ReachOut!

Collaborative Information Sharing in Mobile Situations

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Abstract

We believe that we today, more than ever before, move around in the world. With us we have our faithful friend, our mobile phone. As we move around the people around us change, which is something that most of us do not think about, and therefore we do not take advantage of it. We do not see the great supply of knowledge and information that surrounds us because these people are strangers to us. At the same time, many people have no problem opening up their lives to strangers on the Internet through homepages, communities, blogs, chats, etc. What if you had the possibility to take advantage of information that people around possess and share information with them with your mobile phone?

With this thesis we wanted to research when, and in what situations people would want to share information with others through their mobile phone. And what kind of information would you want to share with the people around you for personal reasons? By performing a user centred study we developed an application that facilitates the possibility to take advantage of the supply of knowledge and information from friends and strangers around you when moving around. This process gave us insights saying that the situation affect with who and what information people want to share through their mobile phone.

Key words
Interaction design, Information sharing, Mobile phones, Mobility, Focus group

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1. Introduction

In this chapter we will present the background to why this project was performed as well as state the problem we will answer throughout this thesis. After the problem area has been explained the purpose, target group and delimitations of the thesis will be presented. The aim of the chapter is to help the reader form an understanding about what the thesis will contain.

1.1 Background

In today's society we move around a lot, not only in our every day life, but we travel all around the world. And with us we almost always have our mobile phones. A lot of people daily use their computers not only to communicate with friends and family, but also with strangers in chat rooms, or they tell people about their life in a web blog. However, another important communication device, our mobile phones, we mainly use to communicate with friends and family (Rheingold, 2003). Why not start using the mobile phone in a similar way that we use our computer to meet new people?

In this design project/thesis we will combine two earlier design projects, which we have been involved in; the mobile applications MobTune and TravelBuddy. MobTune enables the user to share music tips with other users and facilitate interaction between people by means of their music taste. TravelBuddy lets the users get in contact with other users when travelling. Our aim is to combine these two and continue with the concept of sharing information with people in your surrounding. The idea is to transfer information between the mobile phones with the help of Bluetooth technology. Both MobTune and TravelBuddy aim at connecting people and enable them to exchange different kinds of information depending on what they are interested in/ or the situation they are in. They both aim at making people more open to making contact with strangers. Below we have a quick summary of each project.

MobTune- Share your music world (Abdulla et al, 2006)
The article "MobTune- Share your music world" describes the development of a design concept within the theme of mobility. The core idea is to take advantage of that people around you vary, which suggest that the information that people possess around you also vary. We begun with performing a questionnaire with the intention of finding out what kind of information people would like to share with others. By doing

this we realized that the aspect of *where* people are, influences what kind of information they want to share. When performing an ethnographic study at a later stage we found that many listen to music and use their mobile phone when they are moving around in urban places. MobTune became the result of integrating these facts with the mobile information sharing idea.

MobTune is an application used on your mobile phone that allows you to share music tips with other people moving around you, who also use the MobTune application. The application is divided into the four sections "My Search", "My Friends", "My Music Tips", and "My Profile". Within these you can search for music tips shared by people around you, look at your saved friend's profiles and see if they are near by, control your shared music tips, and finally edit shared information about yourself. User tests were performed in order to make sure that the application was easy to use and had a relevant content.

The intention of MobTune is to facilitate a link between people circulating among each other, by means of their music style. Hence MobTune do not only provide people with a variety of music tips; it also enhances mobility and creates new contact seeking opportunities.

TravelBuddy- a new way to find new friends (Ivkovic et al, 2005)
The concept of TravelBuddy was developed to enable people to meet to new people when waiting at airports. We did an ethnographic study at both a train station and an airport. The first study showed that younger people were the ones interested in such an application. The study also showed that they were more willing to share information at an airport where they might have to wait for a longer period of time than at a train station or bus terminal. At the second ethnographic study, at Sturup airport, we wanted to identify which functions people were interested in, as well as what kind of information that might want to share with others.

The TravelBuddy application would be available for downloading on the Internet and when the user was in an airport he or she could login and start interacting with others who also had the TravelBuddy application and were logged on. The user had a user profile where he or she had a name, nationality, age, destination, and interests. The only mandatory information that they had to share was a name. The users could

interact in a chat room or in a private conversation. They were able to find people that they might want to interact with via a search function that allowed the user to fill in what kind of persons they were looking for. They did not have to search; they could also go straight to a chat or private conversation.

In order to continue exploring these ideas we till create an application that facilitates this kind of collaborative information sharing, that lets them reach out to other people. Due to this feature the headline of this thesis say "ReachOut! Collaborative information sharing in mobile situations". In order for no confusions to appear we want to explain that "ReachOut" turned out to be the name of the application that will be developed in this project. Since this name was not decided on before the end of the design process, we will not use that name in the thesis before that part of the process has been explained.

1.2 Problem presentation

The results from the MobTune and the TravelBuddy ethnographic studies show that the situation/place people find themselves in influences the willingness and the kind of information they want to share. This insight made us interested in investigating this in more depth.

We want to try to explore this phenomenon by performing a user centred design study. Within this we propose to develop a mobile application that incorporates the idea of connecting people by sharing information with people in your proximity with the insights from the investigation continued on from the MobTune and TravelBuddy project. The type of shared information these projects focus on, and the kind we also want to continue researching, is information people would like to share on their leisure time with their mobile phones, for personal reasons. We are not interested in work related information sharing.

1.3 Problem

- When/ In what situations are people interested in exchanging information with others by means of their mobile phones?

- And what kinds of information are they interested in sharing for personal reasons?

1.4 Purpose

The purpose of this thesis is to study if there are situations or surroundings where people are more inclined to exchange information with others, what kind of information this might be, and how to integrate this with a social focus. This will be performed by involving a focus group when designing a mobile application that integrates their ideas concerning the studied subject. Hopefully this study can contribute with better knowledge concerning people's standpoint toward mobile information sharing. With better insights about what people want to share, and in what situation people want to share different information, future mobile sharing applications will hopefully be more adapted to people's requirements.

1.5 Target group

Our proposed target groups are others with interest in mobile information sharing, like designers, researcher and student. We also turn to people with a more general interest in interaction design and informatics.

1.6 Delimitations

As described in the problem presentation (see section 1.2), we have delimited the research area by only looking at information people would like to share on their leisure time, and thereby delimiting information that people want to share when working from our study.

We chose to delimit the user contact to involving a focus group. This was a conscious decision since we feel that we this way will get the closeness to the users that we need in order to get the kind of deep answers we strive for.

2. Literature review

With the intention of exploring related work, and to recognize which methods we should use throughout our project, we performed a literature review.

To find information that is relevant for our study we chose to begin with looking at the ACM Portal, and to Google for PDF-files, by searching by a number of keywords related to our problem statement. We first performed a search of a general nature where we tried to find articles written about information sharing and mobile information sharing. Then we focused on when and what kind of information people want to search for. When searching within this field we realised that most work done shared a very social focus, which we also find very important for our study. Our own selected keywords were complemented with relevant ones found in these articles. We also continued our search by using references within these articles to get an as complete review as possible.

2.1 Related work

The material found most relevant is presented below. In order to get a simple overview we have chosen to group them by keywords that represent the three areas, which relate to our study, which we found through our literature review. The information found in the articles does not only aim to give the reader an insight into related work. This information was also used to complement our own studies, and as written earlier to support us in our choice of methods. We also used literature from the method genre and from interaction design to find methods appropriate for our project. Everything regarding our methods will be presented in chapter 3.

2.1.1 Mobile information sharing

There are rather much written about mobile information sharing, but very much of this material is workplace related. “Dealing with Mobility: Understanding Access Anytime, Anywhere” (Brown et al, 2001), “Designing to Support Communication on the Move” (Brodie, 2003) are examples which, even though they had promising titles, all concern this topic.

SEREFE (Ahn J, Pierce J S, 2005) is a concept that is trying to cover both work and personally related information sharing. These researchers have identified a scarcity in support for serendipitously sharing of digital information. In order to face this problem eight different design goals are discussed that a system like this would have to meet to be successful; (1) Support sharing information using mobile devices, (2) Support access to information on multiple devices, (3) Support sharing in the face of inaccessible devices, (4) Support multiple channels for transmitting information, (5) Support both face-to-face and distributed sharing, (6) Protect the privacy of users' information, (7) Provide a minimal set-up process and (8)Support sharing across a users' own devices. SEREFE is a system designed to meet these goals and is a new architecture for SEREndipitous File Exchange. It works like an extended instant messenger, which makes it possible to share information (with other users) that is stored on any of your devices, including your mobile phone, or to copy it to another of your devices. What is interesting for us here is of course the fact that it concerns sharing information with our mobile phones. Though, it does not have the social focus nor does it bring up anything about detecting other devices in your surrounding and taking advantage of the information they might contain. The presented goals are something that we feel could be of great use during our design.

There were some articles that treated mobile information sharing for personal purposes. "Life is Sharable: Blogging Life Experience with RFID Embedded Mobile Phones" (Yun-Maw Cheng, Wai Yu, Tzu-Chuan Chou, 2005) presents a design concept that aims to make it possible for people to share experiences. By means of their mobile phones people should be able to post comments and pictures at RFID-tagged places or objects. Through a connection to a server these comments are sent to a weblog. When people are close to a tagged area they can check interesting messages and rate them in accordance to how interesting they found them. What motivated the research of this article were observations of why and how people capture their spontaneous life experiences, and what contents of these they provide and share with others. This kind of information can hopefully be of use to our study as well. In addition to that this article relates to our concept in the way that it want to create a communication opportunity and link people depending on their similar interests and also since it uses mobile devices. This article shows that different places can relate to peoples interests, which we need to take into consideration in our study. Our idea differs in many ways though. In this article stationary places or objects are used to

receive and send comments contrary to our idea where people constantly moving around are sharing information with each other.

The LoveBomb (Hansson & Skog, Internet) is another concept that focuses on personal use. It is a little device that you can carry with you wherever you are which facilitates the sharing of emotions. It senses people around you using the device and with only two buttons it lets you anonymously exchange the feeling of love or of sadness with these people as they can with you. The idea is to have a positive affect on the aura in public places by sharing feelings. In order to examine the concept focus groups were used. During the focus group sessions the participants were given a presentation of the concept and were shown design mock-ups to get a good insight into the concept. Users were then encouraged to speak freely about what they thought about how a device like The LoveBomb could affect the aura of public places. The sessions resulted in the insight that the users did not want it to be as anonymous. They wanted the device to have more functionality so it for example could lead to social interaction. There was positive feedback on how the device would affect the aura as the participants thought that the device could lead to decreasing feeling of loneliness. We find this concept relevant for our project since it brings up an alternate idea of what you can share. It makes us aware of that when talking about sharing information with people in your surrounding, information is a very wide concept. This article also gives us good inspiration for what kind of methods we can use in our study.

The idea within this theme that relates the most to our project is presented by Cöster et al (2004). They describe a social mobile service called MobiTip, which makes use of relative positioning using Bluetooth. The idea is that this service gives the users the possibility to post tips or comments concerning something of interest in the environment. These tips are then pushed over to other users as they pass each other, when getting close to a hotspot, or on demand. MobiTip wants to stress the importance of the social space and does so by visualizing it in the application. A presence map illustrates other users nearby, thereby illustrating where tips come from and why they are presented at some particular point in time. Changes in proximity between devices are shown in the map by icons appearing and disappearing from view. Similarities between users, the context defined by Bluetooth-closeness, and tip popularity define what tips the system presents in a given situation. Hence, user movement and presence of other users, combined with tips and ratings, form a web of

social trails. This concept is alike our in the way that it takes advantage of people moving around and being able to share tips with the people in their proximity. MobiTip lets the user enter their own opinions, as well as inspect and react to tips from others, which is something that we most likely will implement in our application, if our users want so.

2.1.2 Mobile social matching

Within this keyword there was a lot to be found that related to our study. Rather many of the explained concepts were of similar nature. When we found very similar ones we chose only to select the best described one to present below.

Social Net is an interest-matching application used on mobile devices (Leigh et al, 2002). This application uses Bluetooth to detect people in your surroundings. It records time and duration of encounters and checks for patterns in proximity over time between different people in order to try to find out if you might have some interests in common. With this information as a foundation, the application checks if these strangers have a mutual friend in their friends list. If that is the case the friend is suggested to introduce the two. This way Social Net strives for a natural way of interacting in contrary to similar services, which the authors mean forces on an unnatural socializing. A functioning application was implemented on a mobile device and tested in a field test, where both positive and negative things were discovered about its use in practice. Positive was that first of all that the application successfully generated introduction proposals. Another positive thing was that the users appreciated the application's features that were designed to guard their privacy. This mitigated the users' fears of being tracked. Negative response was that the users did not always understand why Social Net suggested an introduction since they were not sure of what they had in common. Another problem the field study revealed was that people did not add each other as friends after being introduced. This led to other mutual friends also receiving suggested introductions for the pair. This means that the actual use of the application does not work as planned. This relates to our study since this application, as ours, aims at making new social contacts. It shows that people do not use all the features which can lead to problems; in this case, they were introduced to the same person several times because they had not added each other as friends. After having read this we became even more aware that we would really have to interact with the users throughout the project to avoid similar mistakes.

