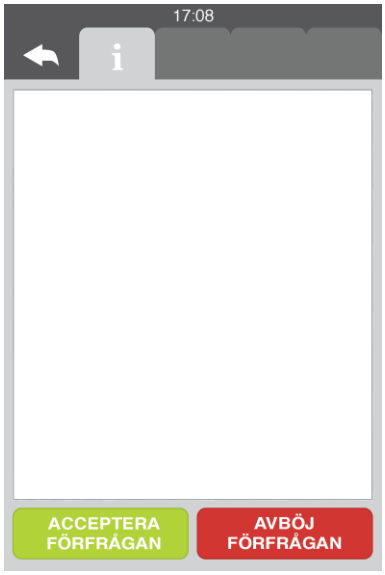
b) I vilken utsträckning känner du dig påverkat till att hjälpa till alternativt inte hjälpa till med anledning av hur alternativen benämnts?

Gradera mellan 1 till 5, där 1 motsvarar inte alls påverkad och 5 mycket påverkad.

1 2 3 4 5

c) Kommentarer

16. För att svara på den förfrågan om hjälpinsats som du mottagit skall du använda dig av de två knapparna som syns längst ner i bilden.



a) Vad är sannolikheten för att du väljer att hjälpa till när du måste välja mellan alternativen som syns i bilden:

Gradera mellan 1 till 5, där 1 motsvarar mycket liten sannolikhet och 5 mycket stor sannolikhet.

1 2 3 4 5

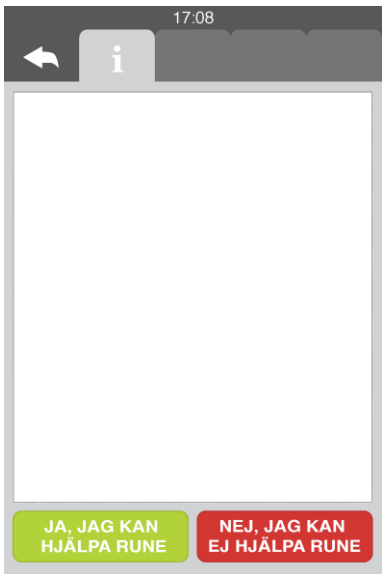
b) I vilken utsträckning känner du dig påverkat till att hjälpa till alternativt inte hjälpa till med anledning av hur alternativen benämnts?

Gradera mellan 1 till 5, där 1 motsvarar inte alls påverkad och 5 mycket påverkad.

1 2 3 4 5

c) Kommentarer

17. För att svara på den förfrågan om hjälpinsats som du mottagit skall du använda dig av de två knapparna som syns längst ner i bilden.



a) Vad är sannolikheten för att du väljer att hjälpa till när du måste välja mellan alternativen som syns i bilden:

Gradera mellan 1 till 5, där 1 motsvarar mycket liten sannolikhet och 5 mycket stor sannolikhet.

1 2 3 4 5

b) I vilken utsträckning känner du dig påverkat till att hjälpa till alternativt inte hjälpa till med anledning av hur alternativen benämnts?

Gradera mellan 1 till 5, där 1 motsvarar inte alls påverkad och 5 mycket påverkad.

1 2 3 4 5

c) Kommentarer

18. I vilken utsträckning stämmer följande påståenden in på din uppfattning?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket väl.

a) Sannolikheten för att jag väljer att hjälpa är oberoende av vem som behöver hjälpen.

1 2 3 4 5

b) Jag känner mig mer trygg med att hjälpa till om jag får veta vem jag ska hjälpa.

1 2 3 4 5

c) Jag känner mig mer motiverad att hjälpa till om meddelandet är direkt riktat mot mig, ex. om det benämns ”DIN HJÄLP BEHÖVS”.

1 2 3 4 5

d) Jag vill inte veta vem som behöver hjälpen eftersom jag vill inte vill känna mig illa till mods gentemot den personen om jag inte har möjlighet att hjälpa till

1 2 3 4 5

e) I de flesta fall ökar min vilja att hjälpa till när jag vet vem som behöver hjälp.

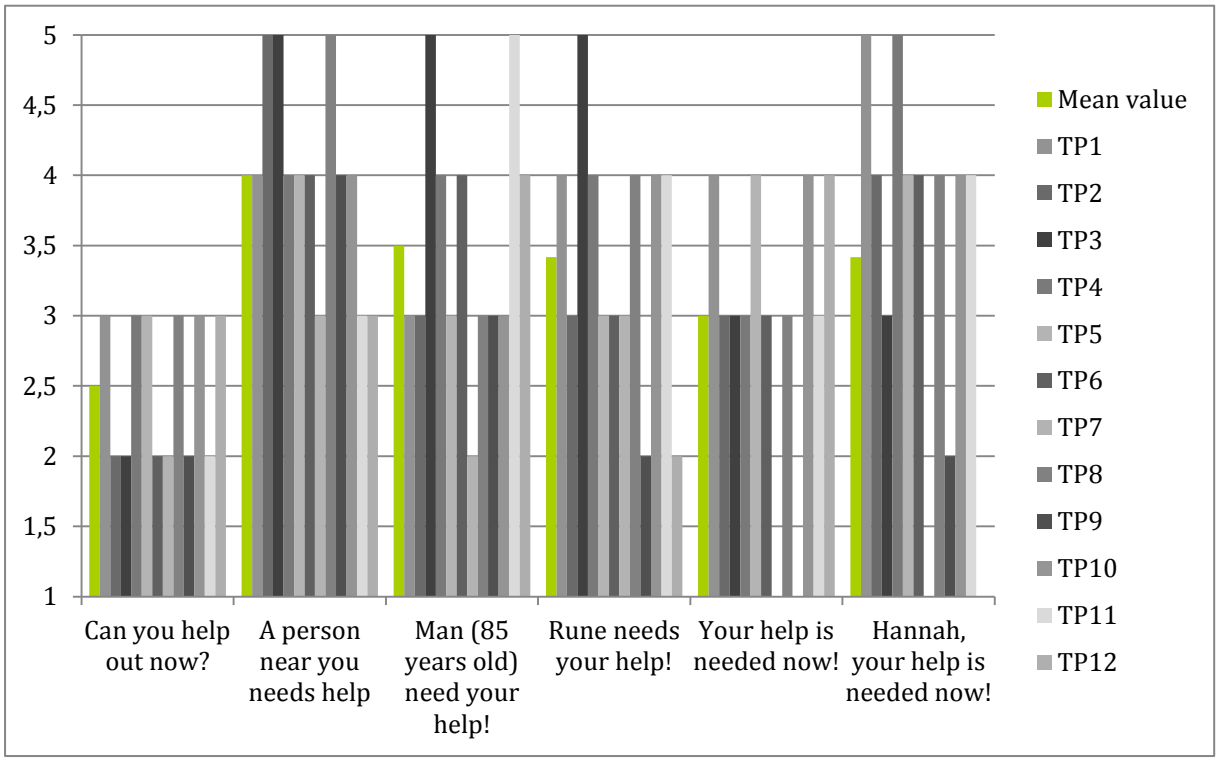
1 2 3 4 5

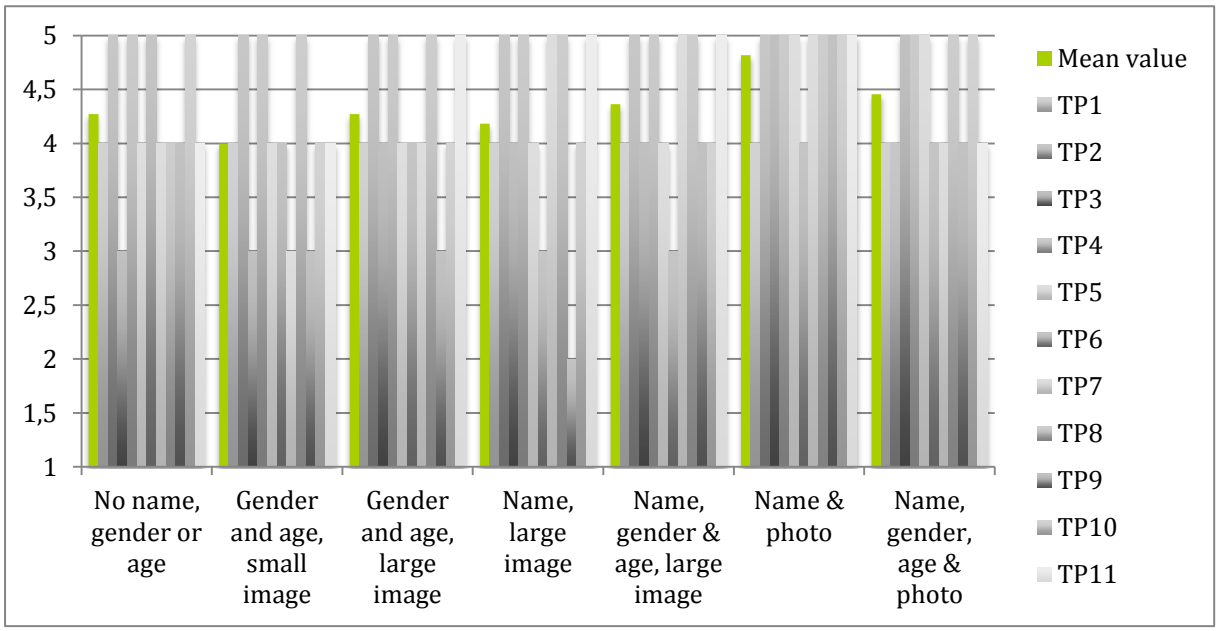
f) Sannolikheten för att jag hjälper till är oberoende av hur meddelandet är formulerat (exempelvis formulering av rubriken och knapparna).