Another concept within mobile social matching is ReConnect (Bounds et al, Internet). This is a system that uses interests and the state of extroversion as guidance of if to interact with someone or not. With both Bluetooth and GPS technology ReConnect aims to make the contact seeking easier by decreasing the fear of rejection. The system has at the time when the article was written not yet been implemented. There is an outlined plan for how the implementation will be performed though. It will be divided into two implementation phases, the initial prototype phase and the long-term. The initial phase will include design analysis, prototyping and user studies, while the long-term one will consist of construction and development of the actual device and the system. When these two phases are completed testing and usability studies will be performed. One of the things that we will use from this article is the insight that people are afraid of rejection. Because of this, we will see if our users would like to use a chat function. This would enable them to join an ongoing conversation and the chance of rejection would be lesser, and since they can be anonymous they feel more secure.

After looking at a concept that had not been completed we found a fully developed system that relates to our study since it aims to facilitate finding friends with similar interests. It is called Serendipity (Eagle, Pentland, 2005) and uses Bluetooth to check the people around you by matching your interests with theirs. If there is a match an anonymous SMS is sent that tells the involved persons that there is someone near you whom you might want to introduce yourself to. Both persons must agree to be interested in starting an interaction with each other in order for them to be able to actually contact each other. During the development there have been testing of both the Bluetooth use, and of the application. When testing how Bluetooth was used the researcher realized that there are many people who own Bluetooth devices, but not many of them have them activated. When performing the test of the application the test persons participated with consent and all of them was given a device with the application, which had Bluetooth activated. The test gave results that showed that the application could be disturbing in some situations, and that the application needed to be easy to turn on and off. Otherwise the feedback on the study was positive. This article relates to ours in the way that is facilitates a way of finding people around you with similar interests by using Bluetooth. The article has made us aware of that the application needs to be easy to turn on and off, so that it will not be disturbing in any

sense. It also presents how the concept can be tested in smaller parts, which sounds like a good idea for making it easier to process. The automatic matchmaking with the SMS proposing an introduction is something we do not find interesting for our case.

Finally we found a system called Proem (Kortuem, Segall, Thompson, 1999) interesting for our study. Proem is a framework for profile-based cooperation between mobile users. By using Proem it becomes possible to create a profile of your own with for example interests, likes and other personal information. You can share this information with others and look at profiles of other mobile users, who you might come across while moving around. The intention of the system is to facilitate informal communication and awareness during chance encounters of mobile users who do not know each other. There are some principles discussed as critical for a system like this, and these need to guide the development. The principles say that the information shared need to be controlled by the owner, and that it has to be up to the reader when and what to select to read and from who. This framework might be the one that is most alike our idea since we also want people to share the same kind of information as the authors of this article. What we will take with us from this article is their principles that say that the information shared need to be controlled by the owner, and that it has to be up to the reader when and what to select to read, and from who.

2.1.3 Willingness to share information

Through this literature review we have shown that there are researchers who have developed concepts and products that facilitate mobile information sharing and social interaction. However, to be able to answer the stated problem in this thesis, when and what kind of information people want to share, we have to go back to more foundational issues, as peoples feelings towards information sharing. There are some researchers who have looked into people's willingness to share information.

Grudin, Horvitz and Olson (2005) mean that people's willingness to share information differs depending on who the receiver is and what kind of information you share. They came up with their insights by using a two phased method. First an exploratory phase was performed where people were asked when they had shared information and later regretted doing it. The results in this phase were then used as a foundation for a survey in the next phase. This survey was performed in order to find out how comfortable people were sharing different things with different people. The aim of the

study was to support the design of future efficient languages and tools that allow users to specify, and refine over time, what they wish to share with whom. This makes the article and its findings highly relevant to our study. We will use this information as a foundation for our study.

We also found a study performed by Dey, Lederer and Mankoff (2003) concerning how the situation and the inquirer influence the privacy concerns for information sharing. This study was performed with the intention of serving as a foundation for designing a user interface for managing everyday privacy in ubiquitous computing. It was carried out by means of a scenario-based web questionnaire, which aimed to show the relative importance of the inquirer and situation for determining an individual's privacy preferences in ubiquitous computing environments. The authors mean that the study indicates a higher importance of the identity of the person who is sharing the information than of the situation. It also shows that the situation is of importance. With this insight the authors propose that when designing for privacy concerns for ubiquitous computing the inquirer should be of first priority and the situation of second priority. This article is relevant for our study in the sense that it brings up issues we need to take into consideration in our design. Also, the fact that it confirms that the situation in which information is shared is of importance for people's willingness to share makes this article very interesting to use as support for our study.

Both these articles focus on privacy concerns and therefore they present why people *do not* want to share certain information to certain people. This is something we have to think about during our study even though we are more interested in when and what kind of information people *do* want to share in certain situations.

2.2 Literature review summary

Below is a summary of what we used in our study from the presented articles. With the intention of making it easier for the reader we chose to have the same layout in this summary as the previous sections.

2.2.1 Mobile information sharing

Here we found a lot of material concerning work placed related information sharing which we weren't interested in. From the article by Ahn and Pierce (2005) *"SEREFE:*

Serendipitous File Exchange Between Users and Devices" we used the 8 goals presented by the authors.

The article "*Life is Sharable: Blogging Life Experience with RFID Embedded Mobile Phones*" by Cheng et al. (2005) researched why and how people capture their spontaneous life experiences, and what contents of these they provide and share with others. We believed that this highly related to the questions that we are trying to answer. This article also showed that different places could relate to peoples interests, which we needed to take into consideration in our study.

From the article "*The LoveBomb: Encouraging the Communication of Emotions in Public Spaces*" by Hansson and Skog (Internet) made us aware that when talking about sharing information with people in your surrounding, information is a very wide concept. This article also gave us good inspiration for what kind of methods we could use in our study.

The concept in the article "*MobiTip: Using Bluetooth as a Mediator of Social Context*" by Cöster et al. (2004) was alike ours in the way that it takes advantage of people moving around and being able to share tips with the people in their proximity, which is something that we wanted to implement in our application, if our users wanted it.

2.2.2 Mobile social matching

Leigh et al.'s (2002) article, *"Social Net- Using Patterns of Physical Proximity Over Time to Infer Shared Interests"* made us aware of that people do not always understand the application, which may lead to that they don no use all the features which can lead to problems. We understood that we really had to interact with the users throughout the project to avoid similar mistakes.

From Bounds et al.'s article (Internet) *"ReConnect: A Mobile Tool for Enabling Social Interaction*", we gained the insight that people are afraid of rejection, and because of this, we decided to see if our users would like to use a chat function. This would enable them to join an ongoing conversation and the chance of rejection would be lesser, and since they can be anonymous they feel more secure.

The article *"Social Serendipity: Mobilizing Social Software"* by Eagle and Pentland (2005) made us aware that the application needed to be easy to turn on and off, so that it will not be disturbing in any sense.

From Kortuem et al.'s (1999) article *"Close Encounters: Supporting Mobile Collaboration through Interchange of User Profiles"* we took with us their principles that say that the information shared need to be controlled by the owner, and that it has to be up to the reader when and what to select to read, and from who.

2.2.3 Willingness to share information

The aim of Grudin et al.'s (2005) study, which their article *"Toward Understanding Preferences for Sharing and Privacy"* build on, was to support the design of future efficient languages and tools that allow users to specify, and refine over time, what they wish to share with whom. We will use this information as a foundation for our study.

The article "*Who Wants to Know What When? Privacy Preference Determinants in Ubiquitous Computing"* by Dey et al. (2003), showed us that when designing for privacy concerns the inquirer should be of first priority and the situation of second priority. We also got confirmation on that the situation in which information is shared is of importance for people's willingness to share.

3. Method

The purpose of this chapter is to give a background to the work process (see chapter 4) used in order to answer the stated problem of this design project/thesis. We will describe both methods and techniques used, as well as motivate why we chose to use these. We start this chapter by illustrating the lifecycle model. We then continue with describing the techniques, methods, and guidelines that we used along the process of designing our prototype.

3.1 Choice of method

As described earlier in this thesis we have decided to do a design study as a method for researching the stated problem and fulfilling the purpose of this thesis. We chose this approach because we hoped to gain deep insights concerning our stated problem by performing an actual development of a concept together with probable users. If they, together with the researchers, can explore, evolve, and test the concept throughout the development we believed that it would make it easier for the persons involved in the research to get an understanding for the concept, or the problem.

3.2 The lifecycle model

With the intention of choosing a development model that would stimulate us reaching the best results through our design process we looked at different development models. We decided on using the Lifecycle model since we believe that this model captures the basic parts of interactions design. *"Many other lifecycle models have been developed in fields related to interaction design, such as software engineering and HCI, and our model is evolved from these ideas"* (Preece et al. (2002) p.183). This is the main reason for us choosing to use the interaction design lifecycle model; it incorporates knowledge gained from models from other fields related to Interaction design.

The design method that we used was the Lifecycle model (see figure 1), which encourages to a user focus and working iterative. The first step in the lifecycle model involves identifying user needs and establishing requirements. We worked with a focus group to do just this. The second step involves designing alternative designs to cover the demands and needs identified in the first step. The last two steps in the lifecycle model involves building interactive versions of the designs from step two that we believed to best fulfil the needs and requirements identified. We then bringing these forth to the users, or in our case focus group, for feedback, evaluating the different

interactive versions built (Preece et al, 2002). It is very common that you after the evaluation go back to step 2 and do these steps iterative. It is also possible to go back to step one again if needed. "Creating good user interfaces requires iterative design."(Lewis et al., 1996:173).

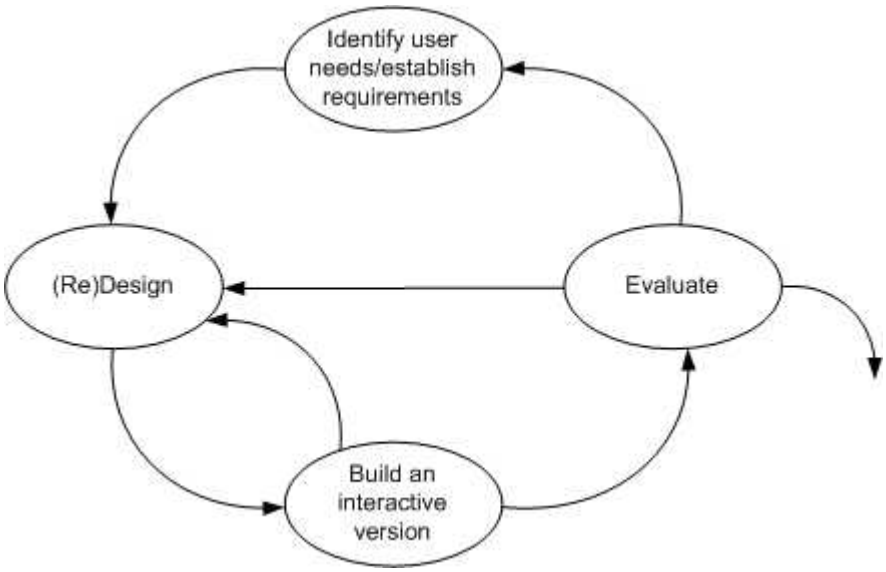

Figure 1. The Lifecycle Model (Preece et al., 2002:186).

Interaction design should be an iterative process, where you are able to go deeper and deeper into the design to help designers avoid making mistakes and errors. The iteration could continue for eternity, but the resources will finally decide when it has to end and the developers have to be satisfied with the result. What in most cases that made us move to the next step in the life cycle was often the time limit, we had to decide that what we had was enough and it was time to move on to the next step. It is important that the development always end with an evaluation, so that the interface meets the usability goals (Preece et al 2002).

3.3 Ethnographic study

In the prior design projects we had performed ethnographic studies and these were used to reveal who our presumed users were for this thesis. The use of ethnographic studies is common in qualitative work. Qualitative techniques, as ethnographic studies, are useful when the researcher wants to make an extensive and deep study of a group or a situation (Bryman, 1997) which is what we wanted to achieve. He states that in ethnographic studies the researchers observe and tries to create a picture of the lifestyle of a group of people.

In the two prior projects we made ethnographic studies where we conducted interviews with people on the street to find out if there was an interest for our applications. The interviews were informal and made in a natural setting for the product. In the TravelBuddy project, the ethnographic studies were made at a train station and at an airport. The people interviewed were all travelling. The ethnographic study made for the MobTune was conducted at a train station, in town, and at the university. In the MobTune project, observations of how people used their mobile phones were also made.

The ethnographic studies made in the prior projects have been followed up in this design project/thesis in the form of a focus group (see section 3.4).

3.4 Focus group

One of the fundamentals with using the life cycle model is to have a user perspective. Users participate in the design process to help the designers to understand what tasks the user need to perform, how often these tasks needs to be done, and under what type of conditions these are to be performed (Hix & Hartson, 1993).

We chose to make the users a part of the design process in the form of a focus group that we worked with throughout the project. Once the literature study was made we sat down and decided upon our focus group. The decisions we made concerned who we should have in this group, which age range it should be within, how many did we need, and what did we want to get from our meetings with them. Based on the ethnographic studies made in our previous projects we decided to have an age range from 18-40 preferably. We wanted users of both genders, and we decided upon having five people in the group. Fewer than five we believed could be too few and if they were more than five they would be too many. Also, if we would have to come down to a vote about a decision, we would not end up with a draw. However, one of the participants in the focus group had to leave in an early stage of the design process due to time constraints. Instead of trying to get somebody else to take her place we chose to keep working with the four users left. The reason that we chose to do this was that after the first focus group meeting we saw that also four users could give us sufficient feedback. This may not have been the case with other participants, but our 4

participants were talkative and wanted to share their input with us and therefore we believed that the feedback that we received from them would be sufficient.

From our focus group meetings we wanted to get feedback that we could use as a base for our design decisions. By keeping in touch with the users we believed that we would not get "lost" and forget whom we were designing for.

The age of the 4 participants in the focus group spanned between 19 and 38. We were aiming at a good mix in age and gender; however we had some problems finding people for the focus group. Our focus group consisted of one male and three female. We would have liked to have a more balanced gender mix, but because of the problems of finding participants we had to settle with 3 females and 1 male. We also decided that the mix in age was of higher importance than a better mix in gender. Participants to a focus group are selected to provide representative sample of typical users (Preece et al., 2002).

To ensure that the thesis was ethically correct we strived for informed consent from the focus group members (Huberman & Miles, 1994). This was achieved by informing them about the aim of the study and that it was up to them to decide how much information that they were willing to give us. At the first meeting we made sure that we had the users consent for using their names, and the information that they have contributed with in the thesis.

Inspired by the LoveBomb project (Hansson, Skog, Internet) presented in the literature review (see section 2.1.1) we chose this form of user participation because they successfully examined the concept by presenting it to the users and using mock-ups. Just like them this is what we initially wanted to do. We also chose to work with a focus group because we believed that a group interview could give us more than one-on-one interviews. The interplay between the interviewed persons often leads to spontaneous and emotional statements about the subject discussed (Kvale, 1997) and this was exactly what we were interested in. The use of a focus group allows diverse and sensitive issues to be raised that otherwise might be missed (Preece et al, 2002). Also, a good way to check how well an interface design is fitted to the users is to test it on the users (Arvidsson & Verdrengh, 2002). Since it was hard to document all that happened at the time, we recorded some of the sessions on video so that we later

could go back and see what was said and done. We did this directly after the session, after the focus group had left, and we then discussed and analysed what had happened. All the sessions, even the ones we did not record, was discussed, analyzed, and written about directly after each session was held. We did this with the intention of having everything fresh in our minds, so that the analyze would be as worthy as possible

3.4.1 Our Focus group

Here below is a short introduction of the participant in the focus group, as well as what we believed each individual could contribute with.

Anna, 19, studies at a University in the south of Sweden. We believed that Anna contributed to our focus group to get an insight in how young adults use their mobile phones today.

Hanna, 26, has just graduated from a University in the south of Sweden and is currently working. Hanna contributed to our focus group with her busy lifestyle; she combined full time studies with part time work.

Catharina, 27, had been unemployed for a period of time but had just gotten a job. She contributed to our focus group with the fact that she had had a lot of free time and represents with her the age the middle of our target group.

Mikael, 38, is currently studying at a University in the south of Sweden and will soon graduate. Besides studying full time he also works part time. His contribution was an insight into the mobile use in his age group and with a male perspective.

3.5 Scenarios

For the first focus group meetings we had made a couple of scenarios. The scenarios that we made were usage scenarios that described a situation in which the product could be used (Preece et al, 2002). By doing this, our focus group could get an idea of how and when they would use it.

Using scenarios to establish function requirements is very beneficial (Preece et al., 2002). The scenarios let the users get a sense of how the application would be used

and which task they could perform, and therefore they could tell us what kind of functions they were interested in as well as what kind of information they were willing to share. When evaluating our prototypes we used a script telling the users what to do. For user evaluation of prototypes, it provides a concrete example of a task the user will perform with the product (Preece et. al., 2002). We could then see how they would use the product, if the interfaces were natural or not.

3.6 Prototypes

At all our meetings with our focus groups, except for the first on, we presented prototypes to them to test our ideas and design. With the help of our prototypes we got these evaluated, which is also why prototypes are developed (Preece et al., 2002). At the first couple of iterations through the lifecycle model, we evaluated our ideas and designs with the help of low-fidelity prototypes. In the last iteration however, we had made a high-fidelity prototype, which looked more like the final product.

3.6.1 Low-fidelity prototyping

At the second and third focus group meetings we let our users make their own low-fidelity prototypes. Low-fidelity prototypes seldom look much like the final product, but they are useful because they are simple, cheap, and quick to produce and modify (Preece et al., 2002). At the two focus group meetings that were more of a workshop character, the users produced interfaces on paper mock-ups of a mobile phone screen (see section 4.1.2). After having evaluated the prototypes made by each user, we came up with two different quick and dirty (Preece et al., 2002) sketched prototypes of our own. These prototypes incorporated what the all the users wanted. In addition to that we took usability goals, user experience goals, and design principles (see section 3.6 and 3.7) in consideration when designing the prototypes. One of these was then transformed into a high-fidelity prototype.

3.6.2 High fidelity prototyping

In the last iteration we made an interactive high fidelity prototype (see section 4.3.2), which was tested by three of the users in the focus group (see section 4.3.3). High-fidelity prototypes are made in materials that can be expected to be in the final product (Preece et al., 2002). The high-fidelity prototypes are also useful for selling ideas to people and for testing out technical issues (Preece et al., 2002). The main

purpose of creating a high-fidelity prototype was not to test the design itself, but to let the users get the feel of the device in its natural settings or as Preece et al. (2002) put it, to sell the idea. Not only did our focus groups test the design but also the feeling of our application. Our prototype was made in Macromedia Flash Lite 1.1 so that it could be tested on mobile phones. We thought this was important because we wanted the users to get the feel of the "real thing" and see how it actually would be used.

Choice of platform

As we wrote above it was important that the application was tested on an actual mobile phone. This guided us in our decision concerning how to implement this interactive prototype, as well as when discussing whether to use Java or Macromedia Flash Lite. We realized that Java probably would be a better choice in the long run because it allows for programming a complete functioning Bluetooth application. However, when trying to find information about how to perform this we found an article by Giguere (2004, Internet) where he points out the following: "Note that Bluetooth programming requires a good understanding of concurrent programming techniques". Due to our limited knowledge of Java this means that it would be too time consuming to develop an application like that. For that reason we chose to leave out the Bluetooth implementation. Instead it can be performed as future research to this thesis.

When we researched Macromedia Flash Lite we realized that despite the obvious long run advantages of Java it would be easier for us to use Macromedia Flash Lite when developing the prototype. The reason for this was that we found more information about this product that was easy to follow (Adobe, 2006, Internet), as well as the reason that we from the beginning possessed more knowledge about Macromedia Flash.

Since we chose to use Macromedia Flash Lite when developing our prototype we had to have a mobile phone that supported it. When we realized that our own phones did not do so we turned to Sony Ericsson who were kind enough to lend us one that did. We created a small test application and after a few tries we understood that this phone supported Macromedia Flash Lite version 1.1 and we were now able to begin developing the actual prototype (see section 4.3.2).

3.7 Usability goals and user experience goals

When designing an interface there are several guidelines that you as a designer can follow. We have in this design project chosen to work with the usability goals, and user experience goals. We chose to work with these goals because we see them as good guidelines when designing an application. We believed that with these kept in mind we would make a better application than without them (see section 4.3.1).

The ***usability goals*** are mainly concerned with optimizing the interactions people have with interactive products. According to Preece et al. (2002) usability goals are turned into usability criteria, which are specific objectives that enable the usability of a product to be assessed in terms of how it can improve a user's performance. The usability goals are:

- Effectiveness
- Efficiency
- Safety
- Utility
- Learnability
- Memorability

The ***user experience goals*** help the designer to focus on supporting people in their everyday life. As Preece et al. (2002) states it, the goals of designing interactive products are primarily concerned with the user experience. That means how the interaction with the system feels like to the users. This involves explaining the nature of the user experience in subjective terms. The user experience goals differ from the more objective usability goals in that they are concerned with how the users experience an interactive product from their perspective, rather than assessing how useful or productive a system is.

- Satisfying
- Enjoyable
- Fun
- Entertaining

- Helpful
- Motivating
- Aesthetically pleasing
- Supportive of creativity
- Rewarding
- Emotionally fulfilling

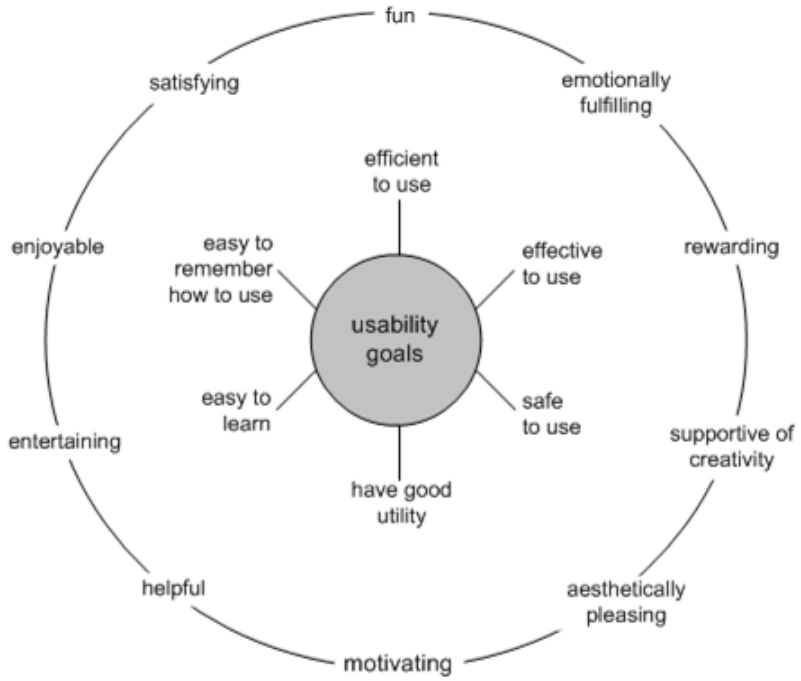

Figure 2. Usability and User Experience Goals (Preece et al., 2002:19).

It is important to realize that the different goals or characteristics influence each other. More focus on one criterion can make it difficult to fulfil other goals. This knowledge helped us to become aware of the consequences of pursuing different combinations in relation to fulfilling different user's needs. However, not all of the usability goals and user experience goals are applicable to every interactive product that is being developed. It is up to us as the designers to decide what we are trying to fulfil with our product.

3.8 Design principles

When designing our interface we also used Norman's (1988) design principles. Design principles are generalizable abstractions intended to orient us towards thinking about different aspects of our design (Preece et al., 2002). Norman's design principles are:

- Visibility
- Feedback
- Constraints
- Mapping
- Consistency
- Affordance

By using these as reminders when designing we hoped to make our application as user-friendly as possible (see section 4.3.1). An application that is so easy to understand that the user intuitively know how to use it and avoid making errors we consider is a good one. This is also something we have tried to achieve with our design and we believe Norman's design principles are good principles when aiming at intuitive user interfaces. Preece et al. (2002:285) states that "…the real users and their goals, not just technology, should be the driving force behind development of a product… a well-designed system should make the most of human skill and judgment, should be directly relevant to the work in hand, and should support rather than constrain the user".

3.9 Critique to used Methods and Techniques

As with everything, nothing is perfect, and of course we encountered some problems along the way with our choices of methods and techniques.