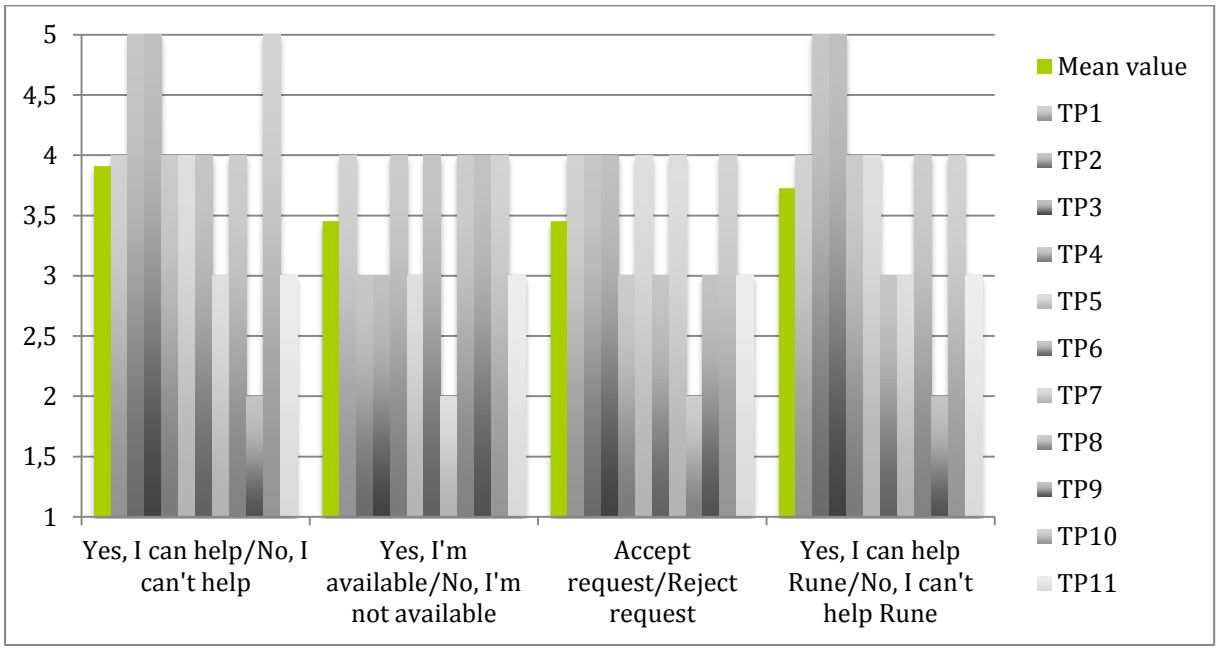
1 2 3 4 5

19. Övriga kommentarer

APPENDIX XIII. RESULTS OF SURVEY ON THE REQUEST






5
4,5
4
3,5
3
2,5
2
1,5
1
Yes, I can help/No, I can't help
Yes, I'm available/No, I'm not available
Accept request/Reject request
Yes, I can help Rune/No, I can't help Rune
Mean value
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11

APPENDIX XIV. SURVEY ON GRAPHICAL STYLE & EXPRESSION

Summary:

Q1-4	Personal information on the interviewee
Q4-6	Experience of volunteering
S1	Expression of graphical profile
S2-S6	Expression of design suggestion 1-5
S7	Comments

1. Inom vilken ålderskategori tillhör du?

>18 år 18-30 år 31-45 år 46-60 år 61-75 år <75 år

2. Kön

Kvinna Man Definierar mig varken som kvinna eller man

3. Vilken är din högsta genomförda utbildning?

Grundskola, folkskola, realskola eller liknande

Gymnasieutbildning

Universitets- eller högskoleutbildning kortare än 3 år

Universitets- eller högskoleutbildning 3 år eller längre

4. Vilken är din huvudsakliga sysselsättning?

Arbetar som anställd Studerande Egen företagare

Pensionär Långtidssjukskriven Tjänstledig eller föräldraledig

Arbetssökande Hemarbetande (sköter hushållet)

Annat:

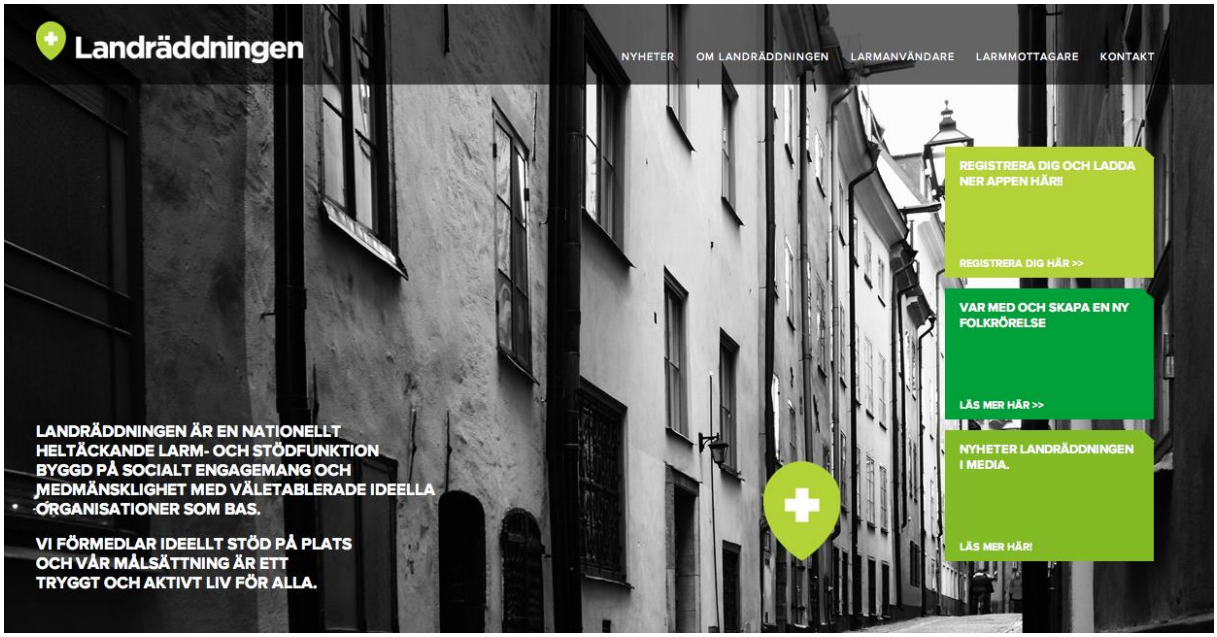
5. Jag har tidigare engagerat mig ideellt

Ja Nej Vet ej

6. Om du svarade ja på föregående fråga, inom vilket område?

1. Bilderna nedan visar Landräddningens grafiska profil och hemsida.

Landräddningen



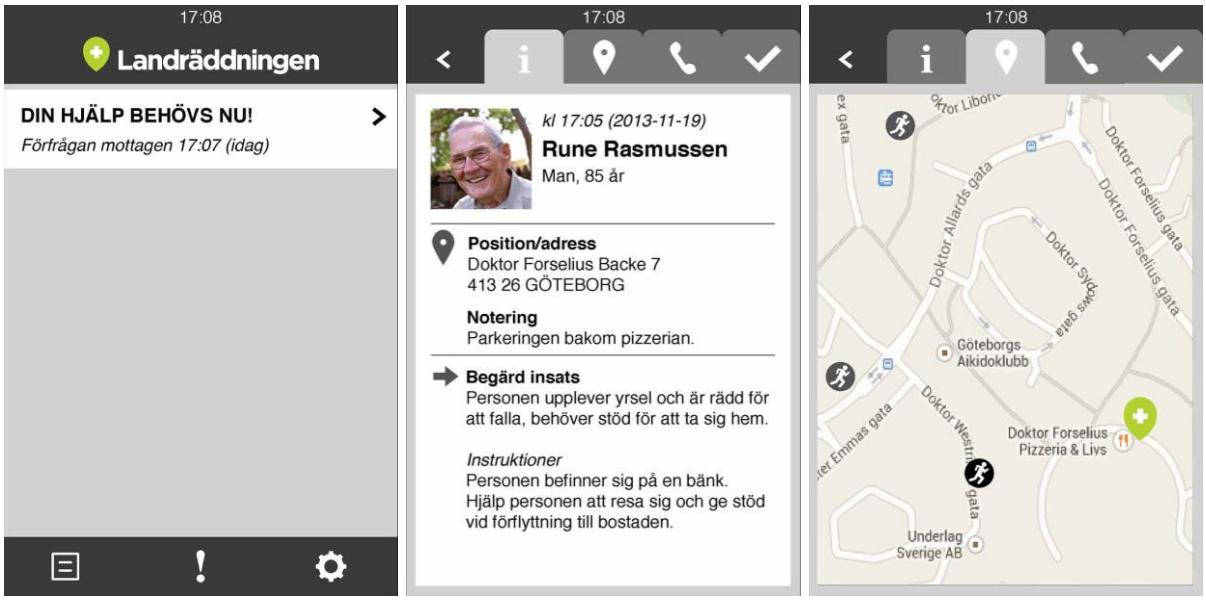
a) I vilken utsträckning tycker du att följande ord stämmer in på de bilder du sett?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

Trygghet	1	2	3	4	5
Informativ	1	2	3	4	5
Engagemang	1	2	3	4	5
Aktivt liv	1	2	3	4	5
Seriös	1	2	3	4	5
Pålitlig	1	2	3	4	5
Funktionell	1	2	3	4	5
Medmänsklighet	1	2	3	4	5
Betydelsefull	1	2	3	4	5
Vänlig	1	2	3	4	5

b) Övriga kommentarer

2. Bilden nedan föreställer ett användargränssnitt för en mobilapplikation.



a) I vilken utsträckning tycker du att följande ord stämmer in på de bilder du sett?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

Trygghet	1	2	3	4	5
Informativ	1	2	3	4	5
Engagemang	1	2	3	4	5
Aktivt liv	1	2	3	4	5
Seriös	1	2	3	4	5
Pålitlig	1	2	3	4	5
Funktionell	1	2	3	4	5
Medmänsklighet	1	2	3	4	5
Betydelsefull	1	2	3	4	5
Vänlig	1	2	3	4	5