The lifecycle model

The life cycle model has worked well for us; however, we found it hard to move on to the next step in the cycle before having finished the one before. Some steps also took more time than we had anticipated which cut back on our most critical resource, time. In the end we had to make a decision that what we had was enough and move on to the next step. It was easy to get stuck trying to take everything a step further. If we

had cut back on the time in the beginning we would have had more time for the user test in the end (see further down).

Focus group

The main concept with the life cycle model is that it is iterative and that it focuses on user involvement (see section 3.1). We had chosen to involve our users with the focus group and have them involved through out the design process. This however proved to be more difficult than we had anticipated. Firstly it turned out to be harder than we had thought to find people that were willing to participate in the focus group. Our second problem was to schedule a meeting that all participants could come to. Several in the focus group worked part time besides studying full time. Our goal was from the beginning to have all participants present at all meetings, but after having to delay the first meeting several times we decided that we had to have meeting even though not all could attend. By doing this we might have missed out on useful feedback. To make up for not having all participants present, we contacted the ones not present after the meeting, informed them about the development, and asked them to either perform what had been done on the missed occasion, or to think through what had been discussed. We also started off all focus group meeting by retelling what had happened since the last time. Another issue with our focus group is that we might have influenced them too much at times. We had an idea about what we were going to do before the first focus group meeting and when watching the video we noticed that we sometimes led them to say the things that we wanted them to say. We tried to avoid this at the second and third meeting that were workshops by letting them make their own low-fidelity prototypes (see sections 4.1.2 and 4.2.1). We also saw a tendency of group thinking, which we tried to avoid after the first focus group meeting by making them work individually.

In the final user evaluation tests (see section 4.3.3) we felt that if the users would have gotten more time with the prototype we would probably have received even better test results. We realized that sometimes you have to accept these kinds of things in a design process and decide that it is time to move on, leave some things for future research, and try to get the best out of what you got. Otherwise you could continue forever and never be satisfied.

When in retrospect trying to evaluate if we in some way could have achieved even better results with some other method than using a focus group it is hard to estimate. We might have achieved better results if we had had more people involved in the research and performing interviews with them. However, that method would have demanded so much time, and it would have been too hard to engage too many users in the design process. Since we wanted to get a deep insight into our stated problem we believe that we made a good choice when selecting this method.

Recording the focus group meetings

By filming the first focus group session we may have received less feedback then we might have received without it. We had to compare the strengths with filming with the drawbacks. By filming we found out that we unconsciously were trying to influence our participants. Since we noticed this after the first meeting we became aware of this and could therefore also change our behaviour and work in a way that highly lessened our influence over the group at the other focus group meetings. The drawbacks with filming are that the participants of the focus group might have felt uncomfortable or prohibited from saying everything that was on their mind (Kvale, 1997). We did however when informing the participants before the meeting ask them if they felt comfortable with being filmed or not. They said that they felt comfortable and didn't mind being filmed. Our conclusion is that the advantage in this case was higher than the drawback.

4. The Design process

This chapter describes the actual work process of the design project, how and when we used the techniques and methods described in chapter 3, the decisions we made, and how the development of our application progressed. The chapter ends with a summary of the process, which aim is to give a quick overview of the chapter.

4.1 First iteration

Before we could meet the users to identity needs and establish requirements, we believed it best to make a literature study where we went through related works (see chapter 3) as well as decide upon which methods and techniques to use (see chapter 4). We chose to do this because we believed it important to see what others had come up with in similar studies, before we made contact with our focus group. By studying related work we could draw knowledge from these and also avoid their mistakes.

4.1.1 Establishing needs and requirements - Focus group meeting 1

In this introducing meeting we wanted to find out what kind of information our focus group wanted to find out about others, and what they were willing to share with people around them (see Appendix 1). We also wanted to find out if there were situations when they were more inclined to communicate with strangers. Inspired by Hansson and Skog (Internet) who examined the concept of their project the LoveBomb (see section 2.1.1) with the help of focus groups, we decided to also give our participants a presentation of the concept before starting on the design.

Below we have listed the findings from this meeting that we have taken with us to the following steps in the design process, for examples when making our low-fidelity prototypes.

- Type of information
  It is not enough to share interests because this is not enough for getting a sense of a person's character and if you have anything in common personality wise, according to our focus group. It is interesting that this feedback is opposite to what has been concluded in all the related works mentioned in our literature review concerning mobile interest-matching (see section 2.1.2). Our users were also sceptical to sharing too personal information with strangers, whereas they

were more inclined to share more personal information with acquaintances and close friends.

- Situation/setting
  Since the persons in our focus group felt that if being inactive for a longer period of time (>30 min) they are more inclined to share information. This is something that we to take this into consideration when designing our application. This means that situation when waiting or travelling longer distances are situations when the users would like to use the application. Despite what Dey, Lederer and Mankoff (2003) say in their article (see section 2.1.3), the opinion of our focus group is that the situation is of higher importance than the person receiving the information.

- Who to share with
  Our focus group were primarily interested in seeing their friends through the application, but in certain situations, as when being in an unfamiliar place or when having a lot of spare time, they would also find it interesting to be able to see others as well. This reminded us of the article by Leigh et al (2002) about the interest-matching application, Social Net (see section 2.1.2) that kept track of your friends and made suggestions to introductions. The combination of having read the article with what our focus group said we came up with the idea that the user would be able to see, and interact with his or her close friends on the application, as well as their friends close friends. This would facilitate the social interaction that we also strive for with our application, at the same time as we let the users ideas form how it will function. This led us to the following section, profiles.

- Profiles
  Since the users felt like there were different situations when they want to see and interact only with friends and acquaintances, and other when wanting to see and interact with strangers, we have decided to implement different profiles. This lets the user decided when to be open to complete strangers. As Yun-Maw Cheng, Wai Yu, Tzu-Chuan Chou (2005) observed, different places could relate to peoples interests (see section 2.1.1). Even our previous studies in the MobTune (Abdulla, 2006) and TravelBuddy (Ivkovic et al, 2005, Internet)

projects insinuated this. This was something that also our focus group could relate to. They too wanted different profiles for different situations, for example, one profile for their everyday life, and one when out travelling. We explored this further in the next focus group meeting.

- Functions

  Unlike the focus group involved in Hansson and Skog's (Internet) project, the LoveBomb (see section 2.1.1), our focus group wanted to have the option to remain anonymous, especially if in contact with strangers. They also wished to be able to block certain person's from being able to contact them and thereby avoid harassments. In addition to that they would also like to have a function that enabled them to become invisible for other users, while still being able to see them. We have considered implementing this feature as a profile instead of a function but we will discuss this further with our focus group. The group also made it clear that it is important that the application does not become a disturbing element, and it has to be easy to turn it off, the same feedback that Eagle and Pentland (2005) received on their application Serendipity (see section 2.1.2).

- Target group

  During the meeting we came to the conclusion that teenagers would be an appropriate target group for an application like this, since our focus group believed that teenagers are more inclined to interact with strangers through their mobile phones. We agree that teenagers probably would be a good fit, and we have considered involving people of this age in our study. But, after having discussed whether or not to involve them, we feel that it would be more interesting to develop an application for a slightly older target group. Our motivation for this standpoint is that we believe that this target group are more likely to become long-term users, while teenagers might be more intense and more short-term users. We want to use a target group that we believe have been neglected, that will say users from the age of 18 to 40, people who are active and moving around a lot.

- Concerns

  Our focus group presented some concerns about the application. The main concern was that it would become a source of annoyance. Several of the users

felt that they had enough information around them and they did not want to have even more popping up in their mobile phones. This would enable them to join an ongoing conversation and the chance of rejection would be lesser, and since they can be anonymous they feel more secure (Bounds et al, Internet). Another concern was that it would make noises or vibrate when receiving information. This reminded us about the article by Kortuem, Segall and Thompson et al. (1999) about Proem (see section 2.1.2). Their principles said that the information shared needed to be controlled by the owner, and that it had to be up to the reader when and what to select to read, as well as from who.

4.1.2 Designing and building prototypes- Focus group meeting 2

Before the second focus group meeting we made some preparations. First of all, we made paper mock-ups of a mobile phone screen that our focus group would work with during the meeting. We had before the meeting decided that we would try something new. Instead of us making low-fidelity prototypes that we then presented to the users, we would let them make the prototypes. The reason that we chose to this, was because we were aware that we had a predetermined idea from the beginning and we did not want to influence or limit our users by presenting different versions of our own ideas to them.

We had prepared three different versions of paper mock-ups. What differed between the three was the design of the menu bar. The first one we chose to have tabs on, the second one had the menu on the side, and the third version differed from the others by having a main menu page. In the first two the menu was always available, while in the third they would have to return to the menu page to change function. The screens were otherwise completely blank. Before the meeting we discussed whether or not to make the screens real sized or not. We chose to make them larger because we believe that it would restrict the creativity if they had to work with too small mock-ups. However, the participants each had a mobile phone next to them (see figure 3), both for inspiration but also to make sure that they kept in mind the real size of the screen. They were also told to keep the design simple.

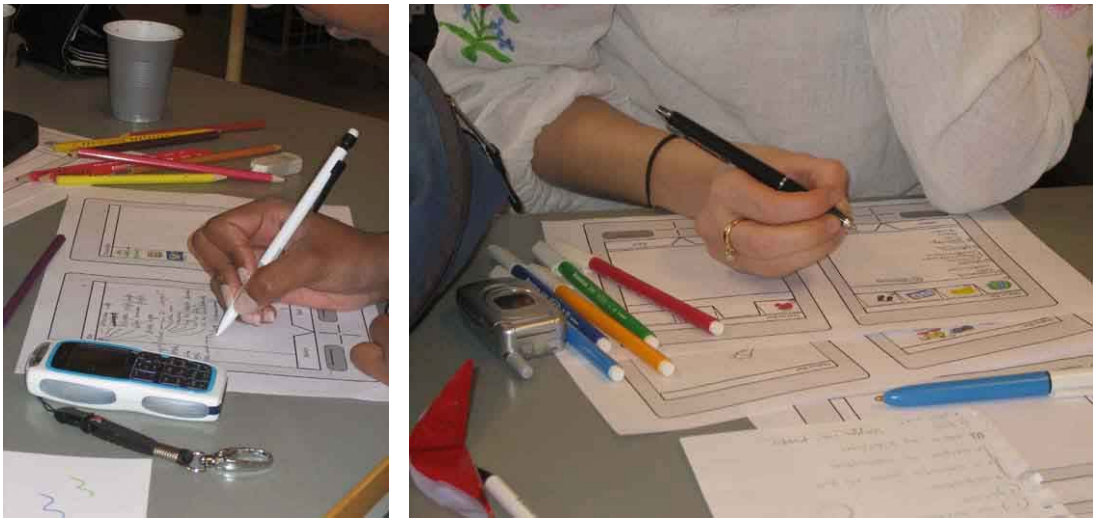

Figure 3. Users drawing menu with mobile phone as support.

The meeting itself was of a workshop character where the participants of the group worked independently on the design. We chose to do this because after the first meeting we saw a tendency toward group thinking and we wanted to avoid this by letting them work on their own, not being able to lean on each other.

The first thing we did was to have an open discussion about what they had thought about since the last meeting as well as informing them about what we had used from that meeting. Once this was done, we had a brainstorming session where they had to come up with a number of different functions. We had before the meeting written down a number of functions that originated from the first focus group meeting. We did this to inspire the group by giving a couple of examples to get them going. Once we had a list of functions (see Appendix 2) they had to start working on their own. First they chose a paper mock-up with the menu system of their choice, and then they chose between the functions produced during the brainstorming session. They would then put the functions of their choice under different main functions that they wanted on the menu bar (see figure 4). The meeting ended after we had gone through the different designs and asked them why they had done it the way they had. They all were given paper mock-ups to bring home with them so that if feeling inspired they could continue designing more of the interface.