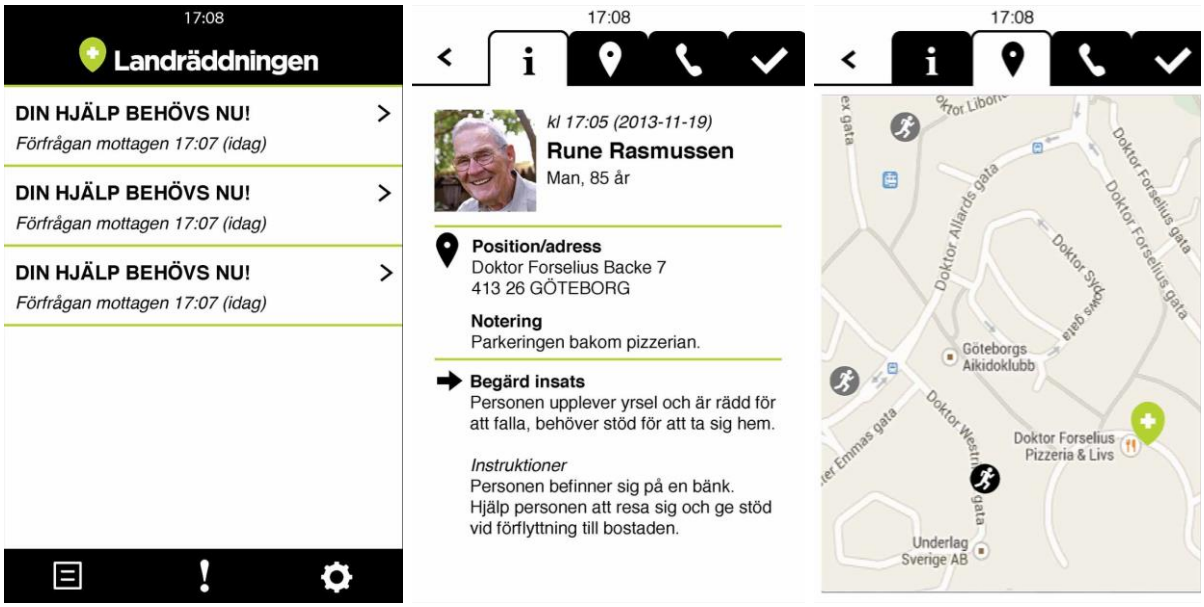
b) I vilken utsträckning tycker du att gränssnittet (som visades på föregående sida) stämmer med Landräddningens grafiska profil (som visas på första sidan)?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt

1 2 3 4 5

c). Övriga kommentarer

3. Bilden nedan föreställer ett annat användargränssnitt för en mobilapplikation.



a) I vilken utsträckning tycker du att följande ord stämmer in på de bilder du sett?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

Trygghet	1	2	3	4	5
Informativ	1	2	3	4	5
Engagemang	1	2	3	4	5
Aktivt liv	1	2	3	4	5
Seriös	1	2	3	4	5
Pålitlig	1	2	3	4	5
Funktionell	1	2	3	4	5
Medmänsklighet	1	2	3	4	5
Betydelsefull	1	2	3	4	5
Vänlig	1	2	3	4	5

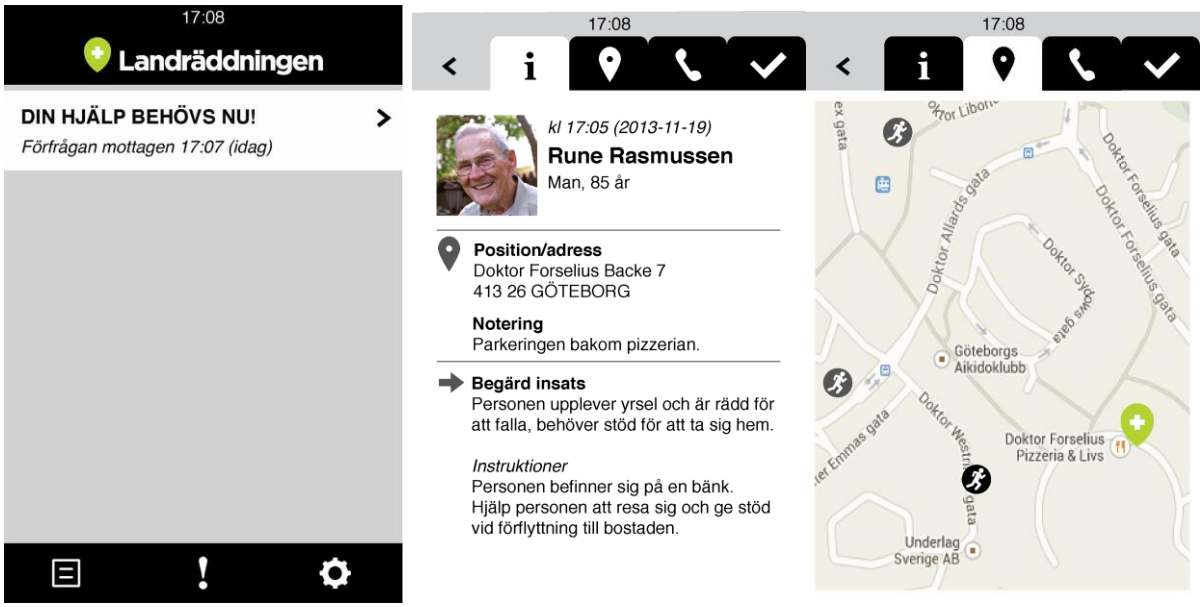
b) I vilken utsträckning tycker du att gränssnittet (som visades på föregående sida) stämmer med Landräddningens grafiska profil (som visas på första sidan)?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt

1 2 3 4 5

c). Övriga kommentarer

4. Bilden nedan föreställer ett annat användargränssnitt för en mobilapplikation.



a) I vilken utsträckning tycker du att följande ord stämmer in på de bilder du sett?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

Trygghet	1	2	3	4	5
Informativ	1	2	3	4	5
Engagemang	1	2	3	4	5
Aktivt liv	1	2	3	4	5
Seriös	1	2	3	4	5
Pålitlig	1	2	3	4	5
Funktionell	1	2	3	4	5
Medmänsklighet	1	2	3	4	5
Betydelsefull	1	2	3	4	5
Vänlig	1	2	3	4	5

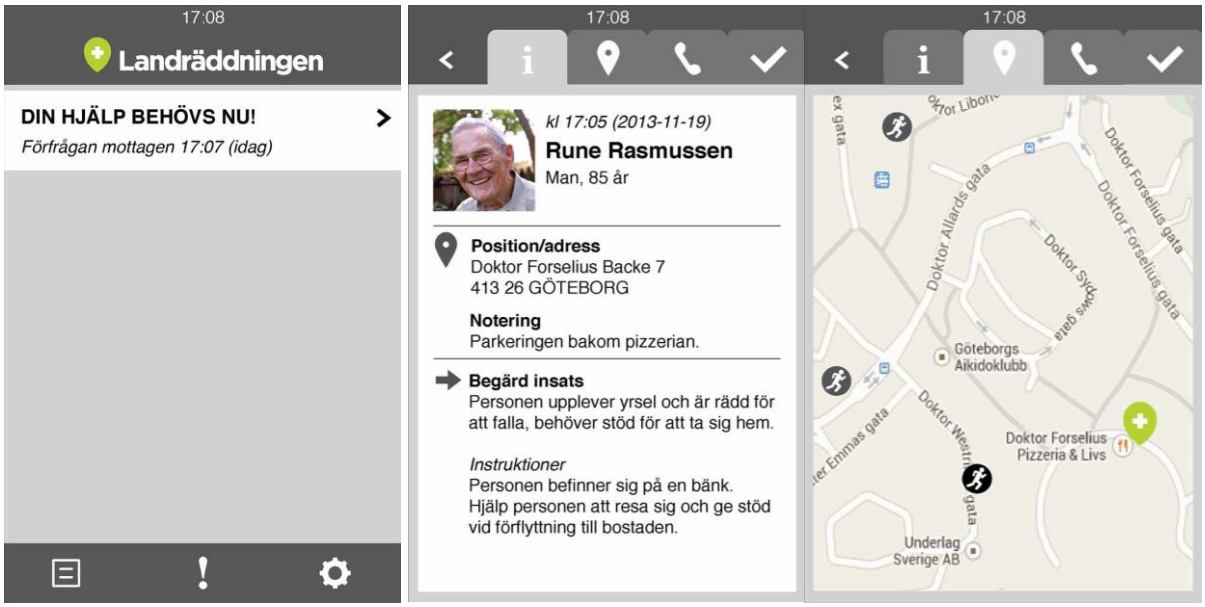
b) I vilken utsträckning tycker du att gränssnittet (som visades på föregående sida) stämmer med Landräddningens grafiska profil (som visas på första sidan)?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt

1 2 3 4 5

c). Övriga kommentarer

5. Bilden nedan föreställer ett användargränssnitt för en mobilapplikation.



a) I vilken utsträckning tycker du att följande ord stämmer in på de bilder du sett?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

Trygghet	1	2	3	4	5
Informativ	1	2	3	4	5
Engagemang	1	2	3	4	5
Aktivt liv	1	2	3	4	5
Seriös	1	2	3	4	5
Pålitlig	1	2	3	4	5
Funktionell	1	2	3	4	5
Medmänsklighet	1	2	3	4	5
Betydelsefull	1	2	3	4	5
Vänlig	1	2	3	4	5

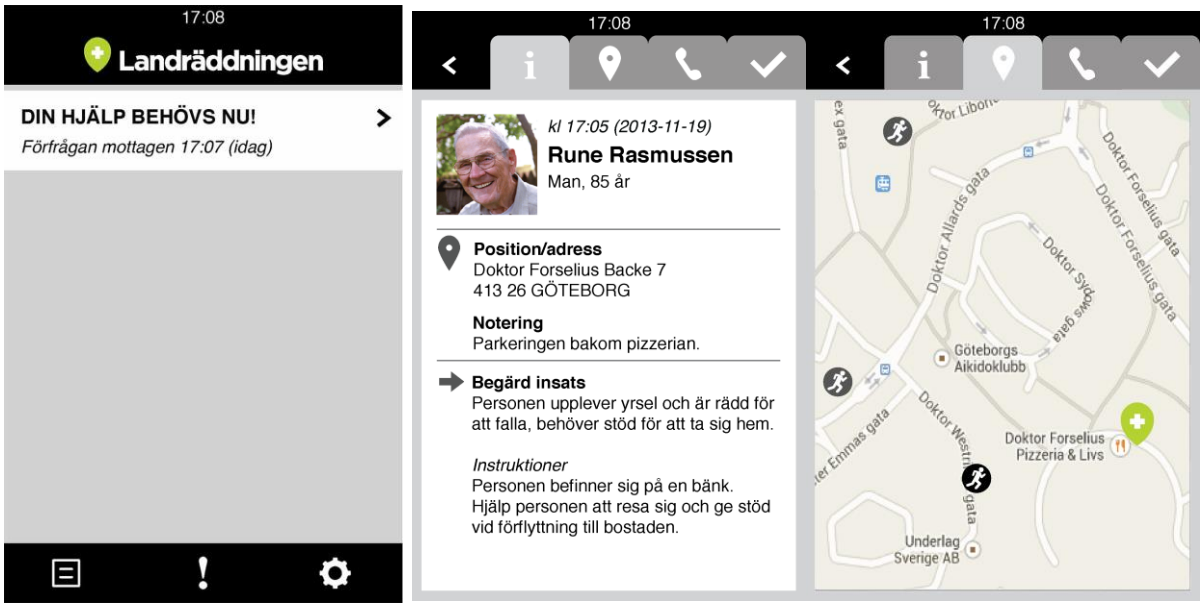
b) I vilken utsträckning tycker du att gränssnittet (som visades på föregående sida) stämmer med Landräddningens grafiska profil (som visas på första sidan)?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt

1 2 3 4 5

c). Övriga kommentarer

6. Bilden nedan föreställer ett annat användargränssnitt för en mobilapplikation.



a) I vilken utsträckning tycker du att följande ord stämmer in på de bilder du sett?

Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt.

Trygghet	1	2	3	4	5
Informativ	1	2	3	4	5
Engagemang	1	2	3	4	5
Aktivt liv	1	2	3	4	5
Seriös	1	2	3	4	5
Pålitlig	1	2	3	4	5
Funktionell	1	2	3	4	5
Medmänsklighet	1	2	3	4	5
Betydelsefull	1	2	3	4	5
Vänlig	1	2	3	4	5

b) I vilken utsträckning tycker du att gränssnittet (som visades på föregående sida) stämmer med Landräddningens grafiska profil (som visas på första sidan)?

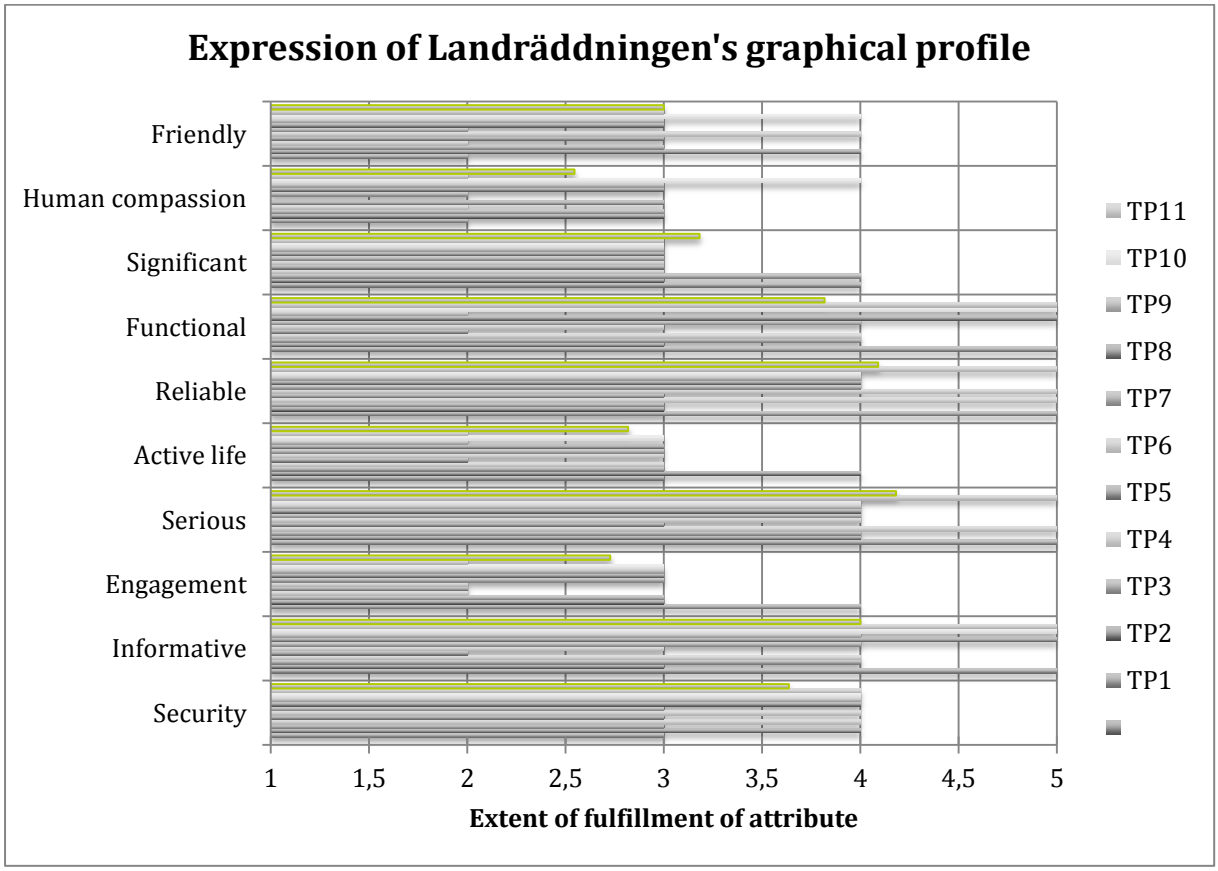
Gradera mellan 1 till 5, där 1 motsvarar inte alls och 5 mycket starkt