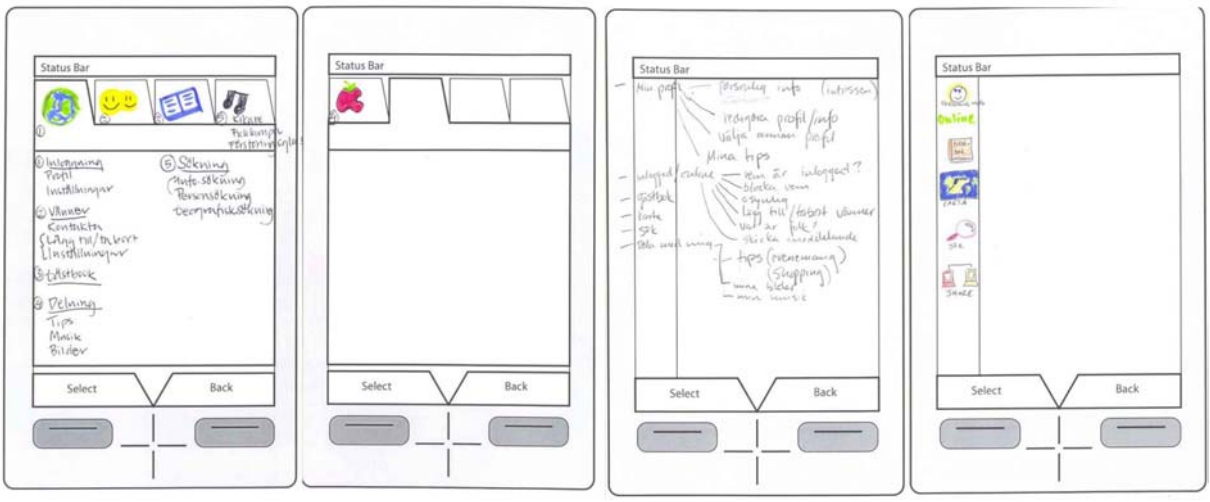

Figure 4. Examples of mock-ups with menus drawn by focus group users.

4.1.3 Evaluation

We evaluated the prototypes made by our focus group with both them and afterwards by ourselves. We asked the different persons how they had been thinking when designing their interfaces and why they chose to do it the way they did. By asking these questions the users had to consider their choice of functions and how these were represented on the paper mock-ups. This made it easier for us to understand the users' designs and their way of thinking. Found below is what we will take with us to the following iteration.

- When analyzing the mock-ups we could see that the users had chosen different menu versions. The tab and the side menu seemed to be the most popular ones.

- Independent of what menu version they worked with all the users chose to make up icons to represent the functions in the menu.

- When looking at what kind of functionality the users had selected for the menu we realized that there was not many differences. The functions found in the menus was the following:

    - **Profile settings**

      Here the users wanted to be able to select which profile they wanted to

log in with. Within each profile they wanted to have different amount and type of information about themselves that could be viewed by others. The users wanted to be able to edit their information on their computer and then transfer the information to their mobile phones. One of the users had an idea of linking the calendar within the mobile phone with the personal information, so that for example your friends could see that you are on your way to the hairdresser. The users pointed out that independent of what profile you are in they wanted the menu to look the same. Even though different things might be of different interest they felt that consistency is of higher importance.

- **Friends**

  All the users felt that this was the most interesting function for them. They wanted to see if their friends were near by, be able to contact them for free, and share information with them. Since we after the last focus group meeting thought of the addition of also seeing the friends of your friends, we presented this idea to them. They all thought that this could be a function that they would like to include in the application. After the meeting we considered whether it would be a good idea to be able to see if another user had added you as a friend. With this function as with the previous one the users wanted to use their computer to add their friends. They meant that since the application only has a 10-100 meter range it would not be very suitable to only be able to add friends through the phone. This was a highly relevant point that we need to add to our service. They also wanted to be able to see their friends information also if they were not online or nearby. Anna (19) contacted us a few days after the workshop to let us know that the thing that she had found most interesting was the idea of being able to see friends of friends and their information, as we discussed as a possible function to include in section 4.1.1 beneath who to share with. This she believed would enable people to make new friends and broaden their social network.

- **Guestbook**

  Another thing the users wanted in the menu bar was a guestbook. The

idea of the guestbook came to life through the discussion of not wanting contact making though the application to be of any disturbance. If they did not want to be contacted directly it should not be possible to do so. Just like Kortuem et al. (1999) stated about Proem we thought that the information shared needed to be controlled by the owner, and that it had to be up to the reader when and what to select to read, as well as from who (see section 2.1.2). A guestbook would be a good solution according to our focus group since it gives this possibility. Then other users could leave messages that you could choose yourself when to read.

- **Search**

  A function where you could search for other users was of course also to be found in the users' menus. Here we saw some different things which they wanted to be able to search by:

  - Nicknames
  - Gender
  - Age
  - Interests

    Our users at the first focus group meeting (see section 4.1.1) stated that it was not enough to share interests in order to feel a connection to someone. We thought that if the users freely could enter their interests and show that information in combination with other personal information (as the one presented above and below this search criteria), maybe then it should be of more interest for the users?
  - Tips

    Just like Cöster et al's (2004) system MobiTip (see section 2.1.1) the users want to be able to read and share tips with others. MobiTip also gave the opportunity to react to other's tips, but this was not something that our users asked for, and this will therefore not be integrated in our application.
  - Places

    Here the users meant that if they were close to a place they wanted to be able to see tips or messages from other users about

this place. As presented in the related work (see section 2.1.1) the authors Yun-Maw Cheng, Wai Yu and Tzu-Chuan Chou (2005) explain a mobile system with a similar functionality in their article "Life is Sharable: Blogging Life Experience with RFID Embedded Mobile Phones" (Internet). We will try to adapt this functionality to our concept, so that it involves taking advantage of different people being at these locations who share information about the place.

- **Sharing**
  The users wanted a function in the menu bar where they could see, add and delete the information that they shared with others. It was interesting to see that the users separated personal information and other shared information to share like tips, music, and pictures etc. The tips could for example be events, places or shopping. We will have this in mind when designing interactive prototypes in Macromedia Flash, but since we also need to make it as usable as possible, we will have to find a solution that both the users like, and will find usable.

4.2 Second Iteration

After the evaluation we now had established what the users wanted on the menu bar (see section 4.1.3). However, we had not established which functions they wanted under which menu. To find this out, we contacted the users a couple of days after the workshop and asked them to meet up with us again for a third focus group meeting.

4.2.1 Re-designing and building prototypes- Focus group meeting 3

At the third meeting the wanted the users to evolve their design even further. They were now going to drill-down in the menus and make the design of each sub menu. By doing this we wanted to find our what kind of information and functionality they wanted inside each main function, as well as how did they want it to look? Because of time restriction we asked them to only do the submenus for the profile "Me & My Friends.

Before we let them start working with the paper mock-ups we once again brought up the list with functions that they had produced in the previous meeting. We discussed

the functions once again and asked if they could think of anything more that they would like to do. We also brought forth their paper mock-ups from the last meeting and together we once again evaluated the outcome from the previous workshop (see section 4.1.3). By doing all these things we hoped to get them to start thinking in those tracks again so that they could evolve their design further.
As at the previous workshop they worked with paper mock-ups with the menu system of their choice. At the first meeting they only had to produce one screen, now they had to produce all the screens that they wanted to reach from the main menu. Once again we placed them at different tables so that they would not influence each other. When they had finished, we went through their designs and asked them how they had thought, and why they had made the choices they had. Once again we could see a similarity in content and design.

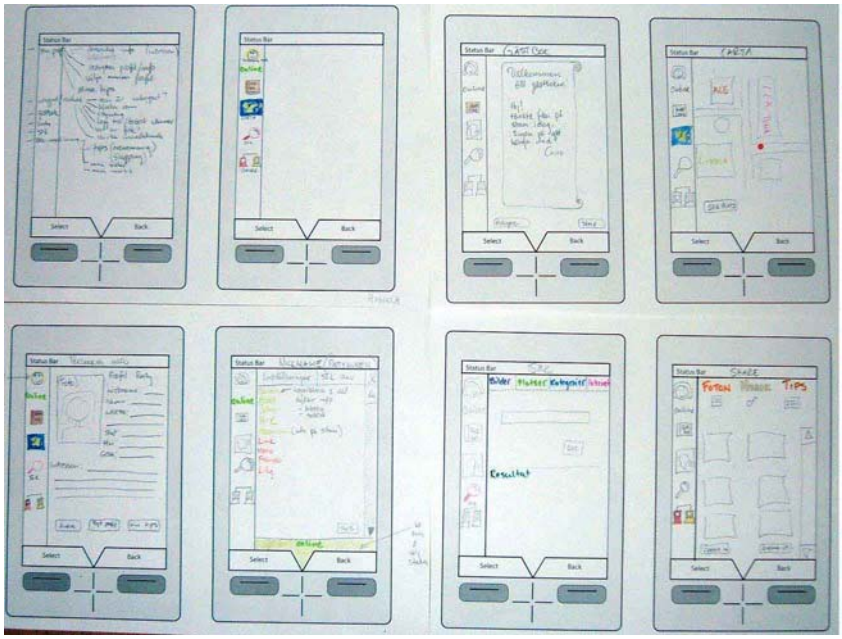

Figure 5. Example of mock-ups with content drawn by a focus group user.

4.2.2 Evaluation

After the third focus group meeting we sat down and evaluated the paper mock-ups without the focus group. Even though they had worked one and one, we could see that they had thought in similar ways. What we then did was to go through what they had done, and discussed each screen and what we should take from it to the interactive Flash prototype. We looked at the users low-fidelity prototypes and took notes concerning what to include in the different profiles. After that we used the notes together with their low-fidelity prototypes (mock-ups) and made our own version of a possible interface on the same paper mock-ups they had used, using the side menu.

We combined the users' ideas with design principles, user experience goals and usability goals (see section 3.6 & 3.7). We chose to use the side menu after having had a discussion about which to use. We believed the side menu to be more natural for the users, in addition to being easy to use. Below you can see what they wanted to be able to do within each submenu.

- **My Friends**
  The most important sub menu to our users was "My Friends". This is where their primarily interest lay so it was important that they can:
  - See a list of their friends who are in and out of range
  - Add/delete friends
  - See what their friends are doing
  - See where their friends are
  - Sign their friends guestbook
  - See their friends' friends
  - Send messages
  - Block other users
  - Make themselves invisible

- **My Guestbook**
  - See messages left by others
  - Delete messages

- **My Search**
  In search they wanted to search by:
  - Nickname
  - Telephone number
  - Interests
  - Activity (with possibility to connect to calendar function within mobile phone as a user previously requested (see section 4.1.3))

- **My Profile**
  The information found in My Profile varied between the different profiles. Since this is the information found in the profile "Me & My Friends" it is more personal information here. With their friends they wanted to expose their:
  - Nickname

- Real name
- Birthday
- Address
- Telephone number
- Activity
- Edit their information
- Change to another profile.

- **My Sharing**
  Whit their friends they wanted to share:
  - Photos
  - Music tips
  - Game tips
  - Place tips
  - Other Tips

4.3 Third Iteration

When starting the third iteration we had established what the users wanted, as well as which functions they wanted under which menu. We also had a good idea of how the users wanted the interface to look. This turned out to be our last iteration through the lifecycle model. The re-design was made parallel to the evaluation in the second iteration.

4.3.1 Re-design

When deciding upon what to include in the prototypes we looked at previous notes and the users mock-ups. On the basis of these, we started writing down what we wanted to include within the different functions. These were then transformed into visual output by drawing quick and dirty sketches (Preece et al., 2002) on our menu templates (see figure 6). When performing this task we tried to keep usability goals, user experience goals, design principles (see section 3.6 and 3.7), and the 8 design goals identified by Ahn J and Pierce (2005) (see section 2.1.1) in mind in order to strive for an application as easy to use and as efficient as possible. We did this by designing the content with for example consistency, high visibility and using icons as the users appeared to prefer (see section 4.1.3). After the sketching we iterated back to

our notes and carried out the process again. This approach made us detect things that we had missed to include earlier and let us keep on improving the interface and its content.

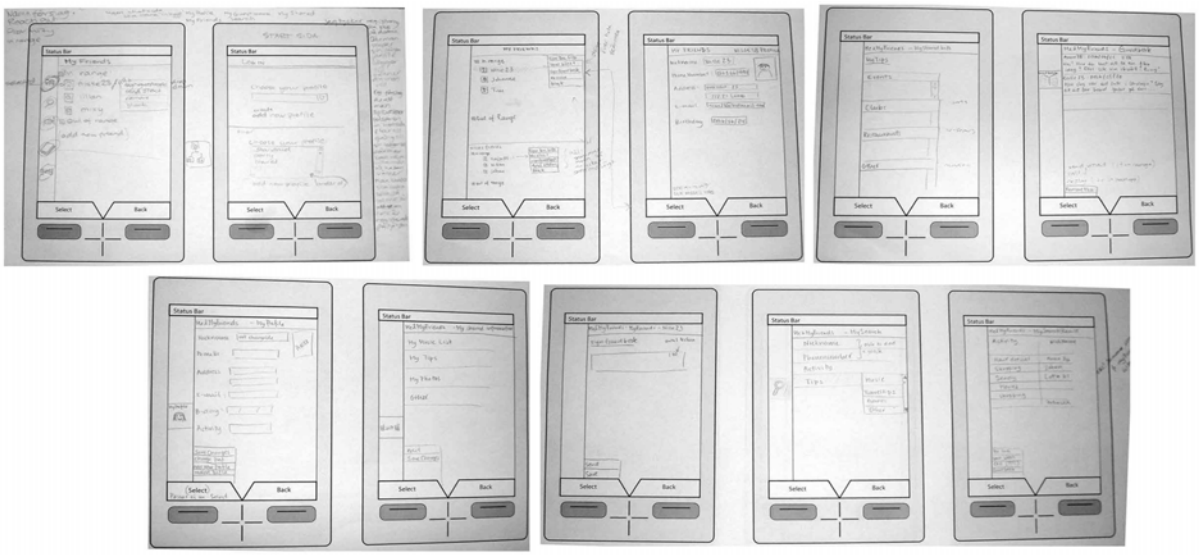

Figure 6. Mock-ups with menu and content drawn by us.

Log in and Profiles

We chose to begin with designing a *log in* page that will be shown when the application is started. On our log in page the user selects which profile to log in with. Three by us predefined profiles are included in the application. All the profiles will have the same menu layout with the same menu functionality, just as the focus group users wanted (see section 4.1.3). As can be seen in the tables below, the content within these menu items differ somewhat in the different profiles. This is since the profiles intend to be adapted for being used at different situations/places, and to include different content is a response to the users request for this. The profiles are presented below in connection with a table presenting its content.

- "Me & My Friends"

  Since the focus group users found it most interesting to see what their friends were doing, and felt most comfortable to share information with them (see section 4.1.1), we adjusted the "Me & My Friends" - profile in line with that. This profile will for that reason contain more personal information (see figure 7). Also, nobody but your friends and their closest friends will be able to contact or see you and your shared information.

My Friends	My Guestbook	My Search	My Profile	My Sharing
Friends in range	See my messages	Real name	See active profile	My music tips
Friends out of range	Delete message	Nickname	See inactive profiles	My travel tips
Friends info (depends on profile)		Phone number	Create new profile	My game tips
Send BlueText* to friend (if in range)		Activity	Edit profile: (Your shared info) • Picture, • Nickname, (not editable) • Real name, • Birthday, • Phone number, • Address, • Activity	My place-related tips
Sign fiends guestbook		Tips		Other tips
See friends of friend		Search result		
Remove friend		See user info (depends on profile)		
Block friend		Block user		
		Add as friend		
			Activate profile	
			Delete profile	

* BlueText is like an SMS, but sent via Bluetooth and therefore free of charge.

Figure 7. Content of Me & My Friends profile

- "Reach Out"

  This profile will let you explore all people in your proximity (who use this application). Here you will be able to share information with everybody around you as they with you. The information showed here should not be as personal

as in "Me and My Friends". Since the users felt that they wanted to be anonymous, especially when exposed to strangers (see section 4.1.1), we decided for example to show nickname and age when logged in with this profile (see figure 8), instead of the users real name and birthday that is showed in "Me and My Friends" (see figure 7). The user will however have the possibility to decide whom to show certain information to.

My Friends	My Guestbook	My Search	My Profile	My Sharing
Friends in range	See my messages	Nickname	See active profile	My music tips
Friends out of range	Delete message	Phone number	See inactive profiles	My travel tips
Friends info (depends on profile)		Age	Create new profile	My game tips
Send BlueText* to friend (if in range)		Gender	Edit profile: (Your shared info) • Nickname, (not editable) • Age, • Gender, • Origin, • Occupation, • Phone number • Interests • Activity	My place-related tips
See friends of friend		Origin		Other tips
Remove friend		Occupation		
		Interests		
		Activity		
		Tips		
		Search result		
		See user info (depends on profile)	Activate profile	
		Add as friend	Delete profile	
		Block user		

Figure 8. Content of Reach out profile

- "Travel"

  Our focus group users have earlier stated that they were more inclined to share a lot more information, and make more contact when they have a lot of inactive time, as when travelling (see section 4.1.1). This knowledge resulted in the

travel profile where the content focuses more on things you might be more interested in when you are on a journey (see figure 9). We used similar anonymity rules for this profile as for the "Reach Out" profile.

My Friends	My Guestbook	My Search	My Profile	My Sharing
Friends in range	See my messages	Nickname	See active profile	My travel tips
Friends out of range	Delete message	Phone number	See inactive profiles	My music tips
Friends info (depends on profile)		Age	Create new profile	My game tips
Send friend BlueText* (if in range)		Gender	Edit profile: (Your shared info) • Nickname, (not editable) • Age, • Gender, • Origin, • Destination, • Phone number • Interests, • Activity	My place-related tips
Sign friends guestbook		Origin		My travel route
See friends of friend		Destination		Other tips
Remove friend		Interests		
Block friend		Activity		
		Tips		
		Travel Route		
		Search result	Activate profile	
		See user info (depends on profile)	Delete profile	
		Add as friend		
		Block user		

Figure 9. Content of Travel profile

Visibility

One of the most important things to our focus group was to be able to change their visibility, like changing your status in Msn Messenger or ICQ, so that if they wanted, nobody could see them, even if they were online and were able too see other users. They explained that they wanted this functionality so that they would not be contacted by others if they did not want to. As shown in Eagle and Pentland's (2005) article about Serendipity an application needs to be easy to turn on and off, so that it will not be disturbing in any sense. The visibility function is an additional way of solving that

disturbance problem. Instead of having a profile that made you invisible as we first planned, we decided to have a function in all profiles that made you invisible. It was important to us to make sure that this function was easy to reach and use.

4.3.2 Building a high-fidelity prototype

Once we had made our sketches and decided upon functions and layout, we started working on developing a high-fidelity prototype. The difficult part with this step in the design lifecycle was that we now had to physically incorporate all the things into the high fidelity prototype that the users had requested during the design process. Sometimes we had sacrifice some of the users want, since they did not feel compatible with our concept, but most of what the users wanted was integrated into the interface.

Incorporated user requests

Below follows descriptions of things we have integrated into the Flash application as the users have requested. We want to clarify that the functionality of being able to use a stationary computer, when adding friends and editing profile information, which our users asked for, (see section 4.1.3) will not be brought up here. We have chosen to leave this feature to future research since it would take too much time implementing and testing it.

- Because the users wanted to be able to select which profile to log in with when starting the application, we implemented it so that when it starts the firs thing the user has to do is to select a profile. The log in page is displayed in figure 10.

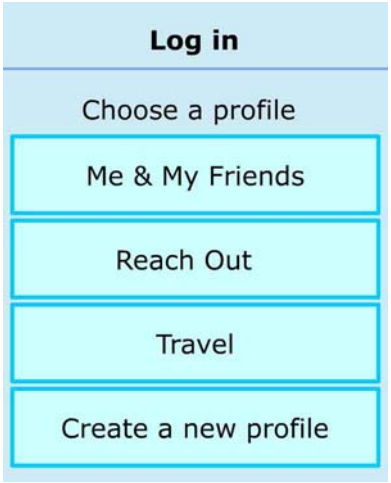

Figure 10. Log in page in the Flash prototype.

- Since our users were sceptical to sharing too personal information with strangers, as described earlier in the process (see for example section 4.3.1), we chose to make the information shared about yourself of less private nature in the profiles "Reach Out" and "Travel" (see example in figure 11). All the information, except for the nickname, is voluntary to enter. By doing this we keep the owner of the information in control of what to share, as was described as important to the users in section 4.1.1:Concerns, as well as by Kortuem et al. (1999).

- Independent of which profile you are logged in to, the users wanted the menu to look the same (see section 4.1.3). We implemented the side menu since the user thought it felt most natural to use with icons to represent the functions in the menu (see figure 11). As described earlier in this section the icons were designed to be consistent and adapted to the users wants.

- The users also pointed out that sharing merely interests is not enough for getting a sense of if you have anything in common personality wise with someone. In order to make the interests of more interest to the reader we decided to show interests in combination with other information about the person (see for example section 4.1.3). This was implemented as shown in figure 11.

- One of the users had an idea of linking the calendar within the mobile phone with the personal information showing your current activity (see section 4.1.3). This is something that the application can have in the future, but since we only simulated the functionality with this Flash prototype, this function has not been implemented yet. At the moment you can only write the activity when editing the profile as shown in figure 11.

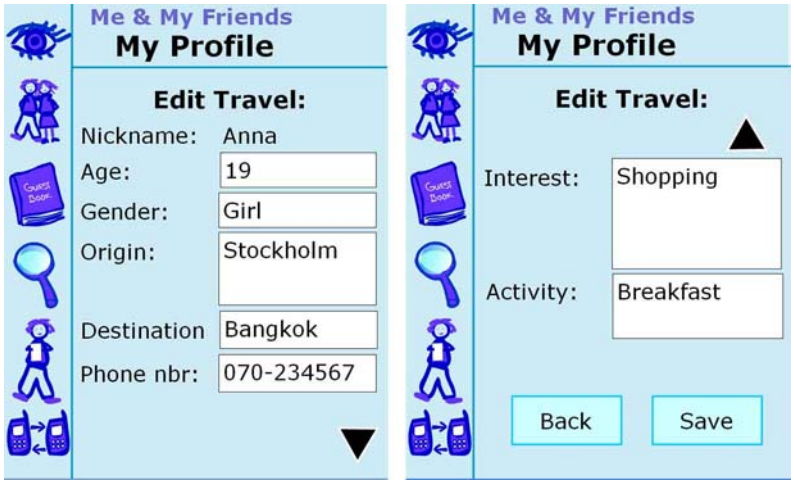

Figure 11. Editable shared information of not too personal nature in Flash prototype.

- The users meant that they were primarily interested in seeing their friends with the application (see for example section 4.3.1). This made us have the "My Friends" menu item automatically opening after having selected a profile to log in with. Within this feature the users wanted to see if their friends were nearby (see figure 12), be able to contact them for free (by sending BlueText, and by signing guestbook, as you can see in figure 13), and share information with them.

Figure 12. My Friends showing friends in range in Flash prototype.

- In order to let the user see, and interact with the friends of his or her close friends on the application (see request in section 4.3.1), we made this a possibility to choose when looking at information about the friend (see figure 13).

Figure 13. Option to see friends of a friend marked in Flash prototype.

- As we wrote in section 4.1.3, our users thought a guestbook would be a good solution to have in the application, in order for users to be able to leave messages that you could choose yourself when to read. This also made contact making through the application of no disturbance to the user. These reasons

made us decide to implement a guestbook functionality in the Flash prototype (see figure 14).

Figure 14. Guestbook in Flash prototype.

- The users separated personal information and other shared information to share like music tips, and therefore we also implemented it the same way. The personal information is entered in the profile and retrieved when looking at information about friends, or using the search function. Tips are on the other hand edited in "My Sharing" (see figure 15) and are retrievable through "My Search" (see figure 16).

- Even though the users would like to share photos with others (see section 4.2.2) we decided not to implement this feature (as seen in figure 15) because it could involve problems with memory capacity in the users' mobile phones. We also decided not to share or being able to search by game tips (see figure 15 and 16), since there was not enough interest for this function within the focus group.

- In order to incorporate the users request to be able to see tips related to places (see section 4.1.3) we implemented places to shared tips (see figure 15). This way the users can enter tips about different places, and when retrieving tips hopefully people who have recommended places will also many times be in the area where these liked places are. This is how we adapted this feature to our

concept (see section 4.1.3).

Figure 15. Shared tips in the "Me & My Friends"- profile in Flash prototype.

- As described in section 4.3.1 the users were interested in seeing different information in different situations, hence in the different profiles. This made us implement different search criteria in the different profiles (see figure 16). The information you are able to search by is equal to the information shared in the different profiles (see example of can be shared in figure 11 and 15).

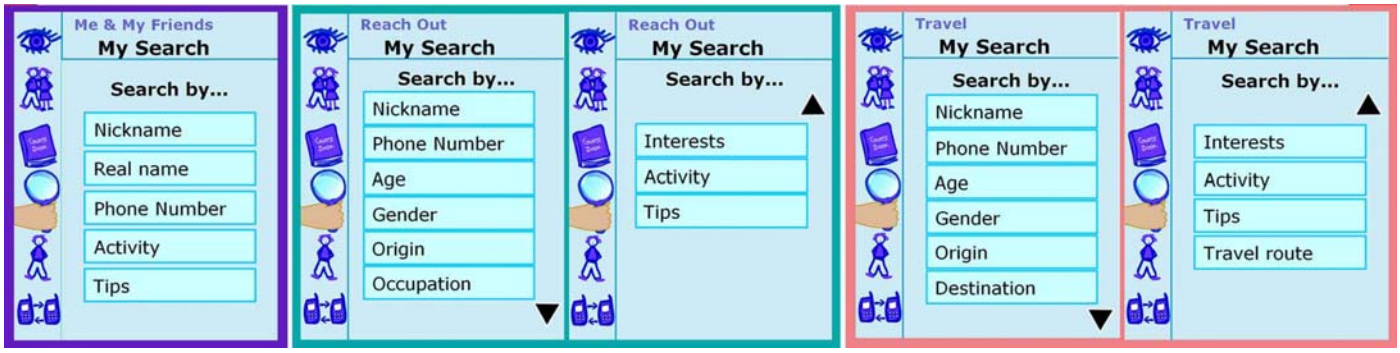

Figure 16. Different search criteria in different profiles in the Flash prototype.