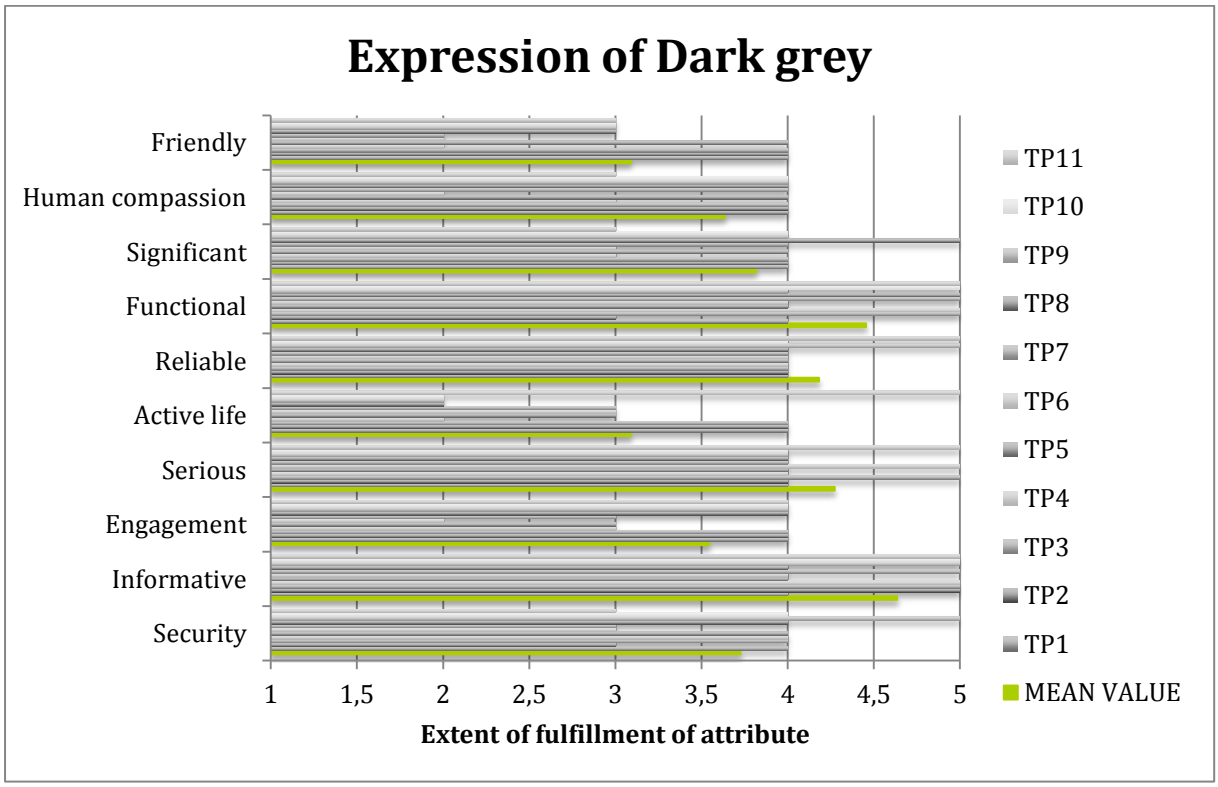
1 2 3 4 5

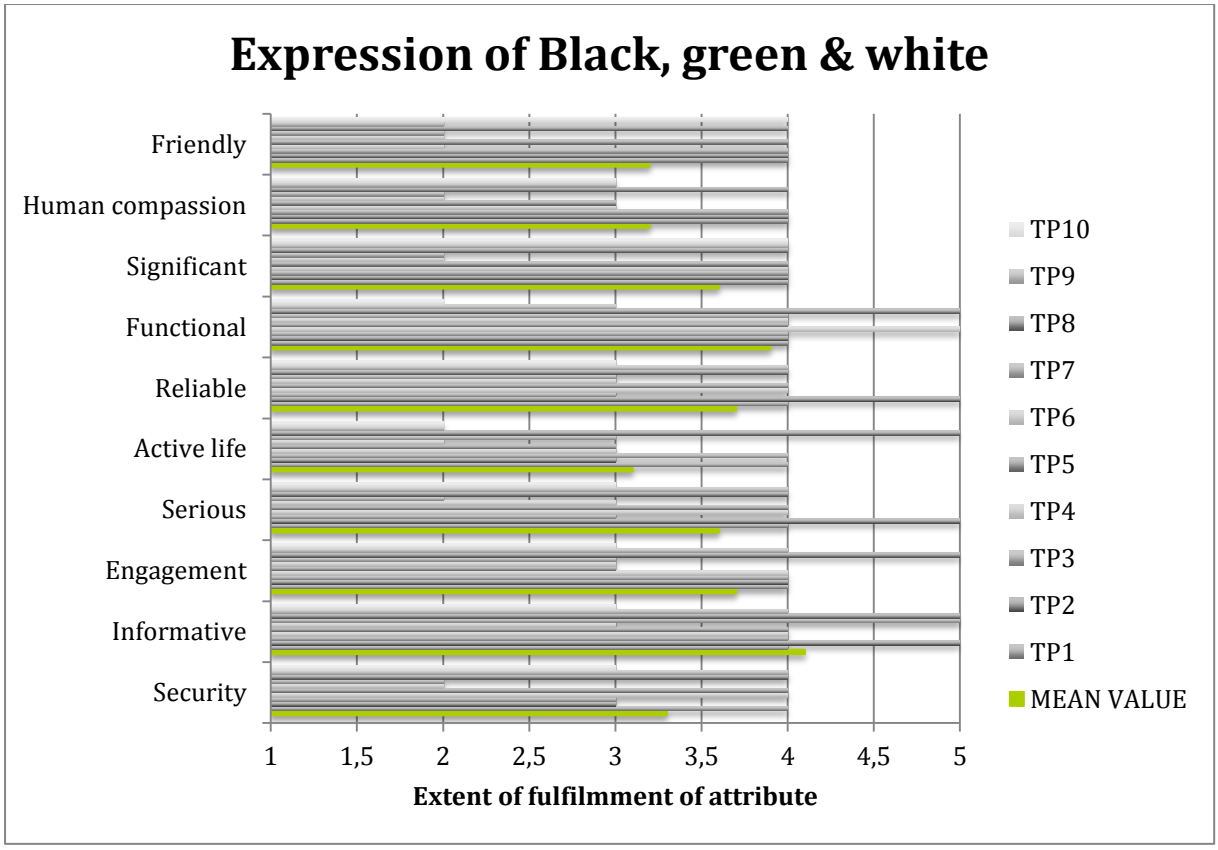
c). Övriga kommentarer

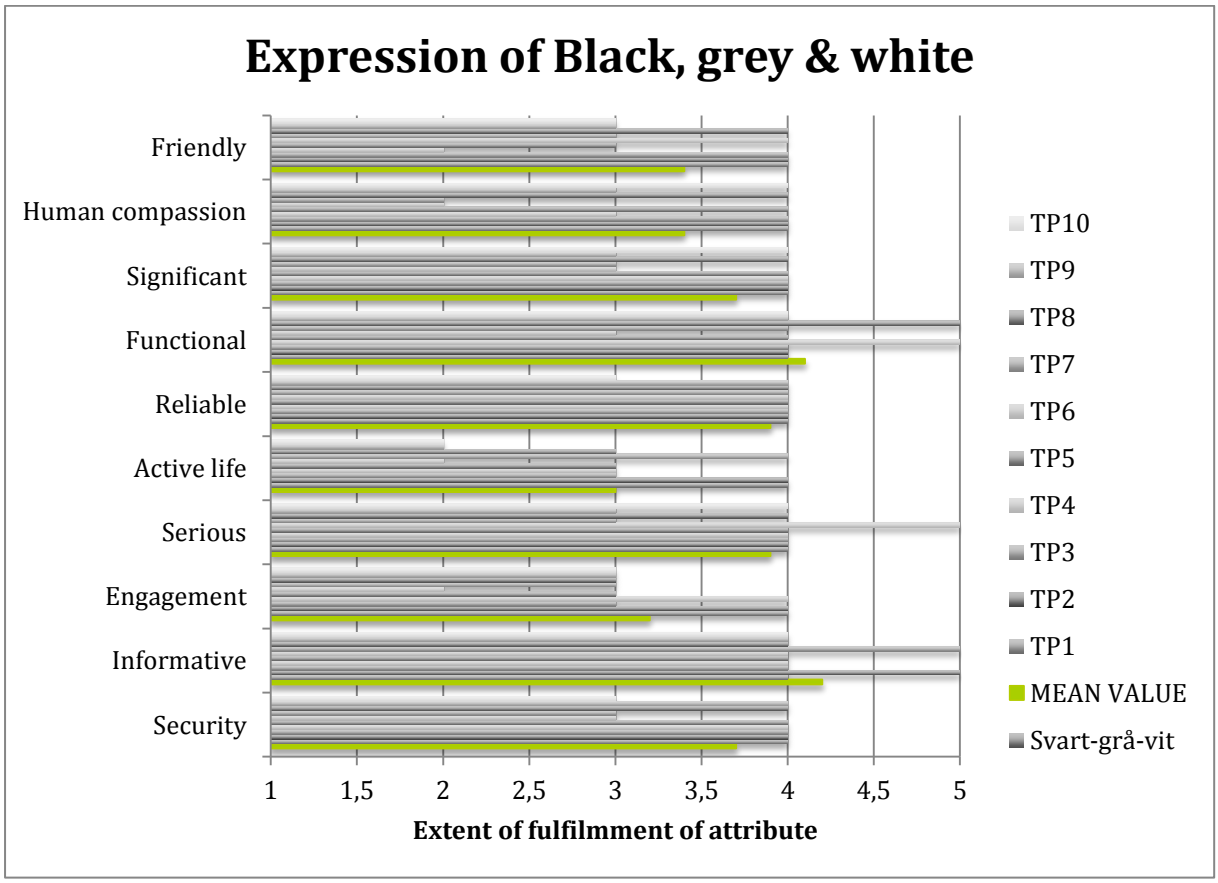
7. Övriga kommentarer

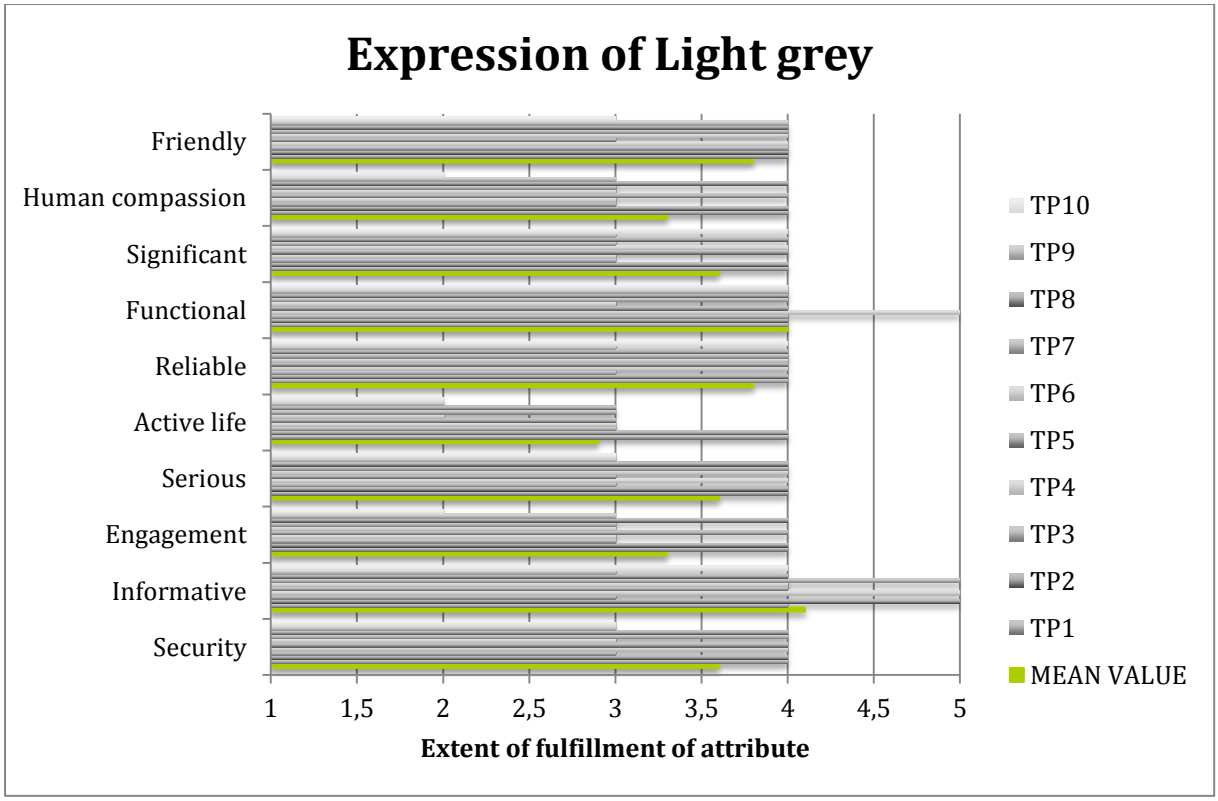
APPENDIX XV. RESULTS SURVEY ON GRAPHICAL STYLE / EXPRESSION