- With the intention of giving the users the possibility to change their visibility, as they had asked for (see section 4.1.3) we implemented another menu item that we called "My Visibility". This function lest you change visibility between "Visible" and "Invisible", and involves that nobody is able to see or contact you if you have chosen to be invisible. We represented this function with an eye open or closed which we placed above the other menu items (see figure 17), so

that it would be easy to see and change whenever wanted, as stated as important in section 4.3.1.

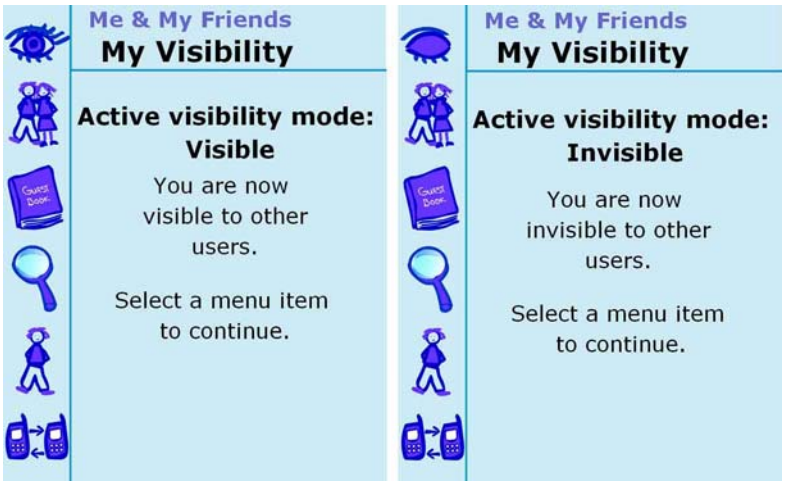

Figure 17. Visibility function in Flash prototype.

The development process

The process of building the high fidelity prototype in Macromedia Flash Lite 1.1 was of an iterative nature. When something was drawn, or some code entered or edited in Flash, it was then tested on the computer, and if needed it was edited again. After a couple of things had been tested on the computer the application (as a swf-file) was transferred to the mobile phone to ensure that everything looked and worked properly. If it looked correct we continued the same process and made new additions to the interface, and if not we went back and changed it before continuing.

When building the prototype we had the sketches and notes with the layout and functions next to us and tried to transfer what we had decided upon to include. Just like in section 3.4.1 we started off by creating the "Log in" page where the user should chose which profile to log in with. After that we began drawing icons that would represent the main functions that were established at the first focus group meeting (see section 4.1.3). They all had one state that represent that it has been selected and one normal state. When we had created three of the menu icons we realized that they were not very similar, and that they looked kind of childish. So, we started over again with the intention of giving the icons, for example, a more consistent look, with high utility, and more adapted to our target group. We tried to keep in mind the icons made by our users and what they had looked like. We also placed them in the order the user wanted them to be in.

When the menu was finished we focused on creating the content for the menu items, one at a time. We began with “My Friends”, then “My Guestbook”, “My Search”, “My Profile” and finally “My Sharing”. With the intention of designing a consistent interface we tried to reuse as much as possible, e.g. buttons as well as the layout. The most important and challenging menu item to create the content for was “My profile”. Here we had to be able to change the active profile, which meant that what was shared and searched for within the other menu items also changed. Since we wanted to test the use of the different profiles this needed to work, and luckily we solved this after some redesigns.

Within the content of the menu items we focused on having high visibility, which is very important due to the smallness of the mobile screen. We strived for good feedback as well as making it easy to learn and remember how to use it by limiting the number of steps you had to do to get where you wanted. By striving for all these things we hoped to make the application as simple and user friendly as possible, and thereby limit the mistakes users otherwise could make.

After many iterations in the development process, when the content of the different menu items were completed, the final prototype was transferred to the mobile phone and was now ready to be tested by the focus group users.

In order to test the application use the prototype link in the reference list.

4.3.3 Evaluation

The evaluation of the high-fidelity prototype took place at three different locations/situations and with three different test users. We met up with the three test users separately so that they would not influence each other. All tests were performed with the application on the mobile phone. One reason that we believe it was important to test the application on a mobile phone and in a natural setting was because of the problems that Leigh et al. (2002) encountered in their project Social Net (see section 2.1.2). Their study showed that people do not use all the features which can lead to problems, in their case, their test persons were introduced to the same person several times because they had not added each other as friends. Another reason was that we found it important that the users could get a feel for using the

application in its natural environment (Preece et al., 2002). Finally, the most important reason for why we wanted the application on the mobile phone was to let the users experience the feeling of the concept by having something concrete in their hands. We hoped that it would make it easier for them to see how it could be used, and when and how they would like to use it.

The aim of these last tests was to find out in what situation they would use it, would they use different profiles in different situations, and what kind of information were they interesting in seeing as well as reveal to others? By performing these tests with the application on the mobile phone we hoped to get deeper answers concerning these questions.

The user evaluation tests

The user evaluation tests of our high-fidelity prototype were performed by three of the four focus group members. We would have let all the users do the test but unfortunately Christina could not attend. The evaluation test was performed in three parts. First we let the test user play around with the application so that he or she would feel familiar and comfortable with it. Once this was done, the user was asked to perform a number of tasks in the application (see Appendix 3). The user now had to navigate through the different functions and find his, or her, own way without us helping. For some of the tasks we gave clear instructions where the user could find them, others they had to figure out for themselves. We did this to see if the icons were symbolic for the different menus as well as to investigate if the application was logic and easy to use and intuitive.

When the user had performed all the different tasks given, we discussed how it had felt to use it. We asked questions like: was this something that they would be interesting in using? When would they be using it? Would they use the different profiles? What kinds of information were they interested in seeing? When asked if there was any functionality that the test users were missing or if there was something that they did not think was of interest, most of the users thought that question was hard to answer after so little time with the application. It might have been better if we would have given them some more time with the application, maybe have sent a version that could be used on their computers so that they would be able to give some more feedback.

The very last thing that we did with our users after each test was to discuss possible names for the application. The name they liked the most was ReachOut. The reason that they liked it was because they believed that this is just what the application encourages you to do.

User test 1

Mikael who was the first to test the application was the most sceptical one to the idea of the application at the first focus group meeting. We therefore looked forward to hear his opinion now that he could see the application and try it out and thereby get a feel for it.

The test of the application took place at a restaurant in a busy area in Malmö. Here he was surrounded of different people moving around, in and out of his range. Since Mikael had been sceptical to the application before we were please to hear that now that he could see the application he actually believed in it. He confessed that when we first approached him and the others at the first focus group meeting he really did not see a use for it. However, now that he was able to play around with it he could see that he might actually like to use it, "It is such a difference hearing about an idea and then to hold it in your hand interacting with it".

Mikael liked being able to chose which profile to use, though he would probably only use the "Me & My Friends" profile, and the "Travel" profile. Even though Mikael now was positive towards using an application like this he still was not too interested in sharing much information with other people. The main thing he would use the application for he believed would be to see if his friends were close by, and what they were doing. He also liked that he could see his friends' friends. Regarding the "Travel" profile he thought that it would be a good way to find people to talk to if he some time where "stranded" on a buss station or somewhere similar. It could be a way to find out if there where anyone else waiting just like him who he could talk to. Furthermore Mikael thought that what the different icons represented was clear, and the application was easy to use.

User test 2

The second person to test the application was Hanna. Her test was performed at a café in central Lund. She had just as Mikael felt sceptical to the idea when she first introduced it. But now that she held it in her hand she as well believed that this was an application that she actually would use.

Hanna also believed that she primarily would use the "Me & My Friends" profile, but she could think of times when she would use the "ReachOut" profile, for example if

she was alone and wanted to read tips or see who else was around her, or the "Travel" profile if she was out travelling. She believed that it was essential that the information depended on the different situations you were in. If she was logged in to "Me & My Friends" she wanted to see more personal information about her friends. But if she was logged into "Reach Out" she thought that she mostly would be interested to see music tips. Hanna really liked the use of different profiles and would have liked to have even more. For example she missed a profile for going out, and another for work that was more professional. She would also have liked to have profiles within a profile, for example different travel profiles depending on if you were travelling with Sweden or if you were going abroad.

We had a discussion with her about being able to see the people around her on a presence map, like the one Cöster et al (2004) describes in MobiTip (see section 2.1.1). But after having discussing this she came to the conclusion that if people could see you on a map you would lose your anonymity and you could risk getting stalked or disturbed. The conclusion was that having you anonymity was more important than being able to see where people were. Hanna believed that as long as she could be promised that her identity was kept secret, she would be prepared to tell more about herself / share more information to strangers.

The most interesting thing with this evaluation test was that Hanna had been very firm in her opinion that she would only use the application if she had a very, very long inactive time before her. However, after having seen the application and gotten a feel for it she now said that she could use it if she had 10 minutes over when waiting for a friend or sitting on the train to Malmö. The reason that she changed her mind was that she was afraid that the system would become complicated and all actions would involve several steps. She now saw that application was easy to use and she also believed it to be logical, she completely changed her mind.

User test 3

The third person to test the application was Anna, and she like Hanna, performed her test at a busy café in central Lund (see figure 18). Unlike Mikael and Hanna, she had been quite positive to the idea of the application when we presented it the first time. Anna was the youngest in the focus group and we were curious to see if she would

use the application in similar ways as for example Mikael who was the oldest, and also if she would use it in similar situations or not.

The first thing that hit us when watching Anna play around with the application was that she got the hang of it faster than the others had. She understood right away what the different icons represented without having any explanations at all. When asked about how she primarily would use the application she said that she would see who of her friends that were online and also see liked the idea of being able to see her friends' friends. That way she could get hold of them even though she might not have their number. She could really see a use for the application in groups of friends who all had it. If all had the application on their mobile phones it would be easy for them to keep track of each other and meet up. She believed that younger people really would like this application. Not only to use within a group, but also to get to know new people.

When asked about which profiles she would use she said that she would almost only use "Me & My friends", but she liked to have the option to change to one of the others. Of she for example was logged in to the profile "Reach Out" she would primarily be looking for music tips. She also pointed out an interesting thing to us. The mood you were in influenced how open she was to other people and would therefore also affect the use of the application.

Figure 18. Anna testing the application at café in Lund.

4.4 Design process summary

As we said in chapter 3 we have worked according to the lifecycle model (Preece et al., 2002) when developing our application. We made three iterations through the

cycle before we finally emerged with and evaluated our final prototype, ReachOut. In this section we will summarize what has occurred in these iterations in order for the reader to get a good overview before we get to the discussion and conclusions of this thesis.

4.4.1 First Iteration

The first iteration started with a focus group meeting where we sat down with four users. Together with them we identified needs and established requirements. Even before the meeting we had an idea of an application that took advantage of people moving in and out of you range, and with this application you would make contact with these people and create new social links. However, when we presented our idea to the users we were met with scepticism. The critique given to the idea from the focus group was that they were already surrounded with information everywhere and did not need anymore. The idea with strangers being able to contact them did not appeal to them at all. After the first meeting we realised that we had to rethink our concept, or make it interesting to our users. We decided to take some from our original idea and combine it with the feedback given by our focus group. We decided to keep the main concept, that was to take advantage of different people moving around you, but changed the type of information that they shared, and also make different profiles for different situations.

At the second focus group meeting we let our focus group create low-fidelity prototypes. But before they started on the prototypes we had a brainstorming session which resulted in a list of different functions. They then choose the menu bar of their choice, and made some quick sketches of the menu bars, and wrote down which functions they wanted under which menu. After the meeting we sat down and analyzed the paper mock-ups. We could see that even if they had chosen different versions of the menu the content was more or less the same. Not only had they chosen the same main functions to appear in the menu, but they had also chosen to represent them with icons which also were very similar. The main functions were: Profile settings, Friends, Guestbook, Search and Sharing.

4.4.2 Second Iteration

The second iteration started with another focus group meeting. This time we let the users make the pages that you reached from the menu. Before they got started we had

a discussion about the list of functions that they had produced at the last meeting, as well as evaluated their low-fidelity prototypes from the last time. We hoped to get them thinking in the same tracks as they had then by doing this. Once they had finished on their prototypes we sat down with them and asked them about their choices. After the meeting we analyzed the outcome and made our own paper mock-ups with the inspiration from theirs. We ended up with two different versions. We then chose one of these that we made into a high-fidelity prototype.

4.4.3 Third Iteration

The third iteration concerned the production of a high-fidelity prototype. With the help of the low-fidelity prototype that we hade made from the ones made by our users, we developed a high-fidelity prototype in Macromedia Flash Lite 1.1, which we then let three out of four users test in a last user evaluation test. The important thing in this iteration was to take all our results and knowledge gained from earlier iterations, and incorporate these into a working application.

All the user tests were performed in an environment that benefited the applications qualities. One test was performed at a restaurant in a busy area of Malmö and two tests were performed at a café in central Lund. Before doing the final user evaluation tests, two of the testers were still very sceptical. But after they had played with ReachOut for a while, they surprisingly said that they could actually see themselves use such an application. It was very interesting, and educational, to see what a difference a high-fidelity prototype tested in its natural environment can affect peoples' opinion about the application.

5. Discussion

The ethnographic studies made in the projects TravelBuddy and MobTune (see section 3.2), which were the inspiration for this study, hinted that different situations influence how willing people are towards sharing information, as well as what they are prepared to share. During this thesis we have tried to gain deeper insights in this phenomenon with the help of a focus group. With the focus group we have discussed questions concerning these areas, and they have also been involved in the development of an application that implemented a concept that builds on their attitudes towards the phenomenon. In this chapter we will discuss how we through this project have gained deeper insight concerning our stated problem for this thesis and which these insights are.

When we tried to get an understanding for when / in what situations people would want to share information through their mobile phones the amount of inactive time proved to be of big relevance to our focus group. If people knew that they only were going to travel a short distance or having to wait for a friend for only a couple of minutes, they did not find it necessary to have an application to entertain them while waiting, according to our focus group. However, the length of this inactive time changed during the time period that we had contact with the group. In the beginning the users could not see themselves use the application if they did not have a longer period of inactive time, at the very least 30 minutes. When they tested ReachOut they changed their minds and felt that they might even use the application when only being inactive for approximately 5 or 10 minutes. This was something that we found very interesting. What changed their minds we are not sure of, but it might have been the fact that they got used to the idea of the application. We asked them to throughout the project think about the application outside the meetings, and try to see when they would like to use it. So, when for example travelling the short distance between Lund and Malmö, they thought about the application and what they could have done with it at that moment. Hanna for example told us that when she was going home from work one night she took up her mobile phone to create a distance between her and the other people travelling on the train. Her first thought had been that it would have been fun to have the ReachOut application on her mobile phone so that she could entertain herself with looking at music tips etc. Hearing this from Hanna who had been very sceptical before seeing the high-fidelity prototype renewed our belief in

ReachOut. Another reason that we believed they changed their attitude was that they now had had the opportunity to see and use the application. It is one thing to imagine using an application and another one actually using it. Also, if people would start to use the application it is not unlikely that the time period would lessen ever further. The use of the application might also change. Our users believed that they only would use the application for seeing and contacting their friends. But if ReachOut would become a reality that people downloaded to their mobile phones, they might start to interact with strangers as well, or at the very least search for tips, music, etc. These theories are something that we wish we had the resources to confirm. Unfortunately we did not have the knowledge or the time to do this.

Yun-Maw Cheng, Wai Yu and Tzu-Chuan Chou's (2005) article "*Life is Sharable: Blogging Life Experience with RFID, Embedded Mobile Phones*", and our previous studies in the MobTune (Abdulla et al, 2006) and TravelBuddy (Ivkovic et al, 2005, Internet) projects showed that our interest differs in different situations (see section 2.1.1), and this was something that also our focus group could relate to. When we are at home we might not have time for as many interests as we have as when we are out travelling. When we are out travelling we are also more open to meeting new people as the TravelBuddy project showed. Therefore, it is not only the time period of inactive time that influence the willingness to exchange information, the situation is just as important. Mikael in our user group said that when he was travelling between the university and home he had usually been stressed all day and just wanted to relax. But, if he would travel between two cities in Thailand it would be another thing, because then he would feel relaxed since he is on holiday.

At the user evaluation tests, Anna said that another thing that influence when she might feel like exchanging information with others is the mood that she is in. If she is tired after a long day of school, most of us don not want to interact with strangers, but only with friends and family.

Our study has shown that even though all the above reasons are very important to the willingness to share information, it is just as important who you are going to share this information with, which highly affects what kind of information you want to share with others. These things are supported by the articles concerning "willingness to share information" (see section 2.1.3).

We found it interesting that a lot of people are not afraid to open up their life to strangers on the Internet; but opening up their lives to stranger through their mobile phones is found intimidating. We believed that this was an interesting phenomenon and started to ask ourselves, and our focus group why it was so. What makes us more willing to open up our lives to strangers on a computer than on our mobile phones? We came to the conclusion that it is because the possibility to remain anonymous is greater with the Internet than when using a mobile phone.

In ReachOut we have tried to solve the anonymity problem with the use of profiles. With profiles we were able to let our users decide how personal the information that they share should be. The only information that is mandatory is their nickname. We let our users remain anonymous if this is what they want, or they can tell more about themselves. Our users said that if the possibility to remain anonymous when having contact with strangers they would feel more secure and share more personal information, which Bounds et al. (Internet) research confirmed. In contrast to this, the users in Hansson and Skog's (Internet) project LoveBomb wanted to be less anonymous which we found interesting. When discussing why this was, we came to the conclusion that if you are too anonymous you limit the possibility for social interaction because you do not know anything about each other. But some anonymity can facilitate users' interaction with others, or increase the will to share more information. Hanna said that if she could be assured that she would remain anonymous she would be prepared to share more personal information with others. She felt that she could feel more secure, not having to worry about people knowing who she is, or being able to make contact with her directly. Our study showed that it must be up to the user to decide the degree anonymity. A problem with anonymity that our users ventilated was that they were worried that others would lie about their own information since you would not be able to validate it.

Through our study we have found out that the information that our users would find interesting to share were mainly tips from other people. The tips that they wanted were place related tips, music tips, travel tips, etc. Our users primarily wanted to share tips with their friends, because then they could put the tip in perspective to other things that this person liked. The reason for this was that if they did not know the person, the tip did not have the same value. When being in an unfamiliar place or when having a lot of spare time, they would also find it interesting to be able to see

others as well. In such a situation, if they could find out a little about the person sharing tips with them, they would also be interested in sharing with strangers.

Besides tips, they wanted to share some more personal information with their friends. By this we mean seeing birthdays, your real name, telephone number etc. In addition to sharing information with people they also wanted to be able to leave messages in their friends' guestbook, send them BlueText messages, and see what their friends are currently doing.

6. Conclusion

The purpose has been to study if there are situations or surroundings where people are more inclined to exchange information with others, what kind of information this might be, and how to integrate this with a social focus. By developing an application with the user centred strategy we have tried to answer these questions:

- When/ In what situations are people interested in exchanging information with others by means of their mobile phones?
- And what kinds of information are they interested in sharing for personal reasons?

These are our conclusions made from our study:

- We have come to the conclusion that peoples willingness to share information through their mobile phones with others is highly influenced by the situation that they are in, the mood people are in, who they are sharing information with, and degree of anonymity. These things also influence the type of information that people are willing to share for personal reasons.

- The type of information that people are willing to share with friends for personal reason on their mobile phones differs from the information that they want to share with strangers. If the degree of anonymity is higher, they are nevertheless more willing to share more personal information with strangers.

- The kind of information that they are most interested in for personal reasons are: music tips, tips about different places, and being able to see their friends current activity.

- It is important that the owner of the information can control the shared information.

- People are primarily interested in sharing information on their mobile phones with their friends, but in some situation they are also willing to share information with strangers. Situations that people are open to strangers are

highly related to longer periods of inactive time. This time period differs depending how easy the application is to use, and the mood they are in.

7. Future work

Because we chose to delimit this thesis we have left some for future work. Since ReachOut is not a complete product there are some things that can be further developed and researched.

- Finish the work with ReachOut and make further user tests in different situations and surroundings

- Look further into what influence our willingness to share information in different situations from other perspectives, for example from a psychological perspective

- Look further into the information that we are willing to share, what influence our choice of information besides the people we are sharing it with?

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To read this article contact the institution of Informatics at Lund University

Prototype Link

http://www.student.lu.se/~ped01cad/ReachOut/ReachOut.html

Appendix 1 - Focus group meeting 1

By asking questions surrounding this topic and through the use of scenarios we found out that they did not want to share too personal information. The reason was that they wanted to remain anonymous to the people they did not know prior. However, they were willing to share their first name, age, nationality/region they were from, and interests. They all felt that sharing interests did not say much about the person in question, and are not always of interest. In order for it to be of any value it has to give an idea of the person's personality. During the discussion about what kind of information they would like to share about themselves, the question about accurate information emerged. Mikael, 38, said *"I think it would be fun to say that I was a hockey player that likes to knit, just to see how the people around me would react. At the same time I would not like to be fooled by others, I want to know that the information is accurate"*.

To the question if they were interested in interacting with the people around them they were not that interested in communicating with strangers. They were however interested in interacting with their friends. They were worried that all the information and people trying to make contact with them would overwhelm them. One possibility to this problem would be to choose when to be available and also to be able to block people they did not want to contact them. This would also protect them from harassments.

When we asked in which situations they would like to share information with others, we found out that the longer period of time that they were inactive the more inclined they would be to find out information about others. In everyday situations where the time period of inactivity is short they were not interested in sharing information. The reason for this is that they believe that they have too much information around them already and would prefer to filter some of it away. They also believed that it would not be worth the effort to edit the information about themselves if they only would use the application for a shorter period of time. This led the discussion to using different profiles. Here you could have an "everyday" profile that enabled you to "disappear" and become unavailable for interaction. They would also like to use a "just for now" profile where they could have information that was dependent on their current situation or location. If for example on a train to Stockholm to go to a concert they

would be interested in seeing information about the other passengers on the train also going to the same concert.

They first thought that it would be preferable to have the application on a separate device that they could choose when to bring with them. But, after further discussion, they realized that it would be of more convenience to have the application on their mobile phones which they always carry with them. It was however very important the application was easy and quick to use. They would also like to be able to choose how large area they would have in range.

The discussion continued when we asked about what kind of information they were interested in, in different situations. We here found out that they were more interested to find out information about different places than about people. Hanna, 26, said *"I would like to see information about when a restaurant is open and also rating of different things, for example food or movies"*. The others agreed with her. Mikael however would like to know more than just a rating, he would like to see a persons top 3 so that he could see what else they liked to see if they had similar taste. For him, this would be more valuable.

The people that they were most interested in viewing and being able to contact were people they already know. They would like to see if their friends are in the area, but also here they want to have the option to be invisible.

The meeting ended with a discussion that people of different ages are likely to be interested in different things, and more or less inclined to interact with unfamiliar people. The group believed that teenagers would like to search for boys, and girls, chat, find new music, download logos, etc.

Appendix 2- Functions from focus group meeting 2

- tips
    - music
    - shopping
    - events

- who are nearby and logged on

- block people

- make yourself invisible

- add/delete friends
    - on the mobile phone, only people nearby
    - on the computer, so that you can see everybody using the service, even if they are offline or out of range

- send messages
    - person online, message is sent free of charge by means of Bluetooth
    - person offline, if you have asset to his/her mobile phone number, message is sent as a normal SMS

- guestbook

- search function

- see information linked to/saved to a place, like tips about the food on a particular restaurant

- edit your information

- share information/stuff
    - pictures
    - music
    - games

- show/do not show your photo

- log in

- choose profile

- way finder

more?

Appendix 3 - Test scenario

1. Logga in på profilen ”Me & My friends”
2. Kolla vilka som finns med bland dina vänner
3. Välj Lotta för att se ytterligare information
4. Skriv något i Lottas guestbook
5. Gå in i din guestbook
6. Radera meddelandet från Token
7. Gå in på sök
8. Sök efter valfritt Nickname
9. Sök efter telefonnummer 0706-666 666
10. Blockera Pelle
11. Gå in på MyProfile
12. Byt till profilen ”Reach Out”
13. Gå in och titta på dina vänner igen
14. Gå in på Lotta igen
15. Gör dig osynlig
16. Gå in på MySharing
17. Gå in på Travel och se vad du har
18. Back ur igen
19. Gå in i Music
20. Lägg till en låt
21. Gör dig synlig igen