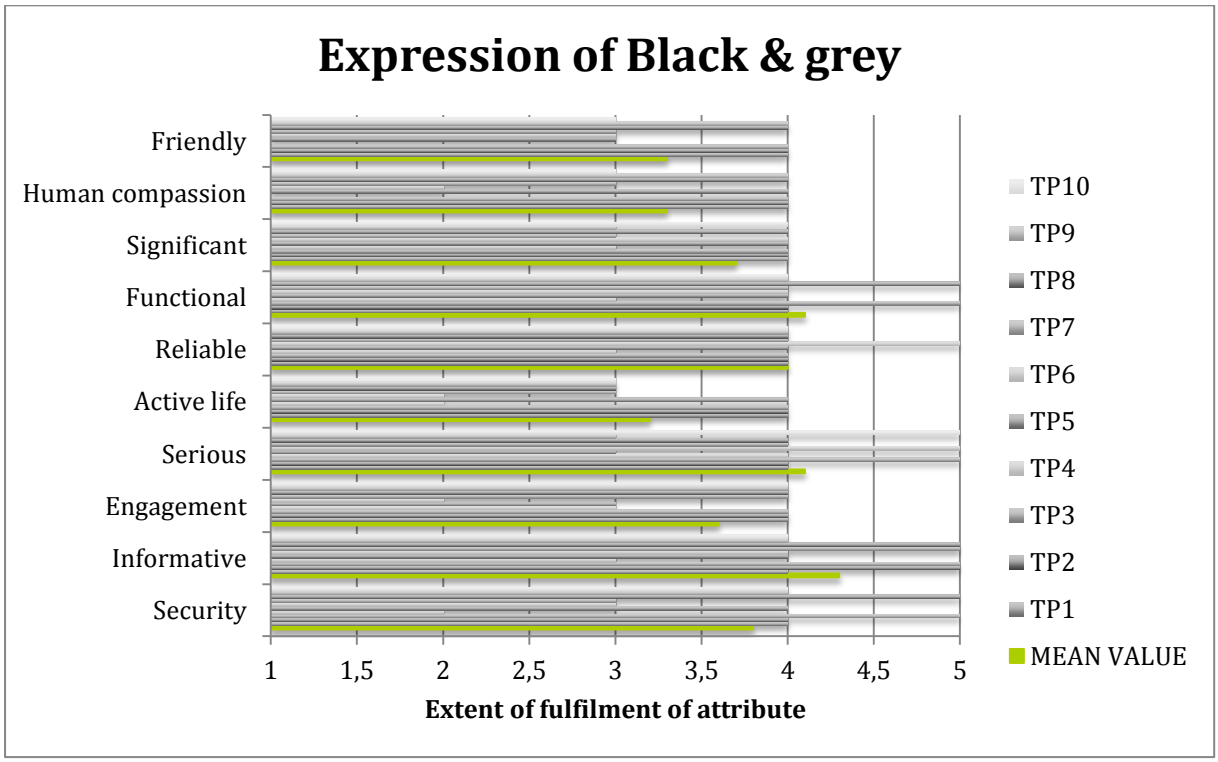


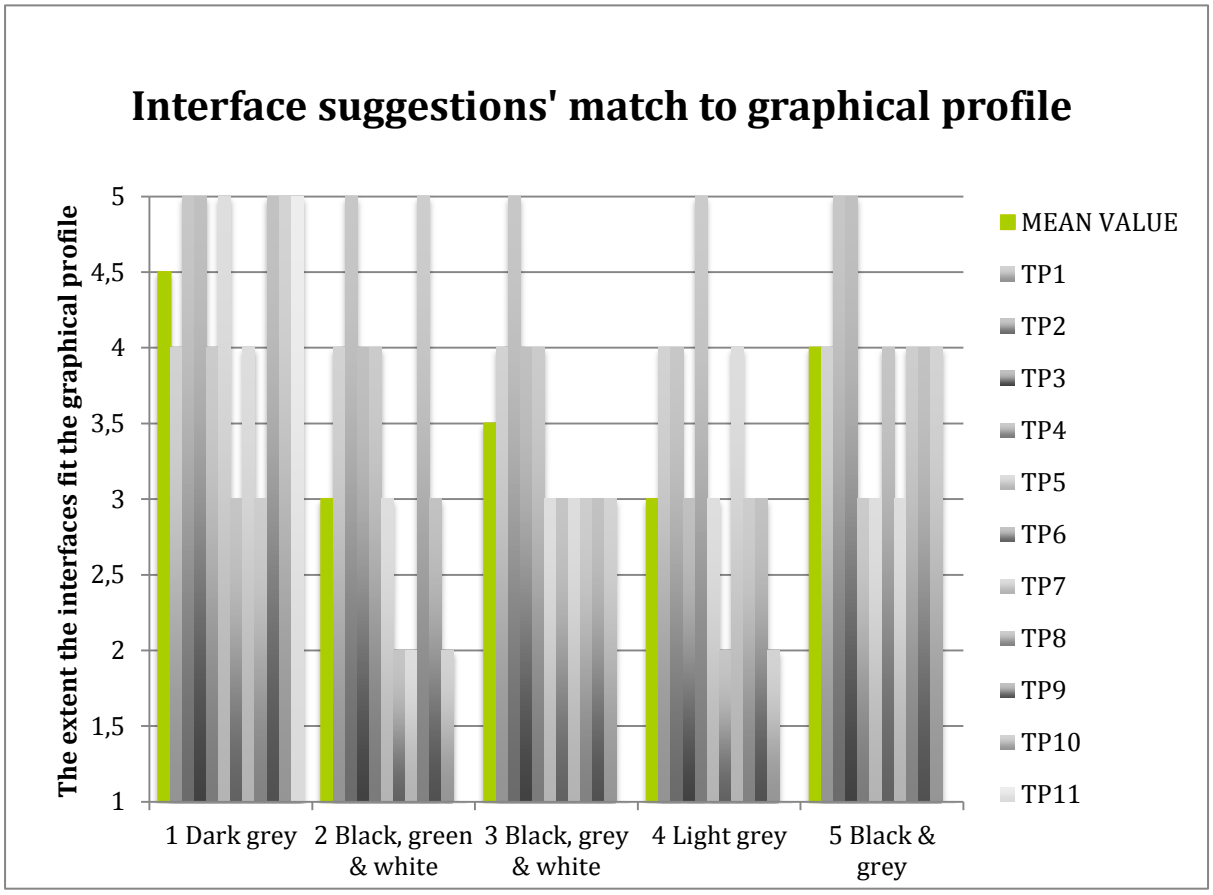



Expression of Black, green & white
Friendly
Human compassion
Significant
Functional
Reliable
Active life
Serious
Engagement
Informative
Security
1
1,5
2
2,5
3
3,5
4
4,5
5
Extent of fulfilmment of attribute
TP10
TP9
TP8
TP7
TP6
TP5
TP4
TP3
TP2
TP1
MEAN VALUE

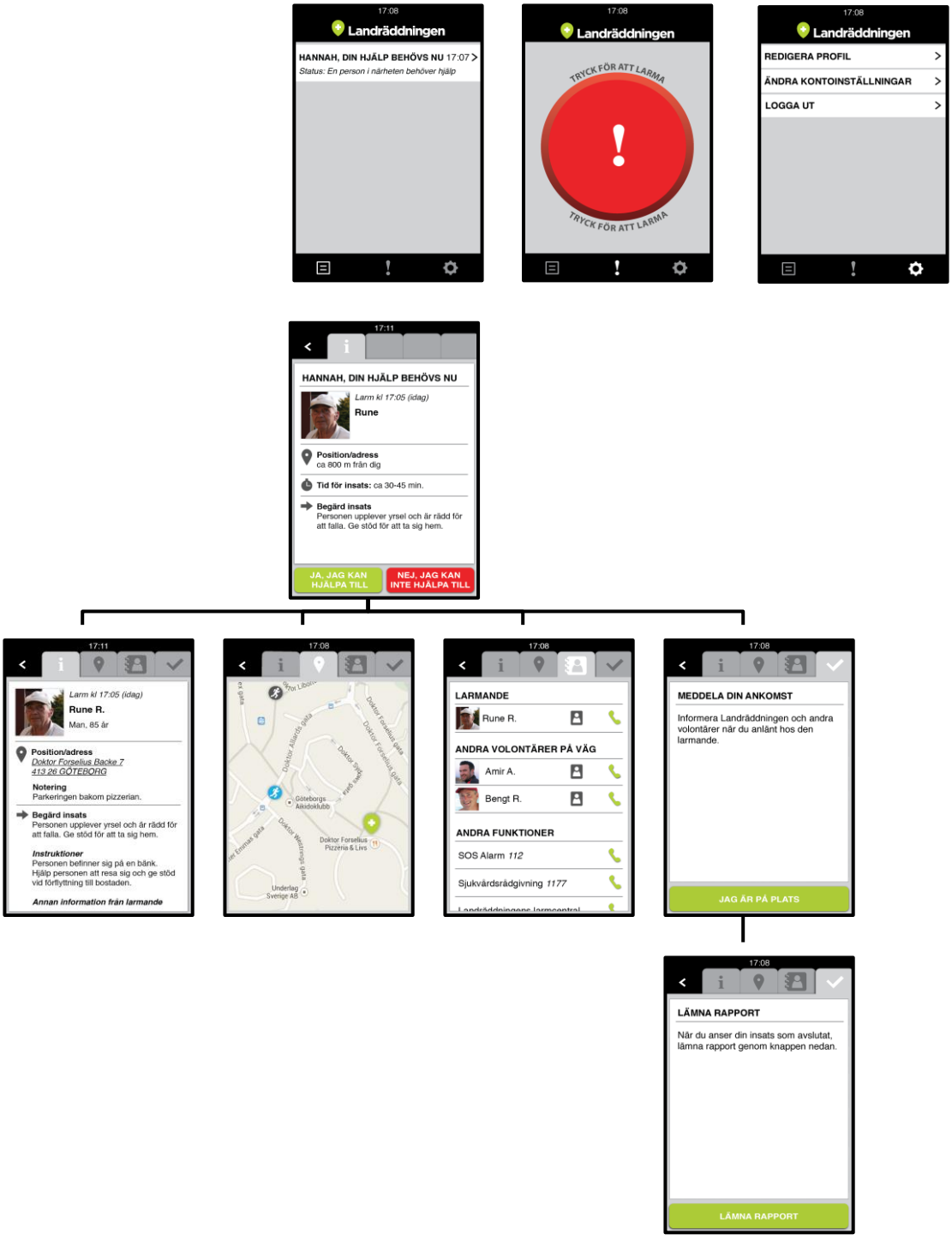

Expression of Black, grey & white
Friendly
Human compassion
Significant
Functional
Reliable
Active life
Serious
Engagement
Informative
Security
1
1,5
2
2,5
3
3,5
4
4,5
5
Extent of fulfilmment of attribute
TP10
TP9
TP8
TP7
TP6
TP5
TP4
TP3
TP2
TP1
MEAN VALUE
Svart-grå-vit

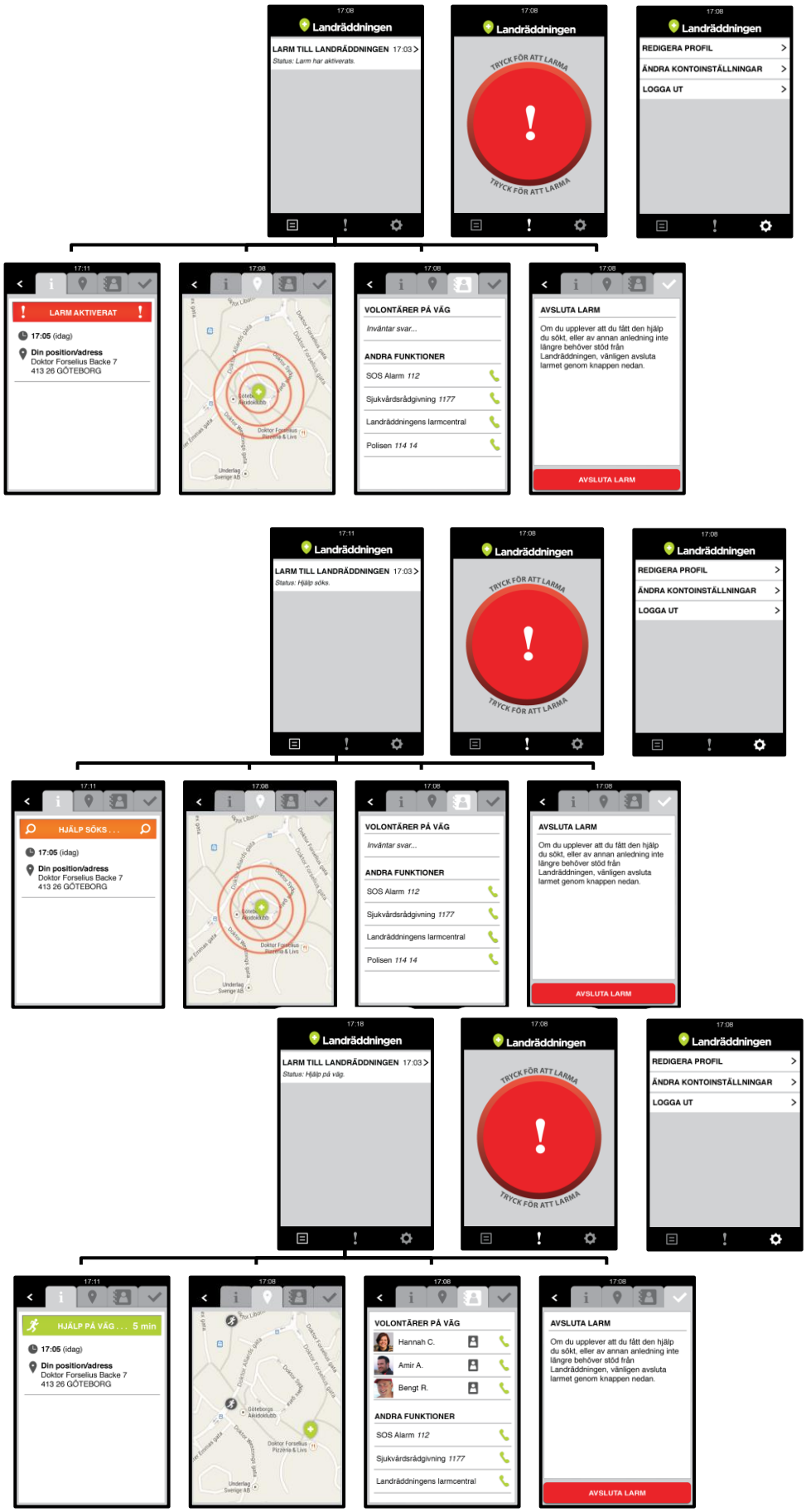

Expression of Light grey
Friendly
Human compassion
Significant
Functional
Reliable
Active life
Serious
Engagement
Informative
Security
1
1,5
2
2,5
3
3,5
4
4,5
5
Extent of fulfillment of attribute
TP10
TP9
TP8
TP7
TP6
TP5
TP4
TP3
TP2
TP1
MEAN VALUE


Expression of Black & grey
Friendly
Human compassion
Significant
Functional
Reliable
Active life
Serious
Engagement
Informative
Security
1
1,5
2
2,5
3
3,5
4
4,5
5
Extent of fulfilment of attribute
TP10
TP9
TP8
TP7
TP6
TP5
TP4
TP3
TP2
TP1
MEAN VALUE

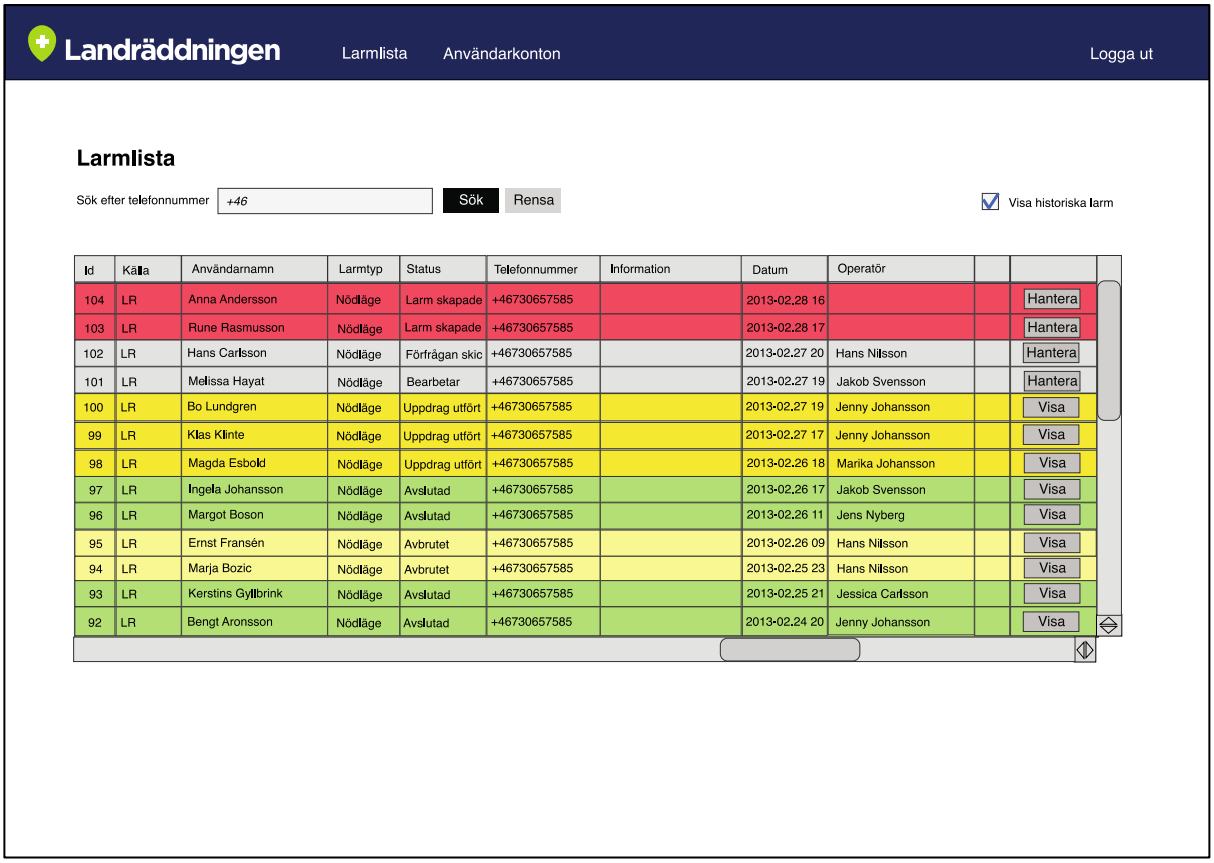

Interface suggestions' match to graphical profile
The extent the interfaces fit the graphical profile
5
4,5
4
3,5
3
2,5
2
1,5
1
1 Dark grey
2 Black, green & white
3 Black, grey & white
4 Light grey
5 Black & grey
MEAN VALUE
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11

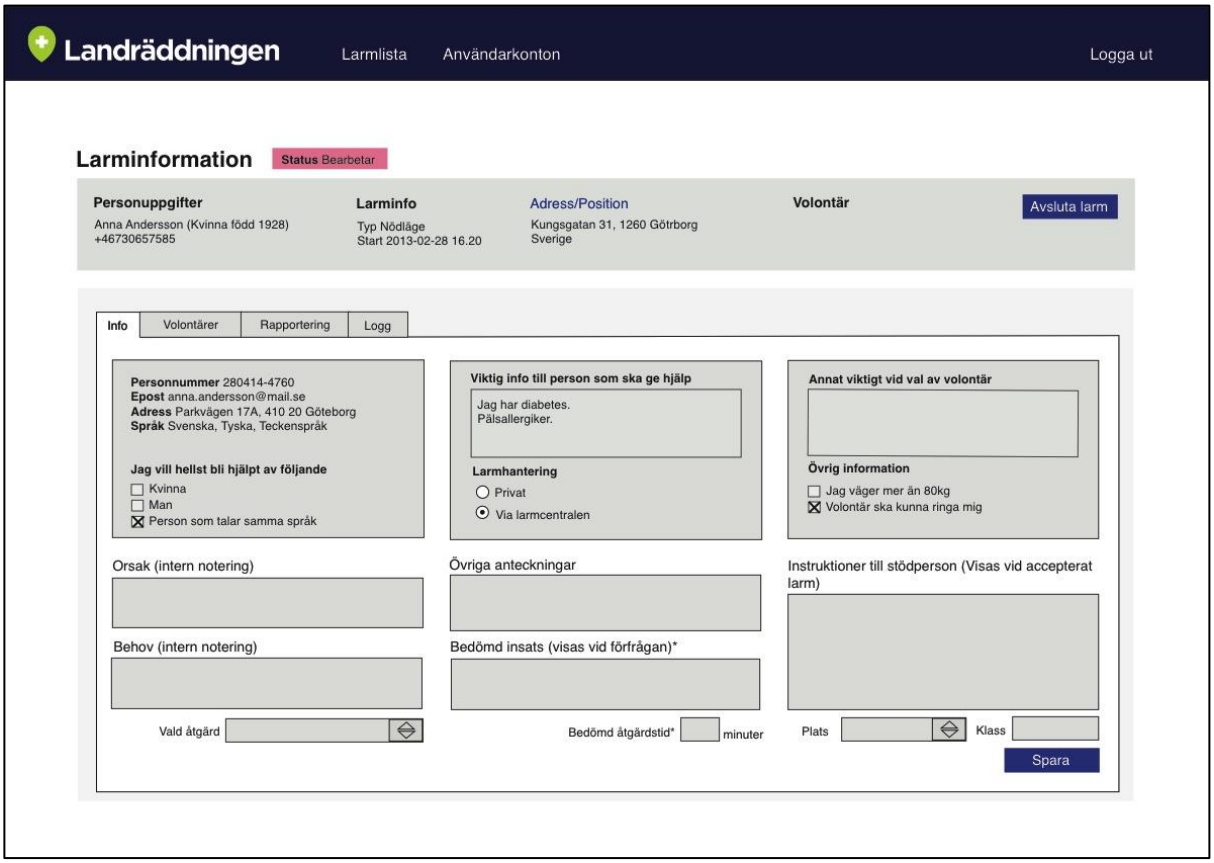
APPENDIX XVI. THE FINAL APP CONCEPT

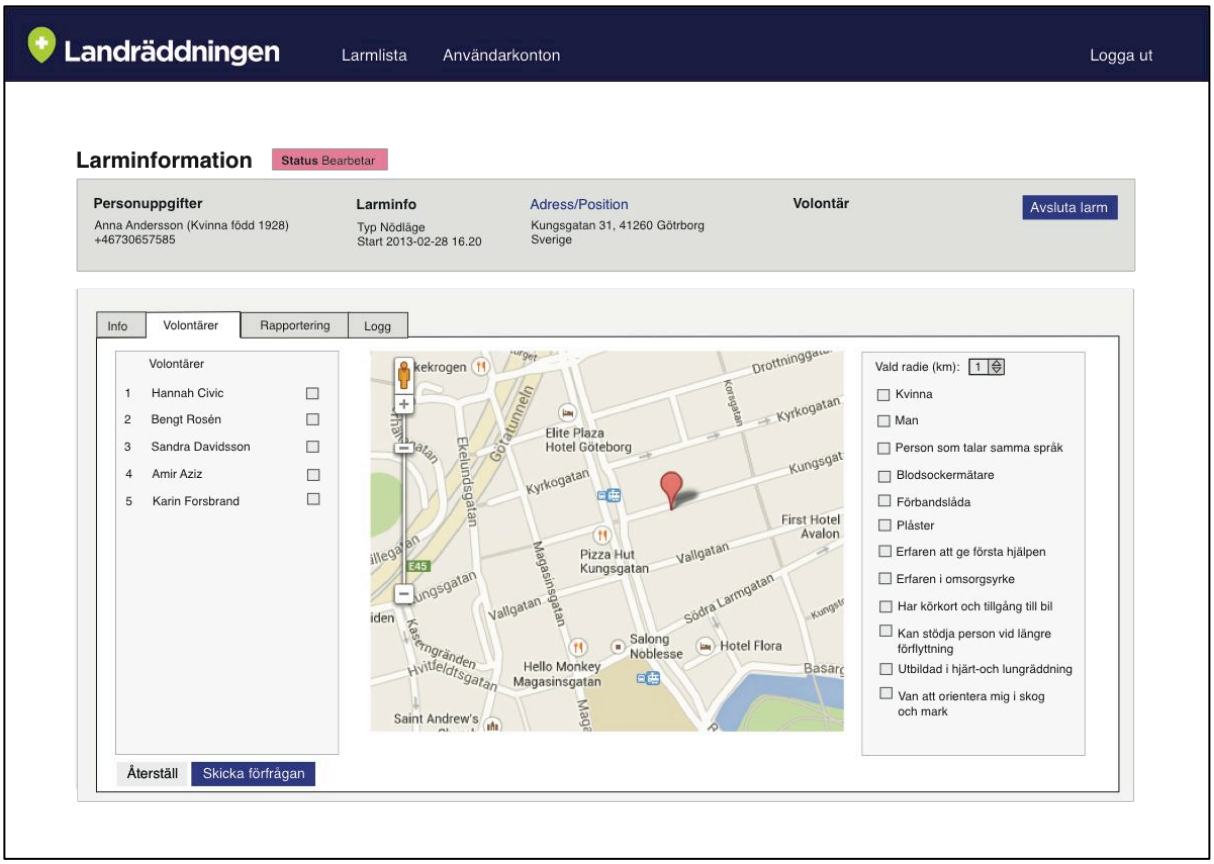


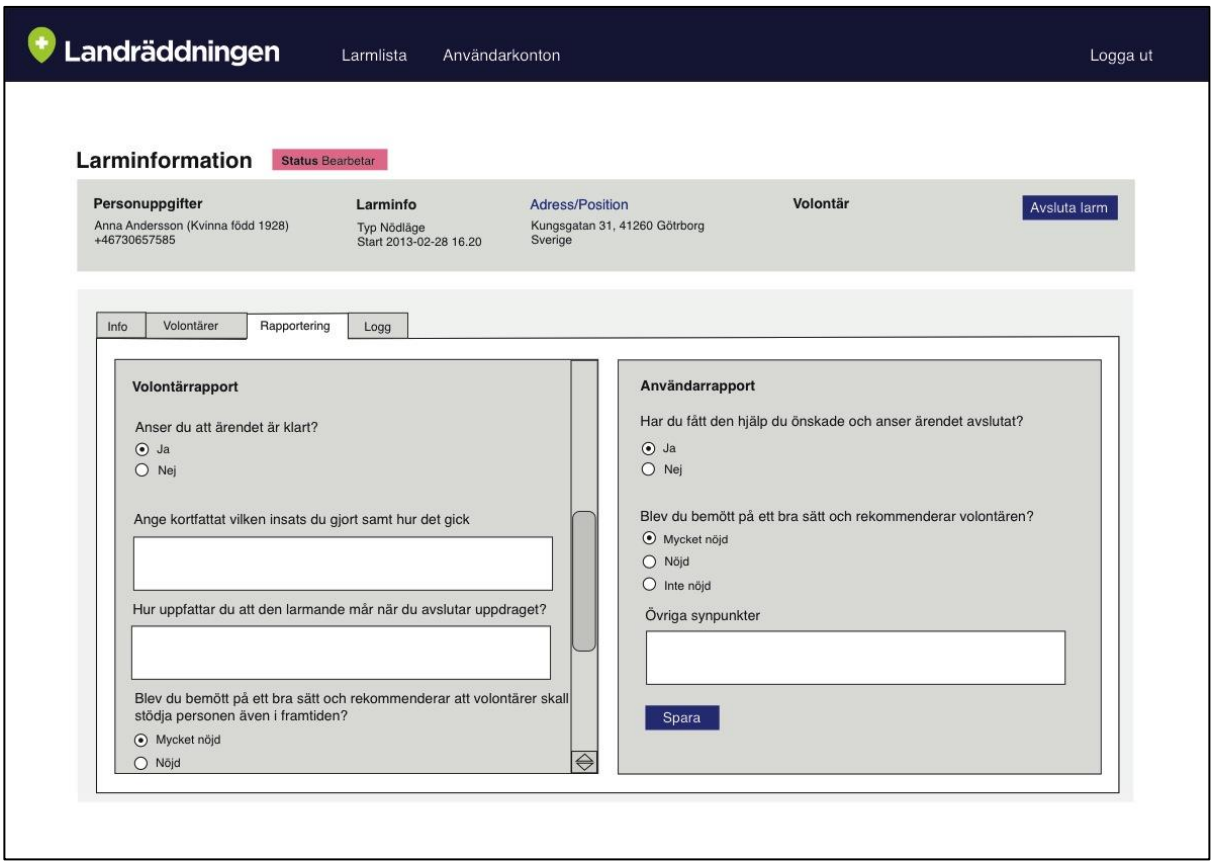

Landräddningen
LARM TILL LANDRÄDDNINGEN 17:03
Status: Larm har aktiverats.
TRYCK FÖR ATT LARMA
REDIGERA PROFIL
ÄNDRA KONTOINSTÄLLNINGAR
LOGGA UT
LARM AKTIVERAT
17:05 (idag)
Din position/adress
Doktor Forselius Backe 7
413 26 GÖTEBORG
VOLONTÄRER PÅ VÄG
Inväntar svar...
ANDRA FUNKTIONER
SOS Alarm 112
Sjukvårdsrådgivning 1177
Landräddningens larmcentral
Polisen 114 14
AVSLUTA LARM
Om du upplever att du fått den hjälp du sökt, eller av annan anledning inte längre behöver stöd från Landräddningen, vänligen avsluta larmet genom knappen nedan.
AVSLUTA LARM
Status: Hjälp söks.
HJÄLP SÖKS . . .
Status: Hjälp på väg.
HJÄLP PÅ VÄG . . . 5 min
Hannah C.
Amir A.
Bengt R.

APPENDIX XVII. REFERENCE INTERFACE






Landräddningen
Larmlista
Användarkonton
Logga ut
Larminformation
Status Bearbetar
Personuppgifter
Anna Andersson (Kvinna född 1928)
+46730657585
Larminfo
Typ Nödläge
Start 2013-02-28 16.20
Adress/Position
Kungsgatan 31, 41260 Götrborg
Sverige
Volontär
Avsluta larm
Info
Volontärer
Rapportering
Logg
Volontärer
1 Hannah Civic
2 Bengt Rosén
3 Sandra Davidsson
4 Amir Aziz
5 Karin Forsbrand
Elite Plaza Hotel Göteborg
Pizza Hut Kungsgatan
First Hotel Avalon
Hotel Flora
Hello Monkey
Saint Andrew's
Kyrkogatan
Vallgatan
Magasinsgatan
Södra Larmgatan
Vald radie (km): 1
Kvinna
Man
Person som talar samma språk
Blodsockermätare
Förbandslåda
Plåster
Erfaren att ge första hjälpen
Erfaren i omsorgsyrke
Har körkort och tillgång till bil
Kan stödja person vid längre förflyttning
Utbildad i hjärt-och lungräddning
Van att orientera mig i skog och mark
Återställ
Skicka förfrågan


Landräddningen
Larmlista
Användarkonton
Logga ut
Larminformation
Status Bearbetar
Personuppgifter
Anna Andersson (Kvinna född 1928)
+46730657585
Larminfo
Typ Nödläge
Start 2013-02-28 16.20
Adress/Position
Kungsgatan 31, 41260 Götrborg
Sverige
Volontär
Avsluta larm
Info
Volontärer
Rapportering
Logg
Volontärrapport
Anser du att ärendet är klart?
Ja
Nej
Ange kortfattat vilken insats du gjort samt hur det gick
Hur uppfattar du att den larmande mår när du avslutar uppdraget?
Blev du bemött på ett bra sätt och rekommenderar att volontärer skall stödja personen även i framtiden?
Mycket nöjd
Nöjd
Användarrapport
Har du fått den hjälp du önskade och anser ärendet avslutat?
Ja
Nej
Blev du bemött på ett bra sätt och rekommenderar volontären?
Mycket nöjd
Nöjd
Inte nöjd
Övriga synpunkter
Spara

ʁSITY OF TECHNOLOGY
, Sweden
Phone: + 46
Web: www